Pak. J. Bot., 57(2): DOI: http://dx.doi.org/10.30848/PJB2025-2(7)

FLORISTIC AND QUANTITATIVE ETHNOBOTANICAL EXPLORATION OF DARAL VALLEY, SWAT

MAROOF SHAH[1], HASSAN SHER[1], HAIDAR ALI[1*], BOB ALLKIN[2] AND TIZIANA A. COSSU[2]

[1]Center for Plant Sciences and Biodiversity, University of Swat, Pakistan
[2]Royal Botanic Gardens Kew, Surrey, London, UK
Corresponding author's email: maroofbotanist@gmail.com, haidar@uswat.edu.pk

Abstract

Floral diversity is facing direct threat not only due to climate change, but various unsustainable use practices are also responsible for the depletion. Daral valley Swat is not an exception. This area was selected based on its remote location and high altitudinal range i.e. starting from the moist temperate region at 1400 m asl up to the alpine region at 5001 m asl. This research was conducted to assess the floristic composition and quantitative ethnobotanical aspects in the study area. In total of 381 plant species belonging to 81 families were identified. Asteraceae is the largest family with 46 species (12.07%), followed by Rosaceae with 28 species (7.34%), and Lamiaceae with 22 species (5.77%). The dominant habit was recorded as perennial herbs (70%), followed by 29 % annual herbs. Life form was recorded having dominance of Therophytes (141 spp., 37%), followed by Hemicryptophytes (100 spp., 26%), and Geophytes (51 spp., 13%). Semi-structured questionnaires and interviews were used to collect quantitative ethnobotanical use data. Of the total 381 species, 252 (66.14%), were used ethnobotanically. Out of these,195 spp. (77%) were used as traditional medicine by the inhabitants of the local communities, while 57 spp. (23%) were used for socioeconomic purposes. The collected data was evaluated using various indices viz., Relative Frequency Citation (RFC), Ethnobotanical Use Value (UV) and Fidelity Level (FL). *Lepidium ruderale* L. had the highest RFC i.e. 0.7741, *Primula denticulata* Sm. had the highest UV i.e. 0.8387, while the highest FL was that of *Salvia hains* Royle ex Bentham (98.48). The current research has reported new ethnobotanical uses for the first time for 96 plant spp. (38%) from the study area. It is concluded that the population of the study area still have sufficient knowledge of ethno-medicinal uses.

Key words: Floristic studies, Novel uses, Quantitative ethnobotany, RFC, UV, FL.

Introduction

Humans have been using plants ever since the beginning of civilization and a knowledge base has been developed over time through trial and error (Stojanoski, 1999). This knowledge base has been developed into the modern healthcare system, which is available in urban areas and some of the far-flung rural areas around the world are still devoid of these modern healthcare systems (Qadir *et al.,* 2023). And even today the indigenous communities of these rural mountainous areas are comparatively more dependent directly on plants for their various livelihood needs, especially for use as medicine, because of the unavailability of modern healthcare facilities in their vicinities (Gul *et al.,* 2012; Sarwat *et al.,* 2012; Khan *et al.,* 2012). Similarly, wild plants with medicinal potential are nowadays used to treat various ailments and are particularly ratified to be effective for chronic conditions for which modern pharmaceutical drugs have proved to be ineffective (Pieroni *et al.,* 2002). These plants and plant-based products are also a rich source of nutrition (Pieroni *et al.,* 2002; Ansari *et al.,* 2005; Balemie *et al.,* 2006; Della *et al.,* 2006). Medicinal plants are used in plant-based pharmaceuticals to prepare herbal recipes, which have been proved as best treatments for common human diseases (Alam *et al.,* 2023; Ali, 2003; Ali & Qaiser, 2009; Ali *et al.,* 2012). It is a common perception that in the traditional healthcare system, medicinal plant products serve primarily as "preventative" medicines, which improve the nutrition and well-being of individuals by helping them avoid illness. About 80% of the marginalized people in Pakistan reside in remote and urban areas, and they depend on plant based indigenous traditional knowledge and folklore methods for curing most of their diseases (Malik *et al.,* 2010). Factors leading to greater dependence on plants and a wider diversity of plants in use for medical reasons in hilly areas includes the isolation from cities, the level of poverty, the lack of awareness, communication and availability of hospital facilities (Gul *et al.,* 2012). Therefore, these people are directly dependent on plant resources, particularly medicinal and aromatic plants (Gul *et al.,* 2012; Sarwat *et al.,* 2012).

The extreme levels of altitudinal variation i.e., starting from the sea level up to the summits of K2 (second highest peak), has caused the existence of different climatic zones in Pakistan. This altitudinal gradient and different edaphic factors have made the availability of rich biodiversity. It is estimated that a total of about 6000 plant species are found in the country out of which about 400-600 are considered medicinally significant (Shinwari, 2010). The Northern Areas of Pakistan are rich in plant diversity (Ali *et al.,* 2011). Due to the difference in climatic and edaphic conditions diverse plant species are found in different localities and based on this variance the indigenous knowledge is developed differently from place to place (Khan *et al.,* 2020). However, many parts of the country are still unexplored due to the inaccessibility and need to be explored due to incomplete documentation of medicinal plant potential (Sher *et al.,* 2014). Similarly, many researchers have reported the ethnomedicinal uses of plants in different regions of Khyber Pakhtunkhwa (Dastagir & Abbasi, 2004; Hamayun *et al*., 2005; Hussain *et al*., 2006; Ullah *et al*., 2006; Khan & Khatoon, 2008; Hussain *et al*., 2008; Abbasi *et al*., 2009; 2010a; 2010b; Qurashi *et al*., 2009a and 2009b), however, they did not mention the source of identification, voucher specimens were not

collected or it has not been mentioned where the voucher specimens were deposited. Their efforts to accurately identify the medicinal flora of the area have been rendered insignificant by the non-availability of voucher specimens.

Swat has rich medicinal plants diversity that is used for a wide range of health and nutritional issues, especially as practiced in mountain communities (Sher *et al.*, 2015). According to Sher *et al*., (2014), 127 high-value plants with aromatic and medicinal properties contribute to a country's economy. Although Swat District is located in the northern areas, and represents a typical Hindu Kush flora, however, in some parts it is influenced by the Himalaya and Karakoram ranges. Because of this unique location, Swat Valley has rich floral diversity. Unfortunately, flora in general and medicinal plants in particular are under tremendous anthropogenic pressure (Shinwari & Khan, 2000; Arshad & Akram, 1999; Durrani & Hussain, 2003; Gilani *et al*., 2003; Hamayun 2005; Ali & Qaiser; 2009; Abbasi *et al*., 2010a; 2010b; 2012; Ajaib *et al*., 2010; Noor & Kalsoom, 2011).

Native communities of the mountain regions in Swat valley depend on plant resources for their sustenance (Akhtar *et al.*, 2013). Elderly people seem to have more traditional knowledge, yet when they age, this priceless knowledge may be lost forever (Akhtar *et al.*, 2013). Due to unplanned urbanization, population explosion, unsustainable plant use and climate change, the available plant resources are being depleted at an unprecedented rate (Jarvis *et al.*, 2010).

The current research hypothesized that the indigenous people living in remote areas of the study area have sufficient medicinal and socioeconomic knowledge of plant species present. In this context it is very imperative that the indigenous knowledge of these mountain communities be scientifically assessed and documented before it is lost forever. Therefore, this study was planned to document the indigenous knowledge about the use of plants in the study area.

Material and Methods

Study area: Daral Valley is situated in northwest of Swat district, Hindu Kush Mountain range (Fig. 1). The valley ranges from 1500 m of Chambargahai, the highest mountain of the study area, i.e., 5001 m above sea level, and is located in 33º 19′ to 36º 46′ N latitudes and 70º 10 ′ to 72º 30′ E longitudes (Sher *et al.*, 2012). The valley consists of ten large villages and twelve small hamlets, with approximately 15000 inhabitants (Sher *et al.*, 2012). Due to its location amidst the high mountains, the valley receives little to no monsoon rainfall, which has a huge impact on biodiversity. During the winter and spring, precipitation is mostly in the form of snow having alpine, sub-alpine and dry temperate vegetation (Champion *et al.*, 1965). The characteristics feature of the valley is Daral Lake which is located at 3502 m on the upper western reaches of Bahrain, and on the foothills of Spinsar and northeast of Saidgai Lake. Melting mountain glaciers are the source of Daral Khwar, a tributary of the Swat River. Daral Lake is accessible only in summer, the trails leading to the lake are closed due to heavy snowfall in winter (Sher *et al.*, 2012).

Phytogeographically, the study area comes under the Sino-Japanese region having a number of endemic, medicinal and aromatic plants (Ali & Qaiser, 1986). The valley vegetation is subjected to extreme biotic stress with terrace agriculture and overgrazing (Sher *et al.*, 2012).

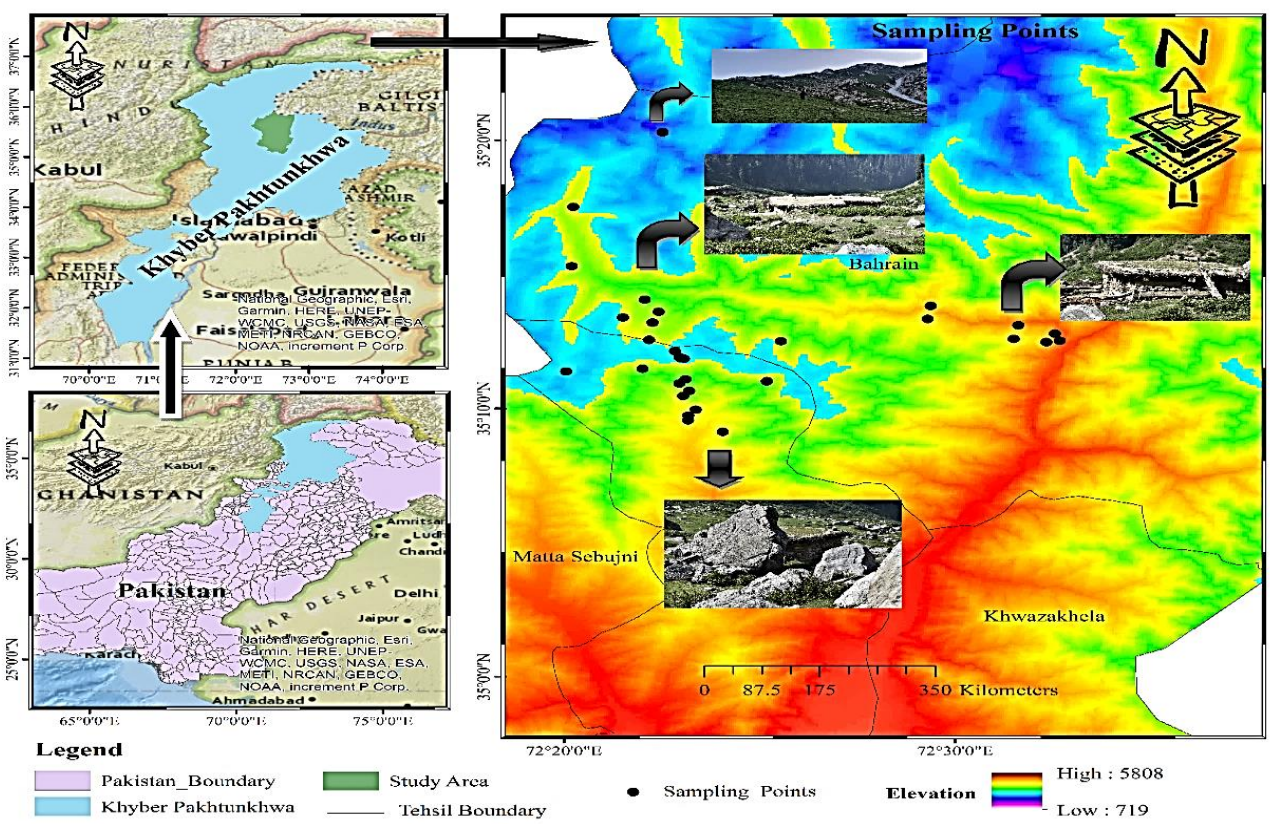

Fig. 1. Map of the study area and sampling points of data collection.

Field work and plant collection: Ethnobotanical studies were carried out for three consecutive years (2019-2021) starting from the early spring up to the end of flowering and fruiting season in the mountain communities of Daral Valley, Swat district, Khyber Pakhtunkhwa, Pakistan. Guided visits were conducted in the study area, where extensive plant species were collected. The medicinal plant species collected were then pressed in rough newspaper and blotting paper and properly dried. The blotting papers were regularly changed to get the specimen properly dry. Cold treatment and naphthalene were used to protect specimens from the attacks of fungi and bacteria. The dried and correctly pressed specimens were placed with adhesive tape & glue on the regular herbarium sheet according to Hassan *et al*., (2019) and deposited to the herbarium University of Swat (SWAT). However, duplicates were also deposited in other herbaria like Karachi University Herbarium (KUH) and the world's largest herbarium at KEW (K). The plant specimens were identified by following the Flora of Pakistan and other regional Floras and Plants of World Online (POWO), Plants of the World Online | Kew Science.

Quantitative ethnobotanical data collection: Semi-structured questionnaires (may be obtained from MS) and interviews were used to collect ethnobotanical data. Similarly, focused group discussions were conducted among the local communities to document ethnobotanical information. Prior consent was sought, and informants were given the assurance that the information they provided would only be utilized for research purposes. Elders (males & females) and other knowledgeable people in the area were interviewed, according to Ahmad *et al*. (2014); Qureshi & Bhatti (2008) and Qureshi *et al*., (2009a; 2009b).

Analysis: The quantitative ethnobotanical data was evaluated using Relative frequency citation (RFC), Use value (UV) and Fidelity level (FL) following (Phillips & Gentry, 1994). RFC indicates the importance of each species and is calculated based on FC, whereas Frequency of Citation indicated the Number of informants mentioning the use of species.

$$RFCs = FCs / n \quad \text{---------- Equation I}$$

The frequency citation value is divided by the total number of informants participating in the field study (n) without considering the use category.

$$UV = \sum Ui / n \quad \text{---------- Equation II}$$

where, Ui indicates the number of uses mentioned by the informants, where (n) is the total number of informants interviewed.

$$FL\ \% = (Np / n) \times 100 \quad \text{---------- Equation III}$$

where, Np is the number of informants reporting the ethnobotanical use of a plant species.

Results and Discussion

Floristic composition: A total of 30 localities were thoroughly studied for three consecutive years and a total of 3500 plant specimens were collected. These localities were identified based on altitudinal variation and habitat variability. A total of 381 taxa were identified belonging with 81 families. The dominant habit was perennial herbs (220, 66%), followed by annual herbs with 110 spp. (33 %), shrubs with 28 spp. (07%), trees with 19 spp., (05%), while biennial herbs were 4, (1%) (Fig. 2). Therefore, the vegetation in the study area is categorized as herbaceous, which strongly specifies short growing season, cold harsh environment, with thick snow layer (Tasser & Tappeiner, 2002). Ijaz *et al.* (2016) also mentioned herbaceous habit as the leading habit from Bajaur agency. Asteraceae was the leading family with 46 species, followed by Rosaceae with 28 species, Lamiaceae with 22 species, Ranunculaceae with 20 species, Poaceae with 17 species, Apiaceae with 14 species, Polygonaceae & Caryophyllaceae 13 species each, Primulaceae 12 species, Plantaginaceae 11 species (Fig. 2). Asteraceae is reported as the leading family with 46 species in the study area, which is also the leading family in the Flora of Pakistan (Ammad & Haq, 2023). Members of Asteraceae family were also found in Lower Dir (Badshah *et al.*, 2013). The Parallel results were also reported by Khattak *et al*., (2015) in Karak, Pakistan, and Hassan *et al*. (2015) in Malakand, Pakistan, who also reported Asteraceae as a dominant family while Khan *et al*., (2015) in Kabal Swat, Pakistan, observed Lamiaceae as the dominant family. However, Lamiaceae is the third largest family in our study area.

Life form: A total of eight different life forms were recorded having dominance of Therophytes (141 spp., 37%), followed by Hemicryptophytes (100 spp., 26%), Geophytes (51 spp., 13%), Chamaephytes (36 spp., 10%), Phanerophytes (28, 07%), Megaphanerophytes (20 spp., 05%), Lianas (03 spp., 1%) and Hydrophyte (02 spp., 1%) (Fig. 3). Vegetation of the study area was dominated by Therophytes (141 spp., 37%), followed by Hemicryptophytes (100 spp., 28.6%). This indicates that vegetation of the study area is moist temperate. Similarly, Sher *et al*., (2012) observed Therophytes as the leading life form in Lalko Swat, Pakistan.

Leaf size spectra: In leaf size spectrum the Microphyll dominated the study area with 174 spp. (46%), followed by Nanophyll with 98 spp. (26%), Mesophyll 72 spp. (19%), Leptophyll 33 spp. (08%), and Megaphyll 4 spp. (1%) (Fig. 4). Furthermore, two species of *Equisetum* were found Aphyllous. The taxa with Microphylls leaves were rich due to ecological deviation and showed the percentage of different leaf form classes varied with increasing elevation. Leaf size spectrum plays a vital role in various physiological processes of plants, which results in characterization of various types of plant communities (Oosting, 1956; Oosting & Hess, 1956). Since, the study area is dominated by Microphyll with 174 spp. (46%), followed by Nanophyll with 98 spp. (26%), Mesophyll (72 spp., 19%) and Leptophyll (33 spp., 08%) therefore, the vegetation may be categorized as steppe. The biological spectrum is the comparative proportion of different life forms for a specific region (Raunkiaer, 1934; Sher *et al*., 2012; Auda, 2023). According to Asmus (1990), the life-form spectra were considered to be the indicator of micro and macro climates.

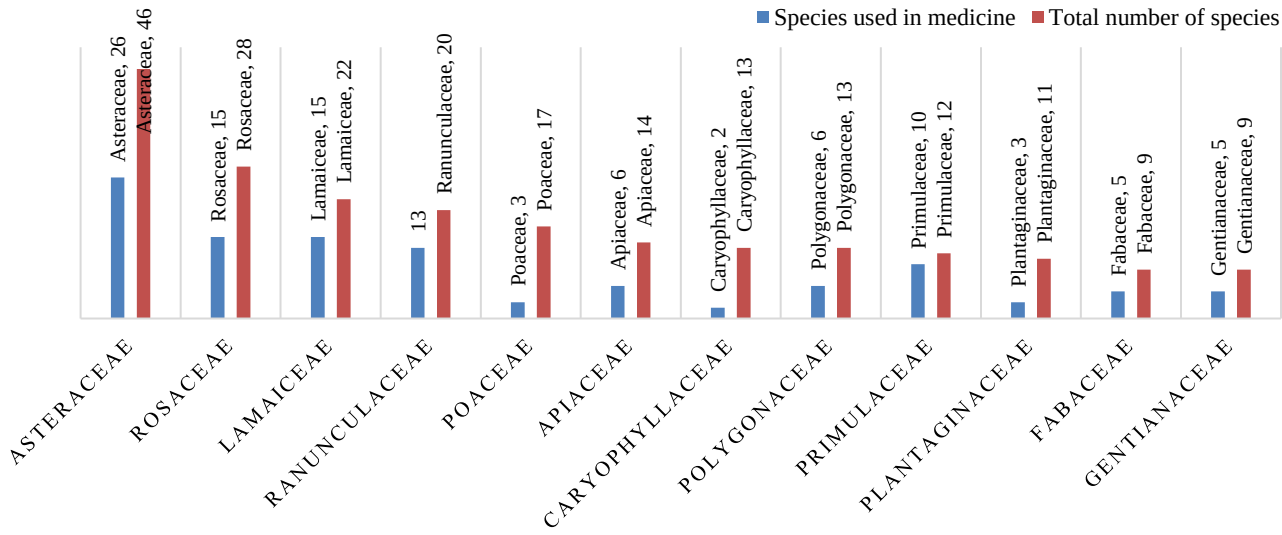

Fig. 2. Total number of species reported from each family and the number of species reported for medicinal use.

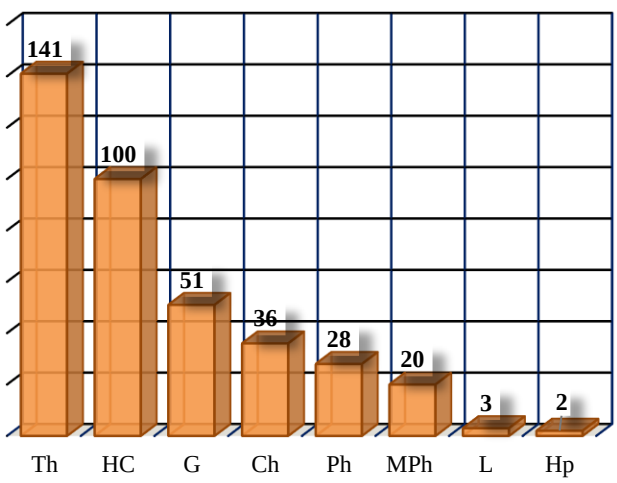

Fig. 3. Life form of the flora recorded from Daral Valley, Th = Therophyte, HC = Hemicryptophyte, G = Geophyte, Ch = Chamaephyte, Ph = Phanerophyte, MPh = Megaphanerophyte, L = lianas & Hp = Hydrophyte.

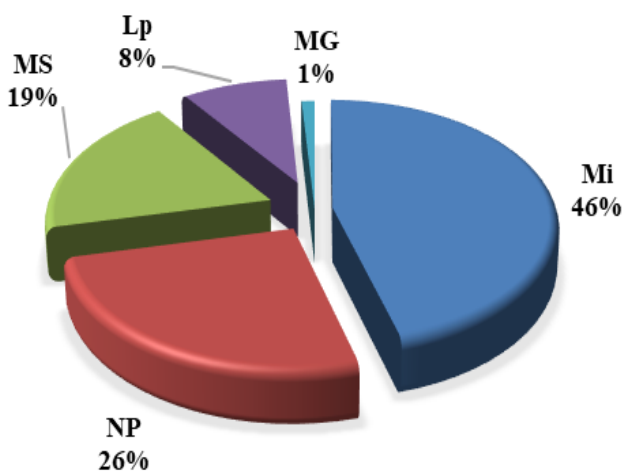

Fig. 4. Different Leaf Size Spectra flora, documented from Daral Valley, Mi = Microphyll, Np = Nanophyll, Ms = Mesophyll, Lp = Leptophyll, Mg = Megaphyll.

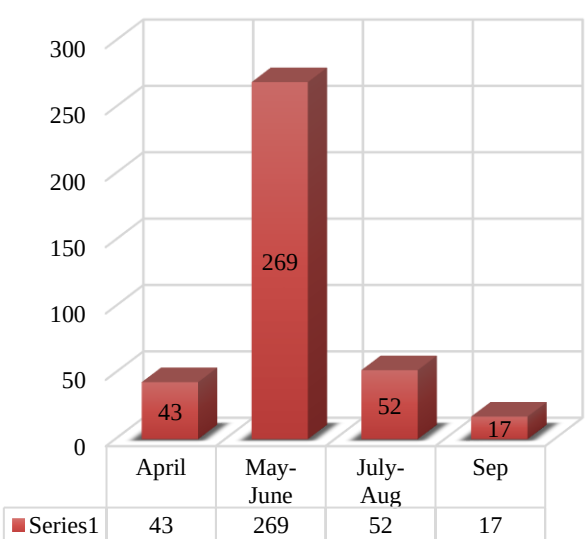

Fig. 5. Phenology of the flora recorded from Daral Valley.

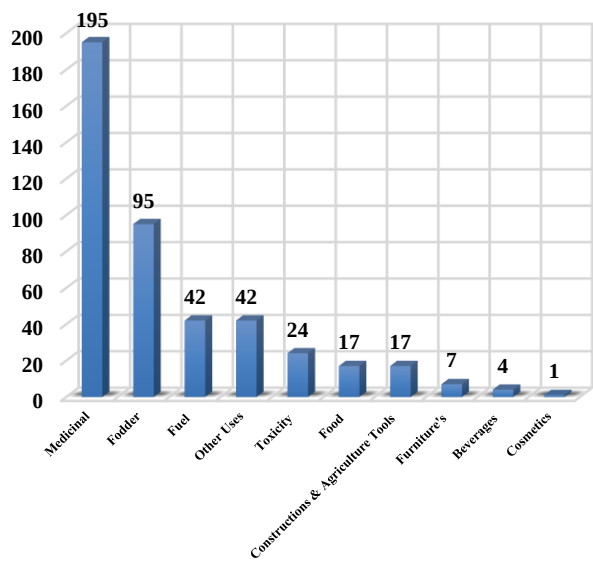

Fig. 6. Ethnobotanical and socioeconomic knowledge of the flora recorded from Daral Valley.

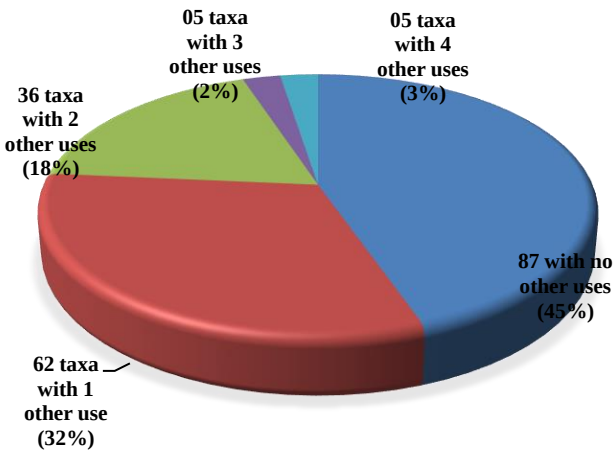

Fig. 7. Ethnobotanical and socioeconomic knowledge of the flora recorded from Daral Valley.

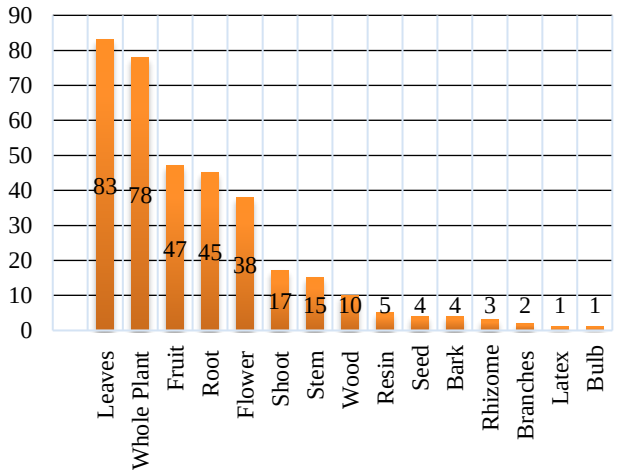

Fig. 8. Different parts used of medicinal plants, recorded from Daral Valley.

Phenological status: The flowering statistics showed that May-June are the highest seasons because spring begins late, with about 269 spp. (71%) had flowers, followed by July-August with 52 spp., (14%) flowers. In April, flowering was observed in 43 spp. (11%), followed by September, where 17 spp. (4%), in flowering stages (Fig. 5). Moreover, the rest of year most of the area was covered with snow and severe cold; therefore, no flowers and fruits were observed throughout the year. Vegetation and floristic phenology of a given area is highly sensitive to the climate change (Rosenzweig *et al.*, 2007). In this study, flowering in 269 spp. (71%) were observed during May to June, followed by July to August with 52 spp. (14%). The abscission of leaves in the present study area occurs during October and November, while seeds are shed during November and December which germinate during in June and onward. In general, the blooming season of plants in Daral valley is from June to August which is in agreement with the findings of Shrestha *et al.*, 1998, also documented the blooming period from May to August in Kavrepalanchok, Nepal. Based on the above-mentioned fasts, it is assumed that the phenological period and weather are dependent upon other ecological factors including temperature, photoperiod and precipitation (Marqueus *et al.*, 2004). In our study area, the plant species bred, matured, were blossoming and fruiting in the warm and damp season, therefore phenological exploration is effective to know the ecosystem health, seasonal diversity among the plants, and forest management (Ide & Oguma, 2010).

Medicinal uses: These plants were reported to be used for different ethnobotanical categories, i.e., medicine, beverages, food, cosmetics, fodder, toxicity, fuel, furniture, agricultural tools and other uses. Out of these 195 spp. (77%), were used as traditional Medicine by the inhabitants of the local communities, while 57 spp. (23%) were used for socioeconomic purposes. In addition, the results showed that 87 spp. (45%) were purely used for the cure of different aliments, followed by 62 spp. (32%), used as a medicine as and for socioeconomical purposes (Figs. 6 & 7). In contrast, 5 species (3 %) have been utilized by the inhabitants for two categories, while 5 spp., (3%) have been utilized for three categories and 5 spp., (2%) for four categories (socioeconomically along with medicinal) as depicted in Fig. 7. The current research has reported for the first time 96 plant spp. (38%) having new ethnobotanical uses recorded for plants from Daral Valley Swat. The previously recorded (156 spp., 62%) ethnobotanical uses are also known from other parts of Swat, indicating the authenticity of these medicinal plants (Table 1). Moreover, male informants (66 %) while female informants (34%) show that males have more ethnobotanical knowledge than females. The use of plants to combat diseases dates back to ancient times (Ali & Qaiser, 2009; Mushtaq *et al.*, 2024). In mountainous regions, this practice serves as a fundamental health resource (Sher *et al.*, 2015). Various authors have documented the medicinal use of plants for treating different diseases in different parts of District Swat (Ali & Qaiser, 2009; Sher *et al.*, 2015). Some of the common medicinal plants of Daral valley are *Tussilago farfara* L. (Fig. 9), *Bergenia stracheyi* (Hook. f. & Thomson) Engl. (Fig. 10), *Salvia hains* Royle ex Bentham (Fig. 11), *Dioscorea deltoidea* Wall. ex Griseb. (Fig. 12), *Aconitum heterophyllum* Wallex Royle (Fig. 13), *Viola biflora* L. (Fig. 14), *Paeonia emodi* Royle (Fig. 15), *Primula denticulata* Sm. (Fig. 16), *Rhododendron anthopogon* D. Don (Fig. 17), *Viburnum grandiflorum* Wall. ex DC. (Fig. 18) and *Bistorta affinis* (D.Don) Greene (Fig. 19).

Part used: Different parts of the plants were used to treat different diseases. Among these leaves were the most abundantly used part i.e. 83 spp. (24%). Followed by whole plants with 78 spp. (22%). Similarly, fruits of 47 spp. (13%) were used, whereas, roots of 45 spp. (13%), flowers of 38 spp. (11%), shoots of 17 spp. (5%), stem of 15 spp. (4%) and wood of 10 spp. (3%) were used (Fig. 8). These findings are in line with previous research conducted in various parts of Swat, where leaves are often cited as the most commonly used part of medicinal plants (Sher *et al.*, 2020).

Cross-culture studies in relation with plant use: People living in the study area comprised of three different communities: the "Zayee Khalak" (landowners), "Shpankiyan" (nomads) and "Karayadar" (tenants). Linguistically, the landowners speak Pashto and Kohistani, the nomads speak Gujro, whereas the tenants speak different languages viz. Pashto, Urdu, Kohistani and Kalami. The landowners used the highest number of species i.e., 188 (46%) followed by nomads 152 species (37%), while 72 species (17%) were used by tenants of the study area (Fig. 20).

Table 1. Quantitative ethnobotanical indices of the flora recorded in Daral Valley Swat along with references codes and novel uses recorded from the study area.

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
1.	*Abies pindrow* (Royle ex D. Don) Royle	Timbers: Furniture: Fuel: Construction and Agriculture	Aachar	Wd	95	0.61	75	0.48	83	91	91.21	15, 38, 17
2.	*Aconitum heterophyllum* Wall. ex Royle	Tonic for adult: Carb & Snake bite poisoning: Intestinal fever: Reduce fever associated with inflammation: Bad Evils of eyes: Toxicity	Gharzahar: Sarbawala	Lv: Rt	81	0.52	95	0.61	70	98	71.43	26, 31, 3, 45, 7, 36, 2, 14, 36, 14
3.	*Aconitum rotundifolium* Kar. & Kir.	Tonic for adult: Carb & Snake bite poisoning: Intestinal fever: Reduce fever associated with inflammation: Toxicity	Gharzahar	Lv: Rt	17	0.11	25	0.16	6	17	35.29	14
4.	*Aconitum violaceum* Jacquem. ex Stapf	Arthritis: Tonic for male: Arthritis: gout: Swelling: Body pain: Intestinal worm: Paralysis: Toxicity	Gharzahar	Lv: Rt	110	0.71	73	0.47	63	86	73.26	6, 37, 6, 26, 33, 35, 41, 26, 7, 20, 8, 35, 36, 38, 14, 9
5.	*Acorus calamus* L.	Remove gas from abdomen: Abdominal Pain: Treat to weak digestive system: Indigestion: Chronic wound: Arthritis: Tape worm: Heart & lungs disorders, Fodder	Skhawaja	Wp	86	0.55	99	0.64	79	99	79.80	6, 15, 11, 3, 31,29, 33, 35,12, 13, 16, 7, 40, 18, 20, 34, 26, 36, 38, 36, 9, 2
6.	*Adiantum capillus-veneris* L.	Treat white discharge: Poisoning fever: Bleedings and burns: The grinded powder form mixes with tea for easy cash	Sumbal	Wp	108	0.70	30	0.19	17	21	80.95	15, 11, 26, 33, 35,12, 16, 5, 25, 40,18, 8, 35, 36, 36, 9
7.	*Adiantum venustum* D. Don	Treat white discharge: Poisoning fever: Bleedings and 8burns, The grinded powder form mixes with tea for easy cash	Sumbal	Wp	21	0.14	32	0.21	10	23	43.48	35, 3, 30, 33,13, 41,7, 40, 20, 36, 38,9
8.	*Ailanthus altissimus* (Mill.) Swingle	Diarrhea: Asthma: Cramps: Epilepsy: Fast heart rate: Gonorrhea: Malaria: Tapeworm: Fodder: Fuel	Spina Bekana	Ft	23	0.15	30	0.19	7	39	17.95	11, 35, 30, 33,12, 20, 5, 10, 25, 26, 18, 38, 21
9.	*Ajuga integrifolia* Buch.-Ham. ex D.Don	Fever: Diabetes: Hepatitis: Stomachic:	Buty	Wp	80	0.52	90	0.58	91	99	91.92	6, 15, 3, 4,3, 19, 30,24, 29, 32, 33,35,12, 20, 16, 37, 41,10, 25, 26, 7, 40,18, 20, 8, 35, 36, 9, 2, 22, 5
10.	*Allium humile* Kunth	Improve digestive heat: Stops diarrhea: Common cold: Fodder	Zangalee Peyaz	Wp	24	0.15	42	0.27	10	24	41.67	37, 26, 32, 33, 7
11.	*Allium sativum* L.	Promotes appetite: Induce sleeping: Reduce high cholesterol and blood pressure: Cure leprosy: Blister: Gynecological problems: Fodder	Peyaz	Bb	108	0.70	82	0.53	81	98	82.65	6, 35, 30,29, 33, 4, 26, 7, 40, 18, 8, 1, 38, 22, 39
12.	*Anaphalis boissieri* Georgiadou	Spermatorrhea poisoning: Glandular disease: Swelling: Joint pains	Pasham	Wp	29	0.19	53	0.34	5	12	41.67	N
13.	*Anaphalis margaritacea* (L.) Benth. & Hook. f.	Spermatorrhea poisoning: Glandular disease: Swelling: Joint pains	Pasham	St: Lv: Fl: Ft	30	0.19	54	0.35	7	13	53.85	14
14.	*Anaphalis nepalensis* (Spreng.) Hand-Mazz.	Spermatorrhea poisoning: Glandular disease: Swelling: Joint pains	Pasham	Wp	34	0.22	45	0.29	6	14	42.86	N
15.	*Anaphalis triplinervis* (Sims) C.B. Clarke	Spermatorrhea poisoning: Glandular disease: Swelling: Joint pains	Pasham	Wp	37	0.24	66	0.43	10	35	28.57	19
16.	*Androsace foliosa* Duby	Against excess serous fluid: Fever: wounds: Swellings	Gul Pensa	Wp	41	0.26	42	0.27	8	42	19.05	5
17.	*Androsace gorodkovii* subsp. *semiperennis* (Jurtzev) Kozhevn.	Anti-inflammatory: Swellings: Fever: Cures wounds	Gul Pensa	St: Lv: Fl: Ft	36	0.23	29	0.19	7	24	29.17	N
18.	*Androsace mucronifolia* Watt	Against excess serous fluid: Fever: wounds: Swellings	Gul Pensa	Wp	40	0.26	41	0.26	10	21	47.62	N

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
19.	*Androsace rotundifolia* Hardw.	Against excess serous fluid: Fever: wounds: Swellings	Gul Pensa	Wp	21	0.14	45	0.29	13	24	54.17	14
20.	*Androsace sempervivoides* Jacquem. ex Duby	Anti-inflammatory: Swellings: Fever	Gul Pensa	Wp	28	0.18	35	0.23	10	21	47.62	14
21.	*Androsace tibetica* var. *tibetica*	Anti-inflammatory: Swellings: Fever	Gul Pensa	Wp	42	0.27	37	0.24	20	39	51.28	N
22.	*Anemonastrum obtusilobum* (D.Don) Mosyakin	Fever: Stomachic: Diarrhea: Snake bite: Dries up yellow serum in knee joints	Gul Pensa	Wp	54	0.35	42	0.27	26	43	60.47	37, 14
23.	*Anethum graveolens* L.	Lactating mother to cure wounds and Lactagogue (increase milk)	Saawa	Wp	21	0.14	82	0.53	56	95	58.95	N
24.	*Anthriscus nemorosa* (M. Bieb.) Spreng.	Fodder	Gul Pensa	Wp	43	0.28	24	0.15	14	37	37.84	N
25.	*Anthriscus sylvestris* (L.) Hoffm.	Fodder	Chatpoolai	Wp	37	0.24	71	0.46	20	29	68.97	N
26.	*Apluda mutica* L.	Fodder	Pashkalay Wakha	Wp	38	0.25	80	0.52	46	51	90.20	16, 12
27.	*Aquilegia fragrans* Benth.	Fodder: Toxicity	Desee Zahar	Wp	51	0.33	74	0.48	25	34	73.53	37, 21, 33, 14
28.	*Aquilegia nivalis* (Falc. ex Brühl) J.R.Drumm. & Hutch.	Fodder: Toxicity	Desee Zahar	Wp	61	0.39	59	0.38	27	34	79.41	37, 21, 14,
29.	*Aquilegia pubiflora* Wall. ex Royle	Skin diseases: Fodder: Toxicity	Desee Zahar	Ft: Rt	48	0.31	52	0.34	23	30	76.67	37, 43, 12
30.	*Arabis amplexicaulis* Edgew.	Promote digestion: Fodder	Larghakhe Geshey	Sh	30	0.19	38	0.25	2	11	18.18	N
31.	*Arisaema flavum* (Forssk.) Schott	Tonic: Allergy: Diabetes mellitus: Swelling: Cancer: Uterine disorders: Poisonous: Cause irregular heartbeats: Fodder: Toxicity	Marjarai	Fl: Rt	3	0.02	45	0.29	9	23	39.13	5, 33, 41, 40, 20, 35, 12, 16
32.	*Arisaema jacquemontii* Blume	Tonic: Allergy: Diabetes mellitus: Swelling: Cancer: Uterine disorders: Poisonous: Cause irregular heartbeats: Fodder: Toxicity	Marjarai	Fl: Rt	98	0.63	58	0.37	21	23	91.30	26, 35, 14, 12
33.	*Arisaema utile* Hook. f. ex Schott	Tonic: Allergy: Diabetes mellitus: Swelling: Cancer: Uterine disorders: Poisonous: Cause irregular heartbeats: Fodder: Toxicity	Marjarai	Fl: Rt	54	0.35	65	0.42	9	17	52.94	5
34.	*Artemisia dubia* Wall. ex Besser	Diarrhea: Cholera: Brooms	Jawkay	Lv: Rt	85	0.55	68	0.44	60	71	84.51	37,19
35.	*Artemisia scoparia* Waldst. & Kit.	Diarrhea: Cholera: Brooms	Jawkay	Lv: Rt	56	0.36	95	0.61	90	92	97.83	15,11, 3, 19, 24, 29, 16, 5, 25, 26, 7,18, 6, 38, 22, 40
36.	*Artemisia vulgaris* L.	Laxative (Diarrhea): Inner injuries: Blood clotting: Pulmonary disease: Construction and agriculture	Trakha	Lv: Rt	71	0.46	45	0.29	7	24	29.17	6, 15, 4, 27,30, 29, 16, 7, 18, 33, 8,1, 36, 38,9, 18
37.	*Aster altaicus* Willd.	Heal poisoning: Epidemic fever: Common cold: Spams of tendons	Wudy Astar	Fl	92	0.59	80	0.52	12	26	46.15	N
38.	*Aster molliusculus* (Lindl. ex DC.) C.B.Clarke	Heal poisoning: Epidemic fever: Common cold: Spams of tendons: Fodder: Toxicity	Zeyar Astar	Fl	54	0.35	59	0.38	11	32	34.38	N
39.	*Atropa acuminata* Royle ex Lindl.	Sedative: Antispasmodic: Antidote for poisoning: Toxicity	Bhange Dewana	Ft: Rt	77	0.50	70	0.45	90	97	92.78	1, 3, 33,12, 41, 26, 7, 20, 6, 38, 44
40.	*Avena sativa* L.	Fodder	Jamdaray	Lv	63	0.41	89	0.57	27	37	72.97	4, 8, 30, 33,12, 26, 40,18, 35, 22, 40,21,
41.	*Berberis calliobotrys* Bien. ex Koehne	Hepatitis: Internal injuries healings: Urticaria: Tonics: Fever: Edible: Beverages: Toxicity	Toor Kwarai	Bk	77	0.50	79	0.51	56	67	83.58	N

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
42.	*Berberis lycium* Royle	Hepatitis: Internal injuries healings: Urticaria: Tonics: Typhoid fever: Eye ailments: Diarrhea: Edible: Fodder	Korai: Hanje	Bk	98	0.63	82	0.53	60	61	98.36	1, 15, 11, 4,3, 19, 27, 26, 3031, 29,32, 17, 35, 12, 13, 16, 5, 41,10, 34, 26, 17, 28, 7, 40,18, 20, 8, 6, 36, 38,2, 9, 22, 39, 40
43.	*Bergenia ciliata* (Haw.) Sternb.	Poultice abbesses: Diarrhea: Fuel	Kamar Prana	Lv	61	0.39	96	0.62	83	85	97.65	1, 35, 37,26, 30, 31, 32, 33, 4, 12, 5, 41, 34, 7, 40,20, 8, 6, 36, 38, 2, 14, 36, 9
44.	*Bergenia stracheyi* (Hook. f. & Thomson) Engl.	Poultice abbesses: Fuel	Kamar Prana	Lv	64	0.41	59	0.38	59	62	95.16	37, 33, 26, 1, 38, 14,
45.	*Bidens pilosa* L.	Anti-tumors: Anti-cancer: Anti-inflammatory: Anti-diabetic: Antioxidant	Boos Buty	Lv	85	0.55	71	0.46	29	39	74.36	N
46.	*Bistorta affinis* (D.Don) Greene (Fig. 19)	Fuel	Masloon	Wd	60	0.39	76	0.49	43	49	87.76	N
47.	*Bromus hordeaceus* subsp. *Hordeaceus*	Fodder: Fuel	Pashkalay Wakha	Wp	40	0.26	60	0.39	10	27	37.04	N
48.	*Caltha alba* Cambess	Blood pressure: Diabetes mellitus: Fever: Anesthesia: Fodder: Food	Makanpat	Wp	50	0.32	75	0.48	61	65	93.85	35, 21, 32, 33, 26, 28, 7, 20, 1, 36, 38,14, 9
49.	*Campanula pallida* Wall.	Anti-inflammatory: Cough: Headache: Fodder	Dese Bangara	Sh	58	0.37	86	0.55	26	53	49.06	N
50.	*Campanula tenuissima* Dunn	Treatment of heart and lung problems: Used as ear drops for a sore ear: Sore eyes	Spin Sar Bangara	Sh	65	0.42	91	0.59	17	23	73.91	5
51.	*Cannabis sativa* L.	Body Pains: Headache: Clear vision: Constipation	Bhang	Lv: Fl	68	0.44	80	0.52	33	39	84.62	15, 3, 35, 3,19, 30,29, 33, 13, 16, 5,34, 26, 7, 40,18, 1, 38, 22, 40
52.	*Carex atrofusca* Schkuhr	Fodder	Narai Deela	Wp	85	0.55	90	0.58	47	55	85.45	N
53.	*Carex filicina* Nees	Fodder	Narai Deela	Wp	40	0.26	55	0.35	53	62	85.48	N
54.	*Carex infuscata* Nees	Fodder	Narai Deela	Wp	55	0.35	45	0.29	32	49	65.31	N
55.	*Cassiope fastigiata* (Wall.) D. Don	Fodder: Toxicity	Pesho Lakai	Wp	64	0.41	65	0.42	43	51	84.31	N
56.	*Cedrus deodara* (Roxb. ex D. Don) G. Don	Remove abscess: Remove miliaria: Eczema: Timbers: Furniture: Fuel: Construction and agriculture	Ranzra	Re: Wd	50	0.32	86	0.55	49	53	92.45	3, 29, 32, 33,7, 40,18, 1, 22, 40
57.	*Chenopodium album* L.	Control excessive perspiration: Promote appetite: Fever: Restore blood: Heals wounds: Itching: Control white discharge: Fodder: Food	Sarmay	Ft: Lv	51	0.33	79	0.51	45	52	86.54	15, 3, 35, 3, 19, 30, 33, 4, 16, 26, 7, 1, 38,14, 14
58.	*Cichorium intybus* L.	Fodder: Food	Haan	Lv	53	0.34	66	0.43	40	45	88.89	15, 3, 35, 3,19, 30,29, 32, 33, 4, 16,5, 41, 34, 26, 7, 18, 1, 36, 38, 9
59.	*Cirsium verutum* (D. Don) Spreng.	Bad-kan disorder: Indigestion: Tumors: Cancer: Swelling and wounds	Kacha Charga	Rt	52	0.34	71	0.46	39	49	79.59	N
60.	*Cirsium arvense* (L.) Scop.	Bad-kan disorder: Indigestion: Tumors: Cancer: Swelling and wounds	Kacha Charga	Sh	60	0.39	81	0.52	37	51	72.55	N
61.	*Cirsium falconeri* (Hook.f.) Petr.	Bad-kan disorder: Indigestion: Tumors: Cancer: Swelling and wounds	Shin Azghakai	Sh	57	0.37	65	0.42	29	49	59.18	N
62.	*Clematis grata* Wall.	Improves digestion: Lack of appetite: Cold: Colon tumors: Serum disorder	Dese Ratt Ki Rani	Br	45	0.29	61	0.39	36	41	87.80	17

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
63.	*Clematis graveolens* Lindl.	Anti-inflammatory: Cytotoxic: Antimicrobial	Dese Ratt Ki Rani	Lv	49	0.32	71	0.46	43	51	84.31	17
64.	*Clinopodium umbrosum* (M. Bieb.) K. Koch	Fodder	Kamasla Pudina	Lv	51	0.33	65	0.42	42	47	89.36	17
65.	*Clinopodium vulgare* L.	Fodder	Kamasla Pudina	Lv	49	0.32	80	0.52	31	39	79.49	N
66.	*Convolvulus arvensis* L.	Stomach diseases: Spleen diseases: Poor metabolism: Dropsy: Fodder	Kamasla Prewatkai	Fl: Rt	41	0.26	74	0.48	35	51	68.63	11, 4, 3, 19, 30, 2, 45, 34, 26, 7, 38,
67.	*Corydalis cornuta* Royle	Fodder	Desi Mamera	St: Lv: Fl: Ft	51	0.33	56	0.36	10	23	43.48	25, 5, 33,12, 26, 20, 6, 14
68.	*Corydalis diphylla* Wall.	Fodder	Desi Mamera	Fl: Lv	50	0.32	56	0.36	23	34	67.65	37,12
69.	*Corydalis gorinensis* V.M.Van	Fodder	Desi Mamera	Fl: Lv	54	0.35	55	0.35	41	53	77.36	N
70.	*Corydalis govaniana* var. *swatensis* (Kitam.) Jafri	Used against proliferation of impure blood: Bleeding: Wounds: Hot disorder associated with blood: Liver and gall bladder: Fodder	Desi Mamera	St: Lv: Fl: Ft	55	0.35	62	0.40	30	39	76.92	N
71.	*Corydalis govaniana* Wall.	Used against proliferation of impure blood: Bleeding: Wounds: Hot disorder associated with blood: Liver and gall bladder: Fodder	Desi Mamera	St: Lv: Fl: Ft	48	0.31	53	0.34	7	19	36.84	37, 33, 7, 25, 38, 14
72.	*Cotoneaster microphyllus* Wall. ex Lindl.	Fodder: Fuel	Mamanra	Wd	50	0.32	73	0.47	10	21	47.62	37, 33, 14
73.	*Cotoneaster nummularius* Fisch. & C.A.Mey.	Fodder: Fuel	Mamanra	Wd	55	0.35	80	0.52	49	53	92.45	15, 11, 16, 17,
74.	*Crataegus songarica* K. Koch	Heart tonic	Butt Sanga	Ft	59	0.38	59	0.38	49	59	83.05	16
75.	*Crucihimalaya himalaica* (Edgew.) Al-Shehbaz, O'Kane & R.A.Price	Promote digestion: Fodder	Larghakhe Geshey	Sh	53	0.34	63	0.41	7	13	53.85	N
76.	*Cyperus rotundus* L.	Cures thirst: Fever: Dysentery: Vomiting: Colic: Nose bleeding: and Fodder	Deela	Rh	56	0.36	67	0.43	47	53	88.68	4
77.	*Dactylis glomerata* L.	Fodder	Zangaliwarbashey	Wp	51	0.33	78	0.50	39	46	84.78	4
78.	*Datura innoxia* Mill.	Cures tooth cavities: Pain: Stomach disorders: Diarrhea	Datura	Fl: Sd	53	0.34	81	0.52	50	54	92.59	11, 3, 33, 18, 6, 37
79.	*Debregeasia saeneb* (Forssk.) Hepper & Wood	Fuel	Ajlai	Wd	59	0.38	71	0.46	37	48	77.08	15, 11, 3, 25,16, 26, 28, 7, 40, 18, 37
80.	*Delphinium denudatum* Wall. ex Hook. f. & Thomson	Remove tick from Animals: Diarrhea and dysentery: Evil spirit: Developing bile fever: Common cold: Fodder: Toxicity	Kono Jarai	Lv: Fl: Ft	53	0.34	89	0.57	81	89	91.01	11, 33, 26, 7, 38, 4
81.	*Dianthus orientalis* Adams	Nasal problems: Allergy: Detergent: Fodder	Kharakh Booty	Rt	46	0.30	36	0.23	30	39	76.92	N
82.	*Dioscorea deltoidea* Wall. ex Griseb.	kill lice: Soap	Kanrees	Rt	54	0.35	98	0.63	90	93	96.77	11, 26, 31,32, 33,12, 26, 7, 20, 8, 1, 36, 38, 36, 9
83.	*Draba oreades* Schrenk	Antimicrobial	Kach Spen Wakha	Wp	48	0.31	58	0.37	21	29	72.41	N
84.	*Dryopteris juxtaposita* Christ	Cancer: Diabetes mellitus: Food	Kwanjay	Lv	89	0.57	90	0.58	37	39	94.87	35, 40, 32, 7, 20, 1, 17
85.	*Dysphania ambrosioides* (L.) Mosyakin & Clemants	Antimicrobial: Antioxidant: Cholinesterase inhibition: Carminative: Astringent	Binnakai	Wp	36	0.23	60	0.39	9	23	39.13	15, 3, 29, 16, 18, 22, 40
86.	*Dysphania botrys* (L.) Mosyakin & Clemants	Boil in Mustard oil used for abdominal pain: Fodder: Food	Sakha Kharawa	Wp	98	0.63	90	0.58	50	57	87.72	15, 11, 29, 16, 24, 7, 18, 1, 38, 14, 17
87.	*Epilobium laxum* Royle	Tea substitute: Eaten raw use like asparagus: Fodder: Food	Soor Dengai	Wp	28	0.18	42	0.27	13	24	54.17	14

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
88.	*Equisetum arvense* L.	Nose bleeding: Excessive menstrual flow: Vomiting in blood: Chronic fever: UTIs: Tumors	Bandakay	Lv: St: Rt	39	0.25	42	0.27	11	46	23.91	11, 3, 29, 33,12, 13, 40,18, 1, 37
89.	*Erigeron bonariensis* L.	Anti-ulcerative	Sakha Buty	Lv	24	0.15	48	0.31	9	23	39.13	15, 21
90.	*Erigeron multiradiatus* (Lindl. ex DC.) Benth. & Hook.f.	Antihyperglycemic: Anti-inflammatory	Tez Benakai	Sh	42	0.27	56	0.36	24	31	77.42	N
91.	*Eritrichium canum* (Benth.) Kitam.	Counter irritant: Rubefacient: Anti-oxidant: Anti-microbial: Analgesic	Ghat mekhakai	Wp	30	0.19	41	0.26	1	37	2.70	N
92.	*Eucalyptus camaldulensis* Dehnh.	Constipation: Diabetes: Kill the birds when eat the plant fruits	Dese Lachi	Lv	41	0.26	49	0.32	29	39	74.36	15
93.	*Euphorbia helioscopia* L.	Cures decompose wounds: Purgative: Remove bad-kan disorder through emesis	Prewatkai	Rt	41	0.26	59	0.38	37	56	66.07	11, 4, 19, 40, 5, 38, 17
94.	*Ferula assa-foetida* L.	Remove Pinworms: Earaches: Asthma: Increased cow milk: Loss of body heat: Cold disorders: Antibacterial	Hanja	Rt: Re	41	0.26	82	0.53	24	27	88.89	N
95.	*Festuca altaica* Trin.	Fodder	Shinkay Wakha	Wp	27	0.17	66	0.43	35	43	81.40	N
96.	*Ficus palmata* Forssk.	Milk used to remove spines thorns: Increase the risk of sore mouth: Laxative: Lung and bladder diseases: Fuel: Construction and agriculture	Enzar	Ft: Lt	40	0.26	86	0.55	30	34	88.24	11, 4, 30, 12, 10, 26, 40,18, 7
97.	*Foeniculum vulgare* Mill.	Lung's fever: Indigestion: Loss of appetite: Used in perfumes	Kagaenalay	Ft	30	0.19	58	0.37	20	49	40.82	11, 35, 3, 30,29, 33,4, 10, 26, 7, 40,18, 20, 8, 1, 36, 9, 22, 40
98.	*Fragaria nubicola* (Hook. f.) Lindl. ex Lacaita	Control proliferation of impure blood in the chest: Cures inflammation of nerves: Edible	Tut	Ft	34	0.22	58	0.37	52	58	89.66	15, 3, 37, 17,2, 14, 7
99.	*Fragaria vesca* L.	Control proliferation of impure blood in the chest: Cures inflammation of nerves: Edible	Tut	Ft	58	0.37	73	0.47	51	58	87.93	35, 5, 30,16,1, 7,
100.	*Gagea alexii* Ali & Levichev	Fodder: Fuel	Ogakai	Lv	58	0.37	69	0.45	51	59	86.44	N
101.	*Gagea lutea* (L.) Ker Gawl.	Fodder: Fuel	Ogakai	Lv	58	0.37	51	0.33	50	62	80.65	N
102.	*Gagea punjabica* Levichev et. Ali	Fodder: Fuel	Ogakai	Lv	73	0.47	69	0.45	49	59	83.05	N
103.	*Galium aparine* L.	Jaundice: Pus formation in wounds: Discharge semen: Stop bleeding and fracture bone: Washing utensils	Konay	Wp	51	0.33	70	0.45	12	21	57.14	7
104.	*Galium elegans* Wall.	Laxative: Lung and bladder diseases: Washing utensils	Konay	Wp	50	0.32	71	0.46	12	21	57.14	N
105.	*Galium hirtiflorum* Req. ex DC.	Jaundice: Pus formation in wounds: Discharge semen's: Stop bleeding and fracture bone: Washing utensils	Konay	Wp	48	0.31	69	0.45	13	21	61.90	N
106.	*Gaultheria trichophylla* Royle	Muscle relaxant: Painkiller Analgesic	Wudy Dana	Ft	51	0.33	61	0.39	54	62	87.10	5
107.	*Gentiana argentea* (Royle ex D.Don) Royle ex D.Don	Cure sore throat: Hoarseness of voice: Cough: Poison Fever: Contagious fever	Aslee Bhangara	Fl	62	0.40	71	0.46	20	23	86.96	N
108.	*Gentiana cachemirica* Decne.	Cure sore throat: Hoarseness of voice: Cough: Poison fever: Contagious fever	Kacha Bhangara	Wp	71	0.46	81	0.52	5	13	38.46	21
109.	*Gentiana membranulifera* var. *membranulifera*	Animal poultice abbesses	Aslee Bhangara	Fl	48	0.31	67	0.43	9	19	47.37	21
110.	*Gentiana olivieri* Griseb.	Antidote for scorpions & snakes: Menstruation over bleeding	Wudy Bhangara	Fl	65	0.42	71	0.46	45	55	81.82	N

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
111.	*Geranium wallichianum* D. Don ex Sweet	Treats contagious fever: Fever of lungs: Poison: Swollen limbs: Inflammation	Sra Zeela	Rt	48	0.31	95	0.61	67	71	94.37	6, 4, 3, 26, 30,31,32, 33,5, 34, 26, 7, 26,1, 36, 38,14, 36, 9
112.	*Geum elatum* Wall. ex G. Don	Fever: Hepatitis: Food for human: Fodder: Food	Da Ghar Botee	Lv	71	0.46	96	0.62	25	26	96.15	37,14
113.	*Geum urbanum* L.	Fever: Hepatitis: Food for human: Fodder: Food	Da Ghar Botee	Lv	24	0.15	80	0.52	18	21	85.71	N
114.	*Gnaphalium uliginosum* L.	Anodyne	Pasham	Sh	20	0.13	49	0.32	9	17	52.94	N
115.	*Heracleum candicans* Wall.ex DC.	Pain: Abdominal cramp caused by intestinal worms	Sakha Kharawa	Ft: Rt	49	0.32	57	0.37	46	56	82.14	33,26, 1, 14
116.	*Hylotelephium ewersii* (Ledeb.) H.Ohba	Transmissible poison: Infections	Rigs	Sh	57	0.37	65	0.42	45	51	88.24	N
117.	*Hypericum perfoliatum* L.	Allergy: Fuel	Shen Chai	Lv	74	0.48	80	0.52	70	75	93.33	15, 4, 30, 32, 33, 12, 16, 5, 34, 26, 7,40, 20, 1, 36, 38,9
118.	*Impatiens edgeworthii* Hook. f.	Menstrual disorder: Urinary disorders	Atraangey	Lv: St: Rt: Ft: Fl	74	0.48	69	0.45	38	56	67.86	43
119.	*Indigofera heterantha* Wall. ex Brandis	Kidney pain: Fodder: Fuel	Ghwareja	Lv: Rt	70	0.45	83	0.54	50	56	89.29	15, 11, 4, 30, 24 29, 12, 16, 26, 7, 18, 20, 1, 14, 24, 25
120.	*Inula racemosa* Hook. F.	Lungs and blood disorders: Brown phlegm: Loss of digestive heat: Contagious fever	Kut	Rt	56	0.36	57	0.37	23	49	46.94	N
121.	*Isodon rugosus* (Wall. ex Benth.) Codd	Teeth ache: Fever: Stomachic: Cough: Sore throat: Fuel	Sparkay: Bratus: Kamasle Sperkai	Lv: Rt: Ft	57	0.37	90	0.58	70	76	92.11	15, 4, 3, 19, 30, 24,29, 33,12, 16, 41,26, 7, 40, 20, 1, 38, 2, 34, 22
122.	*Juglans regia* L.	Headache: Swelling of limbs: Constipation: Promote hair growth: Restore body constituents: Whitening and cleanness of teeth's: Edible: Lipstick: Cosmetics: Fuel: Construction and agriculture	Ghooz	Lv: Ft: Sd	42	0.27	92	0.59	83	91	91.21	15, 11, 35, 26,30, 29, 32,4, 12, 13, 16,5, 41,24, 34, 26, 17, 7 40,18, 20, 8, 1, 36, 38, 9, 28
123.	*Juncus maritimus* Lam.	Fodder	Wakha	Wp	32	0.21	48	0.31	12	15	80.00	N
124.	*Juniperus communis* L.	Kidney disease: Accumulation of yellow serum in joints: Relieves sudden swellings: Fuel	Gogar: Gugarh	Lv	48	0.31	71	0.46	8	71	11.27	5, 17, 7, 18, 1, 14
125.	*Koenigia nepalensis* D. Don.	Mild laxative: Fuel	Da Spin Sar Tarookai	Lv	71	0.46	81	0.52	12	13	92.31	N
126.	*Lactuca serriola* L.	Jaundice: Headache: Fuel	Shwadapai	Wp	69	0.45	78	0.50	45	56	80.36	N
127.	*Lepidium ruderale* L.	Pain: Fracture of bone: Fuel	Zangalee Halam	Wp	120	0.77	102	0.65	98	102	96.08	N
128.	*Leptopus cordifolius* Decne.	Against excess serous fluid: Fever: wounds: Swellings	Krachai: Chaghjey Botay	Wp	102	0.66	89	0.57	27	35	77.14	3, 38,16
129.	*Lomatogonium carinthiacum* (Wulfen) A.Braun	Liver and bile ailments: Fuel	Wudy Glass Gulai	Wp	68	0.44	70	0.45	13	36	36.11	N
130.	*Lomelosia candollei* (Wall. ex DC.) Soják	Energy: Bed eye evils (Jaadoo)	Losa	Fl	70	0.45	81	0.52	23	39	58.97	N
131.	*Lonicera obovata* Royle ex Hook. f. & Thomson	Gynecological diseases: Fuel	Angela	Ft	70	0.45	79	0.51	13	27	48.15	14
132.	*Mallotus philippensis* (Lam.) Müll. Arg.	Increase animal diarrhea: Increase milk in cattle's: Fuel	Kamela	Ft	70	0.45	98	0.63	70	73	95.89	24, 33, 1, 22, 40, 37
133.	*Mazus pumilus* (Burm. f.) Steenis	Aperient: Emmenagogue: Fuel	Gonggat	Sh	58	0.37	70	0.45	23	30	76.67	N

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
134.	*Melia azedarach* L.	Diabetic: Fuel: Construction and agriculture	Toora bakana	Ft	78	0.50	89	0.57	58	62	93.55	15, 11, 35, 3, 29, 4, 10, 26, 40, 18, 1, 38, 22, 40, 2,
135.	*Mentha arvensis* L.	Antiemetics: Stomachache (Abdominal pain)	Podina	Wp	80	0.52	120	0.77	75	78	96.15	3, 8, 29, 4,10, 18, 22, 40
136.	*Mentha longifolia* (L.) L.	Stomach ache (Abdominal pain): Laxative (Diarrhea): Disorder of anus, uterus, skin: Antiseptic	Enalai	Wp	98	0.63	120	0.77	75	79	94.94	15, 3, 4, 3,19, 30, 29, 32, 33, 35,12,13, 16, 5, 41,10, 34,7, 40,18, 8, 1, 38,2, 36, 9, 22, 39, 40
137.	*Micromeria biflora* (Buch.-Ham. ex D. Don) Benth.	Antibacterial: Increase cow milk: Fodder: Wash milk pot and other utensils	Narary Shamkay	Sh	103	0.66	104	0.67	90	98	91.84	3, 35, 30, 4, 5, 34, 22, 40, 7, 18, 1, 2, 37
138.	*Morchella esculenta* Fr.	Food	Gojay	Wp	79	0.51	103	0.66	31	36	86.11	11, 35, 30, 4, 5, 34, 22, 40, 7, 18, 1, 2, 37
139.	*Morus alba* L.	Astringent: Anthelmintic: Purgative: Emollient: Cricket Bat: Construction and agriculture	Toot	Ft	63	0.41	96	0.62	59	62	95.16	11, 4, 3, 30, 33, 5, 34, 26, 17, 7, 18, 1, 38,
140.	*Morus nigra* L.	Anti-Diabetes: Purgative: Arterial pressure: Vermifuge: Cricket Bat: Construction and agriculture	Toot	Ft	80	0.52	96	0.62	59	63	93.65	11, 3, 33, 4,12, 17, 7, 18, 37
141.	*Myriactis wallichii* Less.	Anti-fungal: Antioxidant	Wrejakai	Lv	83	0.54	90	0.58	25	31	80.65	N
142.	*Nasturtium officinale* W.T.Aiton	Diabetes: Blood pressure: Cancer: Constipation: Stomachic: Food: Fodder	Talmeera	Lv	66	0.43	83	0.54	80	83	96.39	15, 4, 3, 19, 30, 29, 12, 16, 5, 10, 34, 26, 7, 40, 1, 37
143.	*Nepeta clarkei* Hook. f.	Antimicrobial: Bad-kan abscess: Ringworm: Fodder	Peshoo Botay	Fl:Lv	66	0.43	72	0.46	61	66	92.42	14
144.	*Nepeta govaniana* (Wall. ex Benth.) Benth.	Antimicrobial: Bad-kan abscess: Ringworm: Fodder	Kianrh: Peshoo Botay	Fl: Lv	83	0.54	89	0.57	62	66	93.94	33, 35, 14
145.	*Nepeta laevigata* (D. Don) Hand.-Mazz.	Fodder	Peshoo Botay	Lv	74	0.48	83	0.54	71	88	80.68	37
146.	*Neslia paniculata subsp. thracica* (Velen.) Bornm.	Fodder	Borchan	Lv	75	0.48	80	0.52	52	69	75.36	N
147.	*Nicotiana tabacum* L.	Appetizer: Fodder	Tamako	Lv	68	0.44	90	0.58	70	75	93.33	37
148.	*Olea europaea subsp. cuspidata* (Wall. & G.Don) Cif.	Sore mouth: Sore throat: Food	Khona	Lv	46	0.30	68	0.44	62	68	91.18	35, 26, 2, 4, 3, 30, 29, 16, 5, 10, 34,17, 7, 40,18, 1, 38, 2, 22, 40
149.	*Onosma hispida* Wall. ex G. Don	Increase cow milk: Fodder	Paimeme	Wp	72	0.46	80	0.52	40	46	86.96	33, 26, 7, 35, 14
150.	*Origanum vulgare* L.	Antibacterial: Increase cow milk, Fodder: Makes brooms to cleans milk Pot	Da Payo shamakai	Sh	76	0.49	89	0.57	67	72	93.06	15, 11, 29, 16, 41, 26, 7, 33, 36, 38, 22, 40, 9, 14, 2
151.	*Paeonia emodi* Royle (Fig. 15)	Backaches: Tonic: Body pain: Knee pain: Arthritis: Fodder: Fuel	Ward: Mamekh	Wp	71	0.46	120	0.77	73	76	96.05	6, 15, 35, 5, 3, 26, 30, 31, 29, 32, 33, 4, 12, 13, 16, 5, 34,26, 7, 40, 20, 8, 1, 36, 38,36,9, 14, 2, 22, 40
152.	*Papaver pavoninum* Schrenk	Body Pains: Headache: Gives Excitement: Fodder: Fuel	Zangalee Qash Qash	Ft	87	0.56	90	0.58	69	82	84.15	N
153.	*Papaver somniferum* L.	Body Pains: Headache: Gives Excitements: Fodder: Fuel	Qash Qash	Ft	67	0.43	102	0.66	83	87	95.40	35, 30, 29, 4, 41, 26, 7, 40,18, 37
154.	*Parnassia nubicola* Wall. ex Royle	Eye diseases	Kamasla Mamera	Fl	57	0.37	67	0.43	25	35	71.43	N

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
155.	*Parrotiopsis jacquemontiana* (Decne.) Rehder	Edible as raw: Fuel: Construction and agriculture	Beeranj	Lv: Wd	67	0.43	100	0.65	60	62	96.77	16
156.	*Patzkea paniculata* subsp. *Paniculate*	Fodder	Ghat Shenkai	Wp	58	0.37	80	0.52	23	31	74.19	N
157.	*Pedicularis pectinata* Wall. ex Benth.	Healing wound: Stomach disease: Vomiting: Dysentery: Cancer	Machar Buty	St: Lv: Fl: Ft	60	0.39	67	0.43	12	26	46.15	14
158.	*Peganum harmala* L.	Sedative: Abortifacient: Anthelminthic: Antispasmodic: Antipyretic: Emetic: Menstrual complaint: Tonic: Appetizer: Gastric disorder	Balti	Rt	67	0.43	77	0.50	50	58	86.21	11, 40, 36, 38, 9, 16
159.	*Phalaris alpina* Haenke	Fodder	Ghat Zoozay	Wp	57	0.37	67	0.43	60	67	89.55	N
160.	*Phalaris minor* Retz.	Fodder	Zoozay	Wp	58	0.37	67	0.43	51	57	89.47	N
161.	*Phleum hirsutum* Honck.	Typhoid fever: Hedge Plant	Azghakay	Sh	47	0.30	58	0.37	50	58	86.21	N
162.	*Phlomoides bracteosa* (Royle ex Benth.) Kamelin & Makhm.	Common cold: Fever: Lung diseases: Asthma: Throat sore	Da Ghar Khardag	Rt	77	0.50	105	0.68	45	47	95.74	N
163.	*Pinus roxburghii* Sarg.	Timbers: Furniture: Fuel: Construction and agriculture	Nakhtar	Wd	80	0.52	102	0.66	70	77	90.91	15, 11, 21, 10, 40,18, 37
164.	*Pinus wallichiana* A.B. Jacks.	Dropsy: Skin disorders: Pain in joints: Timbers: Furniture: Fuel: Construction and agriculture	Peoch: Sarf	Re	54	0.35	126	0.81	77	80	96.25	15, 4, 30,16, 5, 34,1, 14
165.	*Plantago lanceolata* L.	Stomach ache (Abdominal pain): Mouth sore: Fodder	Ghwaye Jabai	Lv	56	0.36	120	0.77	52	54	96.30	35,11, 26, 26, 30, 24, 29, 33, 4, 12, 5, 34, 26, 7, 8, 1, 36, 38, 2, 14, 921, 22, 40
166.	*Pleurospermum brunonis* C.B. Clarke	Animals abdominal swelling: Abdominal pain: Removes worms: Fever: Irregular menstrual period	Manjarra: Benakai	Lv: Rt: St: Fl: Ft	47	0.30	56	0.36	25	39	64.10	N
167.	*Poa annua* L.	Fodder	Shinkay Wakha	Wp	48	0.31	74	0.48	43	47	91.49	N
168.	*Poa sterilis* M. Bieb.	Fodder	Shinkay Wakha	Wp	39	0.25	48	0.31	23	43	53.49	N
169.	*Poa supina* Schrad.	Fodder	Shinkay Wakha	Wp:	38	0.25	75	0.48	43	49	87.76	N
170.	*Podophyllum hexandrum* Royle	Typhoid fever: Allergy: Hepatic Stimulant: Purgative: Emetic: Menstrual flow: Kidney diseases: Stop bleedings: Spleen diseases: Difficulties in delivery: Hemorrhoids	Kakorra	Wp	29	0.19	103	0.66	29	31	93.55	6, 11, 26, 31, 32, 33, 12, 41, 26, 7, 20, 8, 1, 36, 38, 2, 36, 9
171.	*Polygonatum multiflorum* (L.) All.	Astringent: Demulcent: Tonic	Banddakai	Rt	21	0.14	90	0.58	11	19	57.89	31, 33, 35, 41
172.	*Polygonatum verticillatum* (L.) All.	Tonic: Lactaguge: Food	Banddakai	Rt	40	0.26	88	0.57	37	39	94.87	26, 33, 5, 34, 7, 32, 8, 1, 36, 9
173.	*Polygonum aviculare* L.	Dropsy: Urine infection: Skin disease: Common cold	Banddakai: Nooralam: Gharasara: Kozasara	Lv: St: Rt: Ft: Fl	54	0.35	64	0.41	50	53	94.34	4, 30, 33, 12, 7, 1, 14
174.	*Polygonum paronychioides* C.A. Mey.	Rheumatism: Aphrodisiac	Banddakai	Rh	50	0.32	60	0.39	43	49	87.76	N
175.	*Potentilla anserina* L.	Fever: Stomachic: Dysentery: Increase physical strength	Sra Kunachi	Rt	67	0.43	78	0.50	60	66	90.91	N
176.	*Potentilla atrosanguinea* G. Lodd	Common cold: Fever: Against poison: Epidemic disease	Sra Kunachi	Lv: St: Rt: Ft: Fl	40	0.26	80	0.52	35	40	87.50	5, 14
177.	*Potentilla curviseta* Hook. f.	Fever: Stomachic	Sra Kunachi	Wp	72	0.46	86	0.55	67	72	93.06	7, 14
178.	*Potentilla grisea* Juz.	Common cold: Fever: Against poison	Sra Kunachi	Wp	68	0.44	86	0.55	59	63	93.65	14

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
179.	*Potentilla monanthes* Wall. ex Lehm.	Common cold: Fever: Against poison	Sra Kunachi	Wp	83	0.54	99	0.64	79	83	95.18	14, 5
180.	*Potentilla nepalensis* Hook.	Fever: Blood purification: Digestion and stomach disorder	Sra Kunachi	Ft: Rt	75	0.48	83	0.54	69	73	94.52	11, 7, 38, 14
181.	*Potentilla subjuga* Rydb.	Fever: Stomachic	Sra Kunachi	Wp	94	0.61	100	0.65	90	94	95.74	N
182.	*Primula denticulata* Sm.	Anti-bacterial: Ophthalmic disease: Kill leaches: Leukoderma: Fever: Diarrhea	Mameera	Fl	38	0.25	130	0.84	80	82	97.56	35,5, 14, 6, 30, 33, 5, 34, 26, 7, 20, 1, 38, vet 1, vet 3, 14
183.	*Primula reptans* Hook. f. ex Watt	Anti-bacterial infections of eye	Mameera	Wp	61	0.39	70	0.45	56	61	91.80	N
184.	*Primula rosea* Royle	Anti-bacterial infections of eye	Mameera	Wp	80	0.52	90	0.58	76	81	93.83	5
185.	*Primula veris* L.	Anti-bacterial infections of eye	Mameera	Wp	56	0.36	65	0.42	50	53	94.34	N
186.	*Prunella Vulgaris* L.	Fodder	Guljarrai	Lv	23	0.15	69	0.45	20	23	86.96	43, 16
187.	*Quercus floribunda* Lindl. ex A.Camus	Abdominal pain: Cancer: Diabetes mellitus: Common cold: Dysentery: Fuel: Construction and agriculture	Tor Banj	Ft: Re	57	0.37	75	0.48	16	21	76.19	35, 27, 30, 32, 5, 34, 26, 7, 40, 38,16, 22, 40
188.	*Quercus leucotrichophora* A.Camus	Mouth sore: Common cold: Dysentery: Fuel: Construction and agriculture	Spin Banj	Lv: Ft: Re	43	0.28	74	0.48	16	22	72.73	32, 29, 18, 1, 16, 24, 12
189.	*Ranunculus distans* D.Don	Anodyne: Antispasmodic: Antimicrobial: Diaphoretic: Fodder	Ziarh Gulay	Wp	77	0.50	81	0.52	13	17	76.47	15, 16, 14
190.	*Ranunculus munroanus* J.R. Drumm. ex Dunn	Fodder	Ziarh Gulay	Lv	16	0.10	27	0.17	12	23	52.17	N
191.	*Ranunculus muronennus* L.	Antirheumatic: Fodder	Ziarh Gulay	Wp	78	0.50	86	0.55	30	35	85.71	N
192.	*Ranunculus palmatifidus* Riedl	Fodder	Ziarh Gulay	Wp	27	0.17	82	0.53	16	33	48.48	N
193.	*Ranunculus parviflorus* Loefl.	Antiasthma: Antirheumatic: Febrifuge: Fodder	Ziarh Gulay	Wp	55	0.35	86	0.55	50	57	87.72	N
194.	*Ranunculus rufosepalus* Franch.	Fodder	Ziarh Gulay	Wp	35	0.23	81	0.52	32	41	78.05	N
195.	*Ranunculus trichophyllus* Chaix	Bone fever: Rheumatism: Fodder	Ziarh Gulay	Lv: St: Rt: Ft: Fl	82	0.53	87	0.56	36	46	78.26	N
196.	*Ranunculus trullifolius* Hook.f.	Fodder	Ziarh Gulay	Lv	81	0.52	88	0.57	63	78	80.77	N
197.	*Rheum webbianum* Royle	Fever: Poultice for Abscess: Animals' fever: Bone treatment: (stomach ache (abdominal pain): Diabetes mellitus: Burning sensation: Remove infertility of female: Epidemic disease: Indigestion	Chatyal	Wp	64	0.41	98	0.63	39	41	95.12	30, 32, 17
198.	*Rhodiola wallichiana* (Hook.) S.H. Fu	Fever: Dermatological problems	Soor Warkharai	Rt	41	0.26	44	0.28	23	36	63.89	37
199.	*Rhododendron anthopogon* D. Don	Bad-kan disorders: Promotes appetite: Indigestion: Colic: Kidney diseases	Gul Namer	Fl: Lv	44	0.28	97	0.63	38	41	92.68	N
200.	*Robinia pseduacacia* L.	N	Farami Keekar	Wd	41	0.26	57	0.37	34	53	64.15	5
201.	*Rosa canina* L.	Hedge Plant: Ornamental purposes: Fodder	Jangali Spin Gulab	Fl: Wd	57	0.37	96	0.62	55	67	82.09	16
202.	*Rosa webbiana* Wall. ex Royle	Skin diseases: Fever: Hedge Plant: Ornamental purposes: Fodder	Jangali Spin Gulab	Ft	96	0.62	100	0.65	72	77	93.51	11, 26, 32, 33, 18, 43, 16
203.	*Rubus niveus* Thunb.	Fever: Lungs diseases: Ripe fever: Hedge plant: Edible: Fuel	Karwara	Br	77	0.50	78	0.50	71	73	97.26	N
204.	*Rubus ulmifolius* Schott	Hedge plant: Edible: Fuel	Karwara	Ft	73	0.47	83	0.54	80	83	96.39	11, 38,16
205.	*Rubus sanctus* Kuntze	Fever reliver: Hedge plant: Edible: Fuel	Karwara	Rt	83	0.54	87	0.56	65	70	92.86	N

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
206.	*Rumex dentatus* L.	Poultice for abscesses: Food: Fodder	Shalkhai	Lv	87	0.56	96	0.62	54	56	96.43	35, 37,11, 19, 29, 32, 12, 13, 5, 34, 26, 1, 38, 22, 39, 40, 21
207.	*Sageretia thea* (Osbeck) M.C. Johnst.	Antioxidant: Anti-leishmanial properties	Mamanraha	Ft	56	0.36	76	0.49	23	29	79.31	N
208.	*Salix acmophylla* Boiss.	Wounds: Pains: Swellings: Arthritis: Gout: Blister: Furniture: Construction and agriculture	Waala	Bk	25	0.16	76	0.49	23	55	41.82	N
209.	*Salvia cana* Wall. ex Benth.	Eye diseases: Toothache: Oral infection: Liver disorder	Kianrh	Wp	76	0.49	94	0.61	90	93	96.77	33, 26, 35, 33
210.	*Salvia hains* Royle ex Bentham	Eye diseases: Toothache: Oral infection: Liver disorder	Kianrh	Wp	66	0.43	96	0.62	65	66	98.48	N
211.	*Salvia moorcroftiana* Wall. ex Benth.	Eye diseases: Toothache: Oral infection: Liver disorder	Khardag	Wp	107	0.69	110	0.71	96	101	95.05	35, 19, 30, 29, 32, 33, 17, 34, 26, 7, 40, 18, 8, 1, 38, 39, 40, 33
212.	*Saxifraga flagellaris* Willd.	Wounds: Release Sputum: Fever	Mergaya	Lv: St: Rt: Ft: Fl	94	0.61	103	0.66	90	99	90.91	N
213.	*Scutellaria petiolata* Hemsl. ex Lace & Prain	Mild sedative: Sleep promotor: Anti-cancer: Anti-inflammatory: Analgesic	Gwanj Pana	Rh	103	0.66	106	0.68	60	63	95.24	N
214.	*Sibbaldia cuneata* Edgew.	Fodder	Kamasl Shawtal	Wp	81	0.52	88	0.57	39	43	90.70	N
215.	*Sibbaldia procumbens* L.	Fodder	Kamasl Shawtal	Wp	63	0.41	72	0.46	37	41	90.24	14
216.	*Silene vulgaris* (Moench) Garcke	Fodder	Meshogai	Lv	50	0.32	67	0.43	8	13	61.54	35, 30, 33, 26, 7, 1, 14, 33
217.	*Silybum marianum* (L.) Gaertn.	Fodder	Wrejakai	Ft	43	0.28	73	0.47	25	33	75.76	31
218.	*Sisymbrium irio* L	Fodder	Zangali Awray	Ft	41	0.26	99	0.64	14	26	53.85	24, 33, 18, 35
219.	*Skimmia laureola* (DC.) Decne.	Healing of wounds: Bad evils eyes	Nazar Pana	Lv	67	0.43	110	0.71	82	87	94.25	35, 37, 30, 29, 16, 4, 12, 5, 41, 34, 26, 7, 18, 20, 1, 36, 38, 9, 2, 14
220.	*Solanum nigrum* L.	Hepatitis	Kachmacho	Ft: Rt	49	0.32	67	0.43	37	41	90.24	11, 4, 19, 30, 33, 12, 13, 5, 10, 34, 26,17, 18, 20, 1, 18
221.	*Sonchus asper* (L.) Hill	Increase cow milk: Fodder	Shwadapai	Sh	111	0.72	99	0.64	50	56	89.29	19, 26, 1, 33, 38, 4
222.	*Sonchus oleraceus* L.	Increase cow milk: Fodder	Shwadapai	Sh	87	0.56	98	0.63	49	54	90.74	18, 22, 40
223.	*Swertia cordata* (Wall. ex G. Don) C.B. Clarke	Fever of bile: Epidemic fever: Wounds	Loon Saloon	Wp	41	0.26	44	0.28	23	33	69.70	43, 37
224.	*Swertia petiolata* - Royle. ex D. Don.	Fever of bile: Epidemic fever: Wounds: Fodder	Loon Saloon	Lv: St: Rt: Ft: Fl	56	0.36	60	0.39	37	41	90.24	N
225.	*Swertia purpurascens* (D.Don) C.B.Clarke	Fever of bile: Epidemic fever: Wounds: Fodder	Loon Saloon	Wp	54	0.35	61	0.39	50	55	90.91	N
226.	*Taraxacum sect. Taraxacum* F.H.Wigg.	Stomach disorders: Brown phlegm: Fracture bones: Fodder	Booda Boodae	Wp	55	0.35	78	0.50	12	30	40.00	35, 5, 3, 30, 37,34,1, 38,14, 12
227.	*Taxus contorta* Griff.	Cancer: used in Graves: Furniture's Construction and agriculture	Banrhya	Lv	44	0.28	59	0.38	42	49	85.71	N
228.	*Taxus wallichiana* Zucc.	Cancer: used in Graves: Furniture's Construction and agriculture	Banrhya	Lv	41	0.26	87	0.56	44	49	89.80	35, 30, 33, 12, 5, 34, 1
229	*Thymus linearis* Benth.	Animal fever: Reliever abdominal pain: Tonic: Body Pain: Tea substitute: Beverages	Da Ghar Sperkai: Ghar Chai	Wp	78	0.50	102	0.66	81	84	96.43	15, 35, 37, 26, 30, 4, 16, 5, 34, 26, 7, 40, 8, 1, 36, 38,14, 12,

Table 1. (Cont'd.).

S. No.	Botanical name	Uses	Vernacular name	Parts used	FC	RFC	∑Ui	UV	Np	n	FL	References codes*
230	*Torilis leptophylla* (L.) Rchb. f.	Anti-microbial	Torlip	Lv	59	0.38	72	0.46	30	35	85.71	N
231	*Trifolium nepalensis* L.	Constipation: Gives strength: Fodder: Food	Shawtalai	Sh	87	0.56	90	0.58	61	69	88.41	N
232	*Trifolium repens* L.	Constipation: Gives strength: Fodder: Food	Shoutal	Sh	84	0.54	103	0.66	100	106	94.34	43, 4, 28, 19, 37
233	*Trillium govanianum* Wall. ex D.Don	Tonic: Anesthesia for children at night: Beverages	Matarzeela: Matarjarai	Wp	35	0.23	110	0.71	87	89	97.75	6, 31, 41
234	*Tussilago farfara* L.	Expectorant: Tonic: Emollient: Demulcent: Stimulant: Food	Zeyara Chatray	Fl: Lv	85	0.55	97	0.63	62	69	89.86	N
235	*Urtica dioica* L.	Saag used for knee pain: COVID 19: Fever: Improve digestive heat: Hedge Plant: Food	Seezonkai: Jalbang.	Lv: Ft	103	0.66	106	0.68	87	90	96.67	11, 35, 30, 32, 4, 12, 5, 41, 34,1
236	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.	Fodder: Fuel	Keekar	Lv	89	0.57	96	0.62	76	81	93.83	11, 18, 1
237	*Valeriana jatamansi* Jones ex Roxb.	Remove habitual constipation	Shengatai: Musk Bala	Lv: Rt	97	0.63	100	0.65	80	85	94.12	6, 11, 27, 26, 30, 31, 32, 33, 4, 12, 16, 5, 34, 7, 40, 20, 8, 1, 36, 38, 2, 14, 36,9
238	*Verbascum thapsus* L.	Obsessions: Fever lungs: Accidental bleedings: Twisted ankles: Dropsy: fever due to poisons: Tissue paper during Toilets	Khar Ghwag	Lv: Sd	90	0.58	101	0.65	90	92	97.83	15, 4, 11, 30, 24, 29, 32, 33, 16, 5, 34, 7, 40, 18, 1, 38, 2, 22, 39, 40
239	*Veronica alpina* L.	Diaphoretic: Alterative: Diuretic: Expectorant: Anti-oxidant: Tonic	Da Spin Sar Mekhakai	Wp	85	0.55	94	0.61	50	59	84.75	N
240	*Veronica laxa* Benth.	Diaphoretic: Alterative: Diuretic: Expectorant: Anti-oxidant: Tonic: wounds: Joints broken bones: Heal head diseases	Mekhakai	Lv: Rt	92	0.59	100	0.65	80	88	90.91	N
241	*Viburnum cotinifolium* D. Don	Fuel	Amooch	Ft	59	0.38	90	0.58	83	90	92.22	N
242	*Viburnum grandiflorum* Wall. ex DC.	Asthma: Fuel	Letai: Ghazma	Ft	88	0.57	100	0.65	84	87	96.55	15, 35, 37, 30,16, 5, 34, 26, 1, 38, 4, 23
243	*Vincetoxicum arnottianum* (Wight) Wight	Fuel	Malooch Zahar	Wp	90	0.58	101	0.65	85	88	96.59	7, 15
244	*Viola biflora* L.	Astringent: Diaphoretic: Antipyretic: Anticancer: Febrifuge: Purgative: Epilepsy: Nervous disorder	Banafsha	Lv: Rt: Fl: Sd	87	0.56	97	0.63	90	95	94.74	6, 5, 33, 29,18, 34, 1, 36, 38, 43, 9
245	*Viola canescens* Wall.	Astringent: Diaphoretic: Antipyretic: Anticancer: Febrifuge: Purgative: Epilepsy: Nervous disorder	Banafsha	Lv: Rt: Fl	97	0.63	99	0.64	81	84	96.43	15, 37, 21, 5, 7, 40, 8, 36, 38, 9
246	*Vitex negundo* L.	Relieve pains: Chest pain: Backache: Tooth brushes: Aromatic: Febrifuge: Diuretic: Anthelmintic: Relieve headache: Fuel	Marghondai	Lv	84	0.54	94	0.61	81	89	91.01	15, 11, 29, 4, 16, 40,18, 33, 34, 1, 38, 2
247	*Wikstroemia canescens* Meisn.	Paper: Fuel	Katanrh	Bk	93	0.60	99	0.64	58	61	95.08	4
248	*Withania somniferum* (L.) Dunal	Cold: Rheumatic fever: Pregnant women: Sperm counts	Kutelal	Rt	61	0.39	64	0.41	60	66	90.91	33, 26, 7, 40,18, 34, 38, 2
249	*Wulfeniopsis amherstiana* (Benth.) D.Y.Hong	Diuretic	Chit makanpat	Ft: Lv	64	0.41	71	0.46	59	63	93.65	N
250	*Xanthium strumarium* L.	Malarial Fever	Ghat Jeshkai	Lv	63	0.41	73	0.47	50	58	86.21	11, 26, 7, 40, 38, 25
251	*Youngia japonica* (L.) DC.	Antimalarial: Anti-viral: Anti-tumors: Promyelocytic: Myelogenous leukemia: Fodder	Zeyar Gelas Gulai	Lv: Fl	58	0.37	64	0.41	33	41	80.49	N
252	*Ziziphus jujuba* Mill.	Diabetes: Blood pressure: Constipation: Fodder: Food	Makhranai	Ft: Lv	64	0.41	100	0.65	51	57	89.47	15, 35,3, 19, 30, 29, 4, 12, 16, 5, 10, 34,17, 18, 8, 38, 22, 2, 28, 23

* These reference codes are represented as superscripts in the corresponding references.

Wp = Whole plant, Sh = Shoot, St = Stem, Lv = Leaves, Rt = Root, Bb = Bulb, Bk = Bark, Br = Branches, Fl = Flower, Ft = Fruit, Lt = Latex, Wd = Wood, Sd = Seed, Rh = Rhizome, Re = Resin, N = Novel uses of plants

Fig. 9. *Tussilago farfara* L.

Fig. 10. *Bergenia stracheyi* (Hook. f. & Thomson) Engl.

Fig. 11. *Salvia hains* Royle ex Bentham.

Fig. 12. *Dioscorea deltoidea* Wall. ex Griseb.

Fig. 13. *Aconitum heterophyllum* Wall. ex Royle.

Fig. 14. *Viola biflora* L.

Fig. 15. *Paeonia emodi* Royle, in Spin Sar Daral valley 2900m a.s.l.

Fig. 16. *Primula denticulata* Sm.

Fig. 17. *Rhododendron anthopogon* D. Don.

Fig. 18. *Viburnum grandiflorum* Wall. ex DC.

Fig. 19. *Bistorta affinis* (D.Don) Greene in the alpine region of Daral Dand 3402 m a.s.l.

Quantitative ethnobotanical indices

Relative frequency citation: The RFC analysis reveals the sociocultural importance of plants, which plays a significant role in determining their ethnobotanical uses, highlighting the intricate relationship between cultural values and plant utilization. The RFC in our study ranged from 0.7741 to 0.019. The larger the number of citations indicates the importance of the plant species to the informants and their usage in the area (Hassan *et al.*, 2018).

Among these *Lepidium ruderale* L. (0.7741), followed by *Berberis lycium* Royle (0.63225), *Mentha longifolia* (L.) L. (0.6322), *Viola canescens* Wall. (0.6258), *Androsace rotundifolia* Hardw. (0.1354) and *Aconitum rotundifolium* Kar & Kir. (0.1096) were the species with the highest RFC, whereas *Arisaema flavum* (Forssk.) Schott. (0.019) showed the lowest RFC.

Use value: It indicates the use of plants for different purposes. In our studies UV ranged between 0.8387 and 0.1548. According to UV analysis, *Primula denticulata* Sm. showed the highest UV (0.8387) followed by *Pinus wallichiana* A.B. Jacks. (0.8129), *Mentha longifolia* (L.) L. (0.7741), while *Paeonia emodi* Royle (0.77419), *Androsace gorodkovii* subsp. *semiperennis* (Jurtzev) Kozhevn.

(0.1870), *Ranunculus munroanus* J.R. Drumm. ex Dunn (0.1741), *Aconitum rotundifolium* Kar. & Kir. (0.1612) and *Anthriscus nemorosa* (M. Bieb.) Spreng. (0.1548). The high UV indicates that these plants are prevalent in the area and heavily relied upon by the indigenous inhabitants. According to the results, plants that are used frequently tend to have high UV (Hassan *et al.*, 2019).

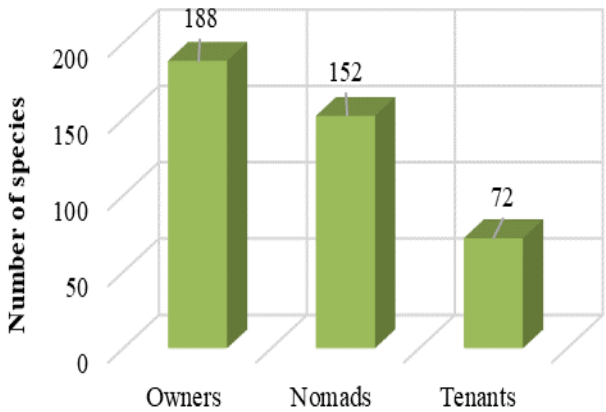

Fig. 20. Cross-culture studies in relation to plant use.

Fidelity level: The higher FL of a plant means that this plant is reported by a larger number (majority) of the informants for a particular use. These plants are used more frequently as compared to those plants which had lower FL values. The highest FL were reported for *Salvia hains* Royle ex Bentham (98.48) followed by *Berberis lyceum* Royle (98.36), *Trillium govanianum* Wall. ex D. Don (97.75), *Bergenia ciliata* (Haw.) Sternb. (97.64), *Dioscorea deltoidei* Wall. ex Griseb. (96.77) and *Geum elatum* Wall. ex G. Don (96.15). In the present study, no plant species was recorded with a 100% FL. However, the lowest FL was recorded for *Juniperus communis* L. (11.26) and *Eritrichium canum* (Benth.) Kitam. (2.702). According to Hassan *et al*., (2019) plants with high FL are promising sources of drug discovery.

Conclusion and recommendations: The study area is floristically and ethnobotanically rich, and the local inhabitants extensively utilize these taxa for medicinal and socioeconomic purposes. These indigenous people are unaware of the sustainable use practices therefore, these plants are unsustainably utilized, which may lead to species extirpation. Therefore, proper sustainable utilization and conservation of these taxa for future generations is recommended. *In-situ* and *ex-situ* conservation techniques may be adapted for conservation of these taxa. It is further recommended that the study area may be declared as a protected area for conservation of these taxa. In addition, there is a need to scientifically validate the novel ethnobotanical uses based on phytochemical investigations.

References

Abbasi, A.M., A.M. Khan, M. Ahmad and M. Zafar. 2012. Medicinal plant biodiversity of Lesser Himalayas-Pakistan. *Springer, New York.*, pp 1-234.

Abbasi, A.M., M.A. Khan, M. Ahmad, M. Zafar, H. Khan, N. Muhammad and S. Sultana. 2009. Medicinal plants used to treat Jaundice and Hepatitis based on Socio-Economics documentation. *Afr. J. Biotechnol*., 8(8): 1643-1650.

Abbasi, A.M., M.A. Khan, M. Ahmad, M. Zafar, S. Jahan and S. Sultana. 2010a. Ethnopharmacological application of medicinal plants to cure skin diseases and folk cosmetics among the tribal communities of North-West Frontier Province, *Pak. J. Ethnopharm*., 128(2): 322-335.

Abbasi, A.M., M.A. Khan, M. Ahmad, R. Qureshi, M. Arshad, S. Jahan, M. Zafar and S. Sultana. 2010b. Ethnobotanical study of wound healing herbs among the tribal communities in Northern Himalaya Ranges District Abbottabad, Pakistan. *Pak. J. Bot*., 42(6): 3747-3753.

Adnan[1], S.M., A.A. Khan, A. Latif and Z.K. Shinwari. 2006. Threats to the sustainability of ethno-medicinal uses in Northern Pakistan (A Case Study of Miandam Valley, District Swat, NWFP Province, Pakistan). *Lyonia,* 11(2): 91-100.

Ahmad[2], M., S. Sultana, S.F. Hadi, T. Ben. Hadda, S. Rashid, M. Zafar, M.A. Khan, P. Zada and G. Yaseen. 2014. An Ethnobotanical study of medicinal plants in the Chail valley District Swat Pakistan mountainous region. *J. Ethnobiol. Ethnomed.,* 12(2): 10-36.

Ahmad[3], N., S. Anwar, H. Fazal and B.H. Abbasi. 2013. Medicinal plants used in indigenous therapy by people of Madyan Valley in District Swat, Pakistan. *Int. J. Med. Arom. Plants*, 3(1): 47-54.

Ajaib, M., Z.D. Khan, N. Khan and M. Wahab. 2010. Ethnobotanical studies on useful shrubs of District Kotli, Azad Jammu & Kashmir, Pakistan. *Pak. J. Bot.,* 42(3): 1407-1415.

Akhtar, N., A. Rashid, W. Murad and E. Bergmeier. 2013. Diversity and use of ethno-medicinal plants in Swat, North Pakistan. *J. Ethnobiol. Ethnomed.*, 9: 1-25.

Alam, J., Z. Abbas, S. Kousar, G. Jan, S. Karim, S. Muhammad, M. Islam, N. Harun, A. Yawer and Z. Abideen. 2023. Plants of the Hunza valley (Central Karakorum), Northern Pakistan: ecology, diversity and conservation. *Pak. J. Bot.,* 55(6): DOI: http://dx.doi.org/10.30848/PJB2023-6(8).

Ali, H. 2003. *Trade of medicinal plants in Mingora City*. M.Sc. Thesis, Department of Botany, Government Postgraduate College, Bannu., 44(6): 1905-1912.

Ali, H. and M. Qaiser. 2009. Ethnobotany of Chitral valley, Pakistan, with particular reference to medicinal plants. *Pak. J. Bot.,* 41(4): 2009-2041.

Ali, H., H. Ahmad and M. Yousaf, 2003.Tradeof local medicinal herbs in Mingora City, Pakistan, *WWF. Proc. Int. Workshop. Islamabad*, 10-17.

Ali, H., H. Ahmad, B.K. Marwat, M. Yousaf, G. Gul and I. Khan. 2012. Trade potential and conservation issues of medicinal plants in District Swat, Pakistan. *Pak. J. Bot.,* 44(6): 1905-1912.

Ali., S.I. and M. Qaiser. 1986. A phytogeographical analysis of the phanerogams of Pakistan and Kashmir. *Proceedings of the Royal Society of Edinburgh*, 89: 89-101.

Ali[4], K., N. Khan, I.U. Rahman, W. Khan, M. Ali, N. Uddin and M. Nisar. 2018. The Ethnobotanical Domain of the Swat Valley, Pakistan. *J. Ethnobiol. & Ethnomed.*, 14: 39.

Ali[5], H., J. Sannai, H. Sher and A. Rashid. 2011. Ethnobotanical profile of some plant resources in Malam Jabba Valley of Swat, Pakistan. *J. Med. Plants Res.,* 5(17): 4171-4180.

Ansari, N.M., L. Houlihan, B. Hussain and A. Pieroni. 2005. Antioxidant activity of five vegetables traditionally consumed by South-Asian migrants in Bradford, Yorkshire, UK. *Phytoth. Res.*, 19: 907-911.

Arshad, M. and S. Akram. 1999. Medicinal plants of University of Arid Agriculture, Rawalpindi. *Hamdard Med*., 40: 46-50.

Asmus, U. 1990. Floristic and phytosociological study in Gropiusstadt (Berlin) Germany. *Verh. Brel. Bot. Vor.*, 8(0): 97-140.

Auda, M.A., 2023. Taxonomical knowledge, biological spectra and ethnomedicinal plant inventory of Asteraceae family in various areas of Gaza strip, Palestine. *Pak. J. Bot.,* 55(6): DOI: http://dx.doi.org/10.30848/PJB2023-6(36).

Badshah, L., F. Hussain and Z. Sher. 2013. Floristic inventory, ecological characteristics and biological spectrum of rangeland, District Tank, Pakistan. *Pak. J. Bot.,* 45(4): 1159-1168.

Balemie, K. and F. Kebebew. 2006. Ethno botanical study of wild edible plants in Derashe and Kucha Districts, South Ethiopia. *J. Ethnobiol. Ethnomed.,* 2 (1): 53.

Bilal[6], H., H. Sher, X. Li and R. Quraishi. 2020. Ecological footprint and sustainability aspects of commercially harvested non-timber forest products (Medicinal and Aromatic Plants) in Hindu Kush Himalayan Region of Swat Pakistan. *Ethnobot. Res. Appl.,* 20: 09.

Champion, H.G., S.K. Seth and G.M. Khattak. 1965. Forest Types of Pakistan. *Pak. For. Inst. Pesh.,* 111-144.

Dastagir, G. and A.M. Abbasi. 2004. Folk medicines used for the treatment of jaundice in district Haripur, Pakistan. *Pak. J. Plant Sci.,* 10(2): 119-123.

Della, A., D. Paraskeva-Hadjichambi and A.C. Hadjichambis. 2006. An ethnobotanical survey of wild edible plants of Paphos and Larnaca countryside of Cyprus. *J. Ethnobiol. Ethnomed.,* 2: 34. https://doi.org/10.1186/1746-4269-2-34.

Durrani, M.J. and F. Hussain. 2003. Ethnoecological profile of plants of Harboi rangeland, Kalat, Pakistan. *Int. J. Biol. Biotech.,* 2: 15-22.

Gilani, S.S., S.Q. Abbas. Z.K. Shinwari, F. Hussain and K. Nargis. 2003. Ethnobotanical studies of Kurram Agency, Pakistan through rural community participation. *Pak. J. Biol. Sci*., 6: 1368-1375.

Gul, F., Z.K. Shinwari and I. Afzal. 2012. Screening of indigenous knowledge of herbal remedies for skin diseases among local communities of northwest Punjab. *Pak. J. Bot*., 44(5): 1609-1616.

Hamayun, M. 2005. Ethnobotanical studies of some useful shrubs and trees of District Buner, Pakistan. *Ethnobot. Leaflets,* 1: 1-17.

Hamayun, M., M.A. Khan and S. Begum. 2003. Marketing of medicinal plants of Utror-Gabral Valleys, Swat, Pakistan. *Ethnobot. Leaflets,* 1: 1-13.

Hamayun, M., S.A. Khan, E.Y. Sohn and I.J. Lee. 2006. Folk medicinal knowledge and conservation status of some economically valued medicinal plants of District Swat, Pakistan. *Lyonia.*, 11(2): 101-113.

Hamayun[7], M., S.A. Khan, I. Iqbal, G. Rehman, T. Hayat and M.A. Khan. 2005. Ethnobotanical Profile of Utror and Gabral Valleys, District Swat, Pakistan. *Ethnobot. Leaflets.,* 1: 1-37.

Hassan, N., M. Ud Din, M. Shuaib, F. Ul Hassan, M. Nisar, A. Khan, S.S. Shah, S. Ahmad, S. Hussain, W. Shah, H. Ali and A. Iqbal. 2018. Medicinal plants consumption in Darmai valley, Swat District Pakistan. *J. Biod. Environ. Sci.,* 12 (5): 120-129.

Hassan, N., M. Ud Din, M. Shuaib, F. Ul Hassan, Y. Zhu, Y. Chen, M. Nisar, I. Iqbal, P. Zada and A. Iqbal. 2019. Quantitative analysis of medicinal plants consumption in the highest mountainous region of Bahrain valley, Northern Pakistan. *Ukrainian J. Ecol.,* 9(1): 35-49.

Hassan, N., M.U. Din, F.L. Hassan, I. Abdullah, Y. Zhu, W. Jinlong, M. Nisar, Y. Iqbal, S.F. Wadood, S.S. Iqbal, S.I. Shah, I. Naeem, A. Sarwar, M. Ihsan, H. Khan and U. Zeb. 2020. Identification and quantitative analyses of medicinal plants of Swat. *Ukrainian J. Ecol.,* 9(1): 55-61.

Hassan, W. Murad, N. Ahmad, A. Tariq, I. Khan, N. Akhtar and S. Jan. 2015. Indigenous Uses of the Plants of Malakand Valley, District Dir (Lower), Khyber Pakhtunkhwa, Pakistan. *Pak. J. Weed Sci. Res.,* 21(1): 83-99.

Hussain, F., M. Islam and A. Zaman. 2006. Ethnobotanical profile of plants of Shawar Valley, District Swat, *Pakistan. Int. J. Biol. Biotech*., 3(2): 301-307.

Hussain, K., A. Shahzad and S.Z. Hussnain. 2008. An Ethnobotanical survey of important wild Medicinal plants of Hattar District Haripur, Pakistan. *Ethnobot. Leaflets,* 12: 29-35.

Hussain, M., G.M. Shah and M.A. Khan. 2006. Traditional medicinal and economic uses of Gymnosperms of Kaghan valley, Pakistan. *Ethnobot. Leaflets.,* 13: 1509-21.

Hussain, Z.S., R.N. Malik, M. Javaid and S. Bibi. 2008. Ethnobotanical properties and uses of medicinal plants of Morgha Biodiversity Park, Rawalpindi. *Pak. J. Bot*., 40(5): 1897-1911.

Ide, R. and H. Oguma. 2010. Use of digital cameras for phenological observations. *Ecol. Inform.,* 5: 339-347.

Ijaz, F., Z. Iqbal, I.U. Rahman, J. Alam, S.M. Khan, G.M. Shah, K. Khan and A. Afzal. 2016. Investigation of traditional medicinal floral knowledge of Sarban Hills, Abbottabad, KP, Pakistan. *J. Ethnopharmacol.,* 179: 208-233.

Islam[13], M., H. Ahmad, A. Rashid, A. Razzaq, N. Akhtar and I. Khan. 2006. Weeds and medicinal plants of Shawar Valley, District Swat. *Pak. J. Weed Sci. Res.,* 12(1-2): 83-88.

Jarvis, A., J. Ramirez, B. Anderson, C. Leibing and P. Aggarwal. 2010. Scenarios of climate change within the context of agriculture. In: Climate Change and Crop Production. *CAB International,* 1-291.

Kayani[14], S., M. Ahmad, S. Sultana, Z.K. Shinwari, M. Zafar, G. Yaseen, M. Hussain and T. Bibi. 2015. Ethnobotany of medicinal plants among the communities of alpine and sub-alpine regions of Pakistan. *J. Ethnopharmacol.,* 164: 186-202.

Khan, A.A., F. Ali, M. Ihsan, K. Hayat and G. Nabi. 2015. Ethnobotanical study of the medicinal plants of Tehsil Charbagh, District Swat, Khyber Pakhtunkhwa, Pakistan. *American-Eurasian J. Agric. & Environ. Sci.,* 15(7): 1464-1474.

Khan, M.A., M.A. Khan and M. Hussain. 2012. Medicinal plants used in folk recipes by the inhabitants of Himalayan Region Poonch valley Azad Kashmir (Pakistan). *J. Basic. Appl. Sci.,* 8: 35-45.

Khan, M.P.Z., M. Ahmad, M. Zafar, S. Sultana, M.I. Ali and H. Sun. 2015. Ethnomedicinal uses of edible wild fruits (EWFs) in Swat Valley, Northern Pakistan. *J. Ethnopharmacol.* 173: 191-203.

Khan, S.M., N. Ud Din, M. Ilyas, Sohail, I. Ur Rahman, F. Ijaz, Z. Iqbal and Z. Ali. 2015. Ethnobotanical study of some medicinal plants of Tehsil Kabal, District Swat, KP, Pakistan. *Med. Aromat. Plants,* 4(3): 57-64.

Khan, S.M., N.U. Din, Sohail, I.U. Rahman, F. Ijaz, Z. Iqbal and Z. Ali. 2015. Ethnobotanical study of some medicinal plants of Tehsil Kabal, District Swat, KP, Pakistan. *Med. Aromat. Plants,* 4: 189. doi:10.4172/2167-0412.1000189.

Khan, S.W. and S. Khatoon. 2008. Ethnobotanical studied on some useful Herbs of Haramosh and Bugrote Vallies in Gilgit, Northern areas of Pakistan. *Pak. J. Bot.,* 40(1): 43-58.

Khan, W.M., S.Z. Shah, and M.S. Khan. 2016. Ethnobotanical relevance of the Weed Flora of Tall Dardyal, Tehsil Kabal, District Swat, Pakistan. *Pak. J. Weed Sci. Res*., 22(1): 125-145.

Khan, W.S., S.Z. Shah, M.S. Khan and N. Akhtar. 2020. Evaluation of indigenous knowledge of medicinal plants from Tall Dardyal Hills, Khyber Pakhtunkhwa, Pakistan. *J. Herb. Med.,* 20:100314.

Khattak, N.S., F. Nouroz, I.U. Rahman and S. Noreen. 2015.Ethno veterinary uses of medicinal plants of district Karak, Pakistan. *J. Ethnopharmacol.,* 171: 273-279.

Latif, A., Z.K. Shinwari, j. Hussain and S. Murtaza. 2006. NTFPS: An alternative to forest logging in Miandam and Sultanar Valley Swat. *Lyonia.*, 11(2): 15-21.

Majid, A., H. Ahmad, Z. Saqib, I.U. Rahman, U. Khan, J. Alam, A.H. Shah, S.A. Jan and N. Ali. 2019. Exploring threatened traditional knowledge; ethnomedicinal studies of rare

endemic flora from Lesser Himalayan region of Pakistan. *Lyonia.*, 11(2): 32-41.

Malik, R.N., S.Z. Husain and I. Nazir. 2010. Heavy metal contamination and accumulation in soil and wild plant species from industrial area of Islamabad. *Pak. J. Bot*., 42(1): 291-301.

Marqueus, M.C.M., J.J. Roper and A.P.B. Salvalaggio. 2004. Phenological patterns among plants life-form in a subtropical forest in Southern Brazil. *J. Plant Ecol.*, 173(2): 203-213.

Muhammad, N., M. U. K. Khan, N. Uddin, N. Ali, S. Ullah and M. Umer. 2020. Ethnoveterinary medicines used against various livestock disorders in the flora of Shamozai Valley, Swat, KP Pakistan. *Manuscript.*, 5(5): 377-388.

Muhammad, N., N. Ali and N. Uddin. 2019. Ethno-veterinary practices used for treatment of various ailments in hilly areas of Melagah valley district Swat KPK, Pakistan. *Int. J. Bot. Stud.*, 4(3): 171-179.

Mushtaq, W., M. Ishtiaq, M. Maqbool, M. Ajaib, T. Hussain, M.W. Mazhar and T. Sardar. 2024. Exploration of antidiabetic potential of traditional ethno-medicinal plant *Viscum cruciatum* Sieber ex Boiss. (Loranthaceae) from Rawalakot district, Poonch, Azad Jammu and Kashmir, Pakistan. *Pak. J. Bot.*, 56(6): DOI: http://dx.doi.org/ 10.30848/PJB2024-6(15).

Nasir, S., J. Ahmed and M. Asrar. 2014. Medicinal Plants: a promising resource for poverty alleviation in the milieu of Swat. *J. Biol*., 4(2): 237-245.

Nawab, J., S. Khan, M.T. Shah, Z. Qamar, I. Din, Q. Mahmood, N. Gul and Q. Huang. 2015. Contamination of soil, medicinal, and fodder plants with lead and cadmium present in mine-affected areas, Northern Pakistan. *Environ. Monit. Assess.*, 187: 605.

Noor, M.J. and U. Kalsoom. 2011. Ethnobotanical studies of selected plant species of Ratwal Village, District Attock, Pakistan. *Pak. J. Bot.*, 43(2): 781-786.

Oosting, H.J. 1956. The Study of Plant Communities, 2nd edition. W.H. Freeman and Co., *Sanfrancisco*, pp: 69-78.

Oosting, H.J. and D. Hess. 1956. Microclimate and a relic stand of *Tsuga canadensis* in the Lower Piedmont of North Carolina. *Ecology.*, 37: 28-39.

Phillips, O., A.H. Gentry, C. Reynel, P. Wilkin and C. Galvez-Durand. 1994. Quantitative Ethnobotany and Amazonian Conservation. *Conserv. Biol.*, 8(1): 225-248.

Pieroni, A., S. Nebel, C. Quave, H. Munz and M. Heinrich. 2002. Ethnopharmacology of Liakra: traditional weedy vegetables of the Arbereshe of the Vulture area in southern Italy. *J. Ethnopharmacol.*, 81: 165-185.

Qadir, G., G.M. Shah, M. Hussain, J. Alam, S. Firdous and A. Gul. 2023. Floristic Studies, Biological Spectrum and Phenology of Laspur Valley, district Chitral, Hindukush range Pakistan. *J. Xi'an Shiyou Uni.*, 66 (03): 101-132

Qazi, W.A., Saqib, Z. and Haq, Z.M. 2023. Diversity and Distribution of Endemic Flora in Pakistan. *Proceedings of the Pakistan Academy of Sciences: B. Life and Environmental Sciences*, 60(2), 165–179. https://doi.org/ 10.53560/PPASB(60-2)777.

Qureshi, R. and G.R. Bhatti. 2008. Ethnobotany of plants used by the Thari people of Nara Desert, Pakistan. *Fitoterapia.*, 79: 468-473.

Qureshi, R., A. Waheed, M. Arshad and T. Umbreen. 2009a. Medico-ethnobotanical inventory of Tehsil Chakwal, Pakistan. *Pak. J. Bot*., 41(2): 529-538.

Qureshi, R.A., M.A. Ghufran, S.A. Gilani, Z. Yousaf, G. Abbas and A. Batool. 2009b. Indigenous medicinal plants used by local women in Southern Himalayan regions of Pakistan. *Pak. J. Bot*., 41(1): 29-25.

Raunkiaer, C.C. 1934. The life forms of plants and statistical plants geography. Clarendon Press Oxford, pp 623.

Razzaq, A., F. Hadi, A. Rashid, M. Ibrar and U. Ali. 2015. Exploration of medicinal plants and their conservation status at higher altitude of District Shangla, Khyber Pakhtunkhwa, Pakistan. *Amer-Eur. J. Agric. Environ. Sci*., 15(3): 328-331.

Rosenzweig, C., G. Casassa, D.J. Karoly, A. Imeson, C. Liu, A. Menzel, S. Rawlins, T.L. Root, B. Seguin, P. Tryjanowski and C.E. Hanson. 2007. Assessment of observed changes and responses in natural and managed systems. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. M.L. Parry, O.F. Canziani, J.P. Palutikof, and P.J. van der Linden, Eds. Cambridge University Press. pp 79-131.

Sarwat, Z.K. Shinwari and N. Ahmad. 2012. Screening of potential medicinal plants from District Sawat Specific for Controlling Women Diseases. *Pak. J. Bot.*, 44(4): 1193-1198.

Shad, A.A., H.U. Shah and J. Bakht. 2013. Ethnobotanical assessment and nutritive potential of wild food plants. *JAPS*., 23(1): 92-99.

Shah, A.S., N. A. Shah, S. Ullah, M. M. Alam, H. Badshah, S. Ullah and A.S. Mumtaz. 2016. Documenting the indigenous knowledge on medicinal flora from communities residing near Swat River (Suvastu) and in High Mountainous Areas in Swat-Pakistan. *J. Ethnopharmacol.*, 166: 157-167.

Sher, H. and F. Hussain. 2009. Ethnobotanical Evaluation of Some Plant Resources in Northern Part of Pakistan. *Afr. J. Biotech.*, 8(17): 4066-4076.

Sher, H. and M. Al-Yemeni. 2011. Economically and ecologically important plant communities in high altitude coniferous forest of Malam Jabba, Swat, Pakistan. *Saudi J. Biol. Sci.*, 18(1): 53-61.

Sher, H., A. Aldosari and R.W. Bussman. 2015. Morels of Palas valley, Pakistan: A potential source for generating income and improving livelihoods of mountain communities. *Eco. Bot.*, XX (X): 1-15.

Sher, H., A. Aldosari, A. Ali and H.J. de-Boer. 2014. Economic benefits of high value medicinal plants to Pakistani communities: an analysis of current practice and potential. *J. Ethnobiol. Ethnomed.*, 10- 71.

Sher, H., A. Aldosari, A. Ali and H.J. de-Boer. 2014. Economic benefits of high value medicinal plants to Pakistani Communities: An analysis of current practice and potential. *J. Ethnobiol. Ethnomed.*, 10: 71.

Sher, H., A. Aldosari, A. Ali and H.J. de-Boer. 2015. Indigenous knowledge of folk medicines among tribal minorities in Khyber Pakhtunkhwa, northwestern Pakistan. *J. Ethnopharmacol.*, 166: 157-167.

Sher, H., A. ldosari, A. Ali and H.J. de-Boer. 2015. Indigenous knowledge of folk medicines among tribal minorities in Khyber Pakhtunkhwa, Northwestern Pakistan. *J. Ethnopharmacol.*, 166: 157-167.

Sher, H., H. Ali and S. Rehman. 2012. Identification and conservation of important plant area for the distribution of medicinal, aromatic & economic plants in the Hindukush-Himalaya Mountain range. *Pak. J. Bot.*, 44: 187-194.

Sher, H., Inamuddin, Z. Khan, R.W. Bussmann and I.U. Rahman. 2020. Medicinal Plant Diversity of Hindubag Mountain, Lalku Valley, District Swat. *Ethnobot. Res. Appl.*, 20: 10.

Sher, H., M. Elyemeni, H. Sher and K. Hussain. 2011. Ethnobotanical and economic observations of some plant resources from the Northern Parts of Pakistan. *Ethnobot. Res. Appl.*, 9: 027-041.

Sher, H., N.M. Alyemeni, L. Wijaya and J.A. Shah. 2010. Ethnopharmaceutically important medicinal plants and its utilization in traditional system of medicine, observation

from the Northern Parts of Pakistan. *J. Med. Plants Res.,* 4(18): 56-67.

Sher, H., R.W. Bussmann and R. Hart. 2017. Promoting sustainable use of medicinal and aromatic plants for livelihood improvement and biodiversity conservation under global climate change, through capacity building in the Himalaya Mountains, Swat District. *Ethnobot. Res. Appl.,* 20(12): 3033-3044.

Shinwari, M.I. and M.A. Khan. 2000. Folk use of medicinal herbs of Margalla Hills National Park, Islamabad. *J. Ethnopharmacol.,* 69(1):45-56. doi: 10.1016/s0378-8741(99)00135-x.

Shinwari, Z.K. 2010. Medicinal Plants Research in Pakistan. *J. Med. Pl. Res.,* 4(3): 161-176.

Shinwari, Z.K. and M. Qaiser. 2011. Efforts on conservation and sustainable use of medicinal plants of Pakistan. *Pak. J. Bot*., 43(Special Issue): 5-10.

Shinwari, Z.K., A.A. Khan and T. Nakaike. 2003. Medicinal and other useful plants of District Swat, Pakistan. Peshawar, Pakistan. *J. Med. Plant Res.,* 4(3): 161-176.

Shinwari, Z.K., T. Watanabe and Y. Yousaf. 2000b. Medicinal Plants of Pakistan: An overview, Proceedings of Nepal-Japan Joint Symposium on Conservation of Natural Medicinal Resources and their Utilization. Kathmandu Nepal, Nov. 5-11, 2000. Edited by T. Watanabe, A. Takano, M.S. Bistan & H.K. Saiju. *Society for the Conservation and Development of Himalayan Medicinal Resources, Tokyo, Japan.,* 279-285.

Shrestha, S., P.K. Jha and K.K. Shrestha. 1998. Vegetation of degraded, regenerating and natural forests in Riayle, Kavrepalanchok, Nepal. *Pak. J. Plant Sci.*, 4: 13-28.

Stojanoski, N. 1999. Development of health culture in Veles and its region from the past to the end of the 20th century. *Veles, Soc. Sci. Art*., 13-34.

Tasser, E. and U. Tappeiner, 2002. Impact of land use changes on mountain vegetation. *Appl. Veg. Sci.,* 5: 173-184.

Ullah, M., H. Sher, A. Ullah, S. Ullah, Sikandar and M.S. Ali. 2014. Traditional uses of medicinal plants for the treatment of livestock ailments in Udigram Swat, Khyber Pakhtunkhwa, Pakistan. *Res. Opin. Anim. Vet. Sci.,* 4(3): 138-141.

Ullah, Q., A. Rashid and N. Akhtar. 2006. Ethnobotanical Survey in Kot Manzary Baba Valley Malakand Agency, Pakistan. *Pak. J. Plant Sci.,* 12(2): 115-121.

Yousufzai, S.A., N. Khan, M. Wahab and K. Ajaib. 2010. Ethnomedicinal Study of Marghazar Valley, Pakistan. *Int. J. Biol. Biotech.,* 7 (4): 409-416.

Zeb, A., M.S. Khan and H. Ahmad. 2013. Wild Plants of the Dughalgay Valley District Swat, Pakistan; Traditional Use and Marketing. Emir. *J. Food Agric.,* 25(10): 234-249.

(Received for publication 3 April 2024)