

Ethnobotanical survey and utilization of medicinal and food plants of Panjgur, Balochistan, Pakistan

MUHAMMAD AYOUB^{1,*}, SHAZIA SAEED¹, ALIA AHMED¹, MARIA AHMED²

¹Department of Botany, University of Balochistan Quetta. Sariab Road, Quetta, Balochistan, Pakistan. Tel.: +92-81-9211264,

*email: mayubbotany@gmail.com

²University Institute of Radiological Sciences and Medical Imaging Technology, Faculty of Allied Health Sciences, University of Lahore. 1 Km Defence Road, Lahore, Punjab, Pakistan

Manuscript received: 24 August 2022. Revision accepted: 2 March 2023.

Abstract. Ayoub M, Saeed S, Ahmed A, Ahmed M. 2023. Ethnobotanical survey and utilization of medicinal and food plants of Panjgur, Balochistan, Pakistan. *Asian J Ethnobiol* 6: 26-35. The present study observes the ethnobotanical and ethnopharmacological of indigenous rural communities' knowledge of the Panjgur District of Balochistan, Pakistan. The rural community of Panjgur utilizes different plants as medicine and food, and wild food plants play a secondary role in dietary supplementation. The study aimed to document medicinal plants and traditional herbal medicines used by rural people in the area. Plant specimens were collected, and plant uses were recorded by semi-structured interviews and group discussions of 120 informants, of which 90 were males and 30 were females under different age groups. A total of 63 species were used as medicine or food by local communities. Most species reported were herbs (56%), followed by shrubs (24%). The major preparation mode was fresh use (36%), and leaves were the main parts used. The total use citations for all the plant species used to cure various ailments were reported. The highest use citation for stomachic problems followed by a throat infection, anti-acne, skin allergy, and joint pain. The Use Value (UV) ranged from 0.03 to 3 by *Cannabis sativa*, followed by *Aloe vera*, *Arundo donax*, *Chenopodium album*, *Citrullus colocynthis*, *Convolvulus arvensis*, *Prosopis juliflora*, *Phoenix dactylifera*, *Lactuca sativa*, *Ziziphora clinopodioides*, and *Cestrum nocturnum*. This study is the first initiative for ethnobotanical investigation in the Panjgur District of Balochistan. The local community not only uses these medicinal and food plants as food and for herbal treatments but also considers them a source of income. The information generated from this study will also provide a baseline for future investigation to be carried out to evaluate the nutritional and bioactive properties of wild medicinal and food plants.

Keywords: Balochistan, ethnobotany, medicinal plants, Pakistan, Panjgur, wild food plants

INTRODUCTION

Ethnobotany studies human-plant interrelationships (Martin 1995; Balick et al. 1996). Plants have been utilized for food, medicines, religious practices, social life, and many other purposes since ancient times (Cunningham 2001). Indigenous knowledge and traditional primary health care systems are common among communities worldwide. Eighty percent of the world's population, including Pakistan, depends on wild plants for their food and healthcare system (Niroula and Singh 2015). In Pakistan, the local communities rely on wild edible plants for daily food and herbal treatments for various ailments. These communities utilize these plants in their daily use and as a source of income. In developing countries, 60–80% of the population depends on plant-based medicines because they are an economical and safe alternative to often inaccessible allopathic medicine (HAQ et al. 2021; Aziz et al. 2022).

Recent research reported on phytochemicals, essential oils, and other biochemical compounds (Mustafa and Verpoorte 2007; Ntie-Kang et al. 2016; Ahmed et al. 2020b; Ahmed et al. 2020a). These compounds can be isolated from different parts of plants. They can treat diseases like cough, stomach disorder, headache, joint

pains, cardiovascular diseases, diuretics, and inflammation and are successfully used against cancer and diabetes. (Nantongo et al. 2018; Le et al. 2020; Pudziuvelyte et al. 2020). Wild food plants constitute an important part of the food habits of diverse ethnic communities worldwide. Further, these plants fulfill the food requirement in developing countries, reducing hunger issues (Sulaiman et al. 2022). Pakistan, however, is one of the world's hot spots for biodiversity but still faces huge challenges of preservation and sustainable use of biological resources. Pakistan's geographical region has diverse climatic zones and unique biodiversity, including approximately 6000 plant species, of which 400-600 are considered medicinally important (Hamayun et al. 2003a,b). Balochistan, the largest Province of Pakistan, has arid to semi-arid ecological regions ranging from cool temperate to coastal tropics (Ahmed et al. 2020a). The diverse ecological conditions increase the floral diversity of the region. Previously, several ethnobotanical studies have been conducted to document folk medicinal plants, therapeutical values, phytochemicals, and their herbal recipes from Balochistan, Pakistan (Baloch et al. 2017; HAQ et al. 2021; Aziz et al. 2022). However, little work is documented on the studied area's floral diversity and ethnobotanical knowledge (Ahmed et al. 2020a). The area was not much

investigated, maybe because of its remoteness, law and order situation, and cultural restrictions.

We hypothesized that due to the area's remoteness along with the villages investigated, there would be a considerable variation in the flora and ethnobotanical knowledge of the people from other areas of the province. Thus the major objective of the current study was to document the indigenous knowledge about the diverse flora and wild medicinal plants used for primary healthcare, particularly focusing on methods of preparation and administration of herbal recipes. Moreover, these valuable wild plants can be utilized as a food source besides the cultivated plants, including the major fruiting and economically important plants.

MATERIALS AND METHODS

The study area and the people

Panjgur District is the 7th largest district in Balochistan with an area of 16891 sq Km, located about 519 km southwest of Quetta, Balochistan, Pakistan. The district is located at 26.976779°N Latitude, 64.083632°E Longitude, towards the southwest region of Balochistan. It is surrounded by the Republic of Iran on the west, Awaran and Kech on the south, and Washuk District on the north. Baloch, Brahvi, Pashtun, and Punjabi are the main tribes. The Baloch tribe is the major tribe and speaks the Balochi language. Geographically, the area is located in the mountainous Siahian range (North) and Makran range (South). The temperature in Panjgur District is warm in summer (maximum 45°C) and cool in winter (minimum -4°C), and the annual rainfall is 25 mm.

Field survey and plant collection

Ethnobotanical data were collected through semi-structured interviews and questionnaires among 12 different communities of the Panjgur District from 2019 to 2020. Group discussions were arranged with key informants, especially the older men and women were focused at their gathering places and homes, respectively. The information about medicinal and edible flora and its utilization pattern was discussed in detail in their local Balochi language. Ethnobotanical information was gathered from 120 local informants, including 90 men and 30 women. The key informants included: medicinal plant collectors, traditional healers, farmers, and old age males and females. Ethnographic information about their names, age groups (Table 1), ethnic backgrounds, qualifications, and occupations was recorded (Tables 2 and 3). In addition, the informants were interviewed in detail about the

vernacular names of plants, parts used as food or medicines, and methods of preparation and administration were discussed.

Data were collected through discussions with local people willing to share their folk knowledge about the use of plants. The pictures of ethnobotanical uses were also captured during the field survey. Permission for field survey and consent was obtained from each of the informants. Plants were collected and identified by Author two. Details of information provided by informants were recorded (Table 4). Plants were further identified with the help of Plants of the World Online (POWO 2021). The voucher specimens were submitted to the Eco-Taxonomy Lab (ETL), University of Balochistan Quetta Pakistan.

Quantitative analysis

Ethnobotanical data were analyzed by using quantitative methods as follow:

Use Value (UV)

The UV of plants was calculated by using the method of Gazzaneo et al. (2005) with the help of the following formula:

$$UV = U_i / N$$

U_i is the preferred number of mentioned species uses, and N is the number of informants.

Informant consensus factor (ICF)

The ICF was calculated by the method of Heinrich et al. (1998) using the following formula:

$$ICF = Nur - N_t / Nur - 1$$

Where, Nur is the number of usage reports for a particular ailment category, and N_t is the number of plants used for a particular ailment category by all informants. The value of ICF ranges from 0 to 1. A high value (close to 1.0) indicates that many informants use relatively few plants. A low value indicates that the informants disagree with the plant used to cure particular illnesses.

Table 1. Age and gender characteristics of informants interviewed in the study area

Gender	Age (Years)				Total
	15-30	31-45	46-60	61-above	
Male	40	18	22	10	90
Female	07	14	06	03	30

Table 2. Qualification of informants interviewed at the study site

Gender	Uneducated	Middle	Matric	Qualification				Total
				Intermediate	Bachelor	Master	M.Phil	
Male	37	05	18	09	06	14	01	90
Female	15	03	06	03	0	03	0	30

Table 3. Occupation of informants

Male		Female	
Teacher	05	Housewife	25
Businessman	04	Teacher	02
Govt Servant	10	Tailor	02
Agricultural Officer	01	Female Health Worker	01
Farmer	22		
Labor	11		
Levies Constable	02		
Student	10		
Butcher	01		
Retired Army man	02		
Driver	04		
Shop keeper	16		
Vaccinator	01		
Doctor	01		
Total	90	Total	30

RESULTS AND DISCUSSION

The present study is the first report of quantitative ethnobotanical investigation on the Panjgur District, Balochistan, Pakistan flora. The study was conducted between 2018 and 2021 using semi-structured interviews and group discussions with 120 informants. A total of 90 males and 30 females of different age groups were interviewed. The local inhabitants of the Panjgur District used various plant parts, as shown in Figure 1. Parts commonly used are listed as seeds, roots, stem, bark, whole plant, and fruits. The utility value of the leaves predominates (32%) all other parts, followed by fruits (19%) and stem (13%).

Collected plants included herbs (56%), followed by shrubs (24%), trees (16%), climbers and creepers (2% each) (Figure 2). The plants are used in different ways. Their mode of preparation included fresh (36%), cooked (17%), dry and powder (14% each), infusion (9%), decoction (6%), and heat (4%). Infusion is prepared by suspending plant material in cold and warm water, whereas decoction is made by boiling plant material in water. The powder is made by finely grinding the dried plant parts. Vegetables are fried in cooking oil, and fruit is taken in fresh and dried form. Twenty-seven species had single use and represented 44% of the total species. Like *Chenopodium album* has a single use, it is used for the fodder of animals. *Convolvulus arvensis* also has single use as fodder, while *C. spinosus* single use as fuel. A total of 26 species representing 42%, had dual uses; these plants are used for treating different ailments and sometimes used as food. A total of nine species representing 14%, had multiple uses, including *Phoenix dactylifera*, used as a fruit and sweet dish, which is also used for treating blood deficiency. Its leaves are used for fodder and making different products like baskets etc. Some vegetables are also used as food that also used to treat any ailment. For example, *Mentha piperita* is used as salad, and it is also used for treating stomach disorders.

In Figure 3, most plant species recorded are from the family Fabaceae with 7 species, then by Brassicaceae with

5 species, Asteraceae, Poaceae, and Solanaceae with 4 species of each. The recorded numbers of Apocynaceae, Lamiaceae, and Zygophyllaceae were three species. After that, Amaranthaceae, Amaryllidaceae, Arecaceae, Convolvulaceae, Moraceae, Plantaginaceae, and Rutaceae with two species each. The remaining 16 families were monotypic for medicinal taxa, including Apiaceae, Asphodelaceae, Cannabaceae, Combretaceae, Cucurbitaceae, Euphorbiaceae, Lythraceae, Myrtaceae, Nitraceae, Oleaceae, Rhamnaceae, Rosaceae, Tamaricaceae, Typhaceae, Verbenaceae, Vitaceae.

Use Value (UV)

Use value was calculated to evaluate the importance of plant species in terms of their traditional use in the study area (Table 4). This study revealed the relative importance of each plant species based on its relative use among informants. Use value was used to assess the relative importance of reported plant uses. Use value (UV) is an index widely used to quantify the relative importance of useful plants. The Use Value (UV) ranged from 0.03 (*Zygophyllum fabago*) to 3 (*Cannabis sativa*). Two (2) UV is reported for *Aloe vera* and *A. donax*. While, *C. album* 1.83, *Citrullus colocynthis* 1.3, *C. arvensis*, *P. juliflora*, *P. dactylifera*, *Lactuca sativa*, *Ziziphora clinopodioides*, *Cestrum nocturnum*, also reported with high UV values 1. The plants found during the study were grouped into wild and cultivated types. While their uses are divided into different categories such as Food, Fodder, Medicinal, Ornamental, Cosmetic, Timber, and other usages of wood. Some plants are reported for their single use, while some are used in multiple ways by the area's local people.

Multiple uses of plant (medicinal)

The *P. dactylifera* is one of the most abundant plants. Different varieties are found wild as well as cultivated in the area. It is medicinally very important and used to cure blood deficiency. Also, it is reported for various pharmacological activities like: analgesic, anti-inflammatory, hepatoprotective, anticancer, and antioxidant. Their high nutritional value increased their use to improve health, and they considered adding a full diet supplement. *Allium cepa* bulb is used to treat Hepatitis (B) by the area's local people. The *A. sativum* to control cholesterol level, blood pressure, and blood sugar. *Calotropis procera* leaves extract in water is taken to treat skin allergies. Latex is also used to treat insect bites and remove thorns and wounds. *Rhazya stricta* treats piles, teeth worms, abdominal worms, and eye swelling, and their pollen grain with lemon to treat skin allergies. The *A. vera* is used to cure foot pain and face wrinkles. Its gel is used to treat stomach ulcers. *Raphanus raphanistrum* (Jangli muli) is good for the liver; it treats hepatitis and kidney problems. The *C. sativa* is used to treat cough, and its anxiety-reducing effect is used for relaxing. The *C. colocynthis* is used for gastrointestinal disorders, antidiabetics, and foot pain. *Euphorbia helioscopia* paste is used to remove WATS. While *Plantago amplexicaulis*, *Z. clinopodioides*, *Ocimum basilicum*, *Peganum harmala*, and *M. piperita* are used for abdominal pain, diarrhea, and peptic ulcer. The *P.*

harmala is also used to treat fever. The *Plantago major* is used for rabbit chest infections, cough, and asthma. *Olea europaea* oil is used in cooking, while their fruit is used as a pickle; Their oil is also used for skin and hair massage and as a blood purifier and thinner; It is also used to treat stomach issues like constipation. *Punica granatum* fruit is used to treat blood deficiency, and the Dry peel of the fruit treats abdominal pain. *Fagonia* sp. is used to treat old fever and abdominal pain. The *Z. fabago* and *Zygophyllum* sp. treat body aches, diarrhea, high fever, and vomiting.

Tamarix dioica is used for cough. *Ficus carica* is a medicinally important fruit for treating piles, cough, and chest problems. *Morus alba* fruit is also used to treat cough and constipation. *Withania coagulans* treat abdominal pain, ulcer, diarrhea, and vomiting. It is also considered a blood purifier and used to treat skin disorders and weight loss.

Food plants (vegetables and fruits)

Eighteen wild and cultivated plants are collected and used as vegetables and fruits. These plants are consumed locally, maybe as raw food, fresh fruit, dry fruits, or different products are made. One of the most economically important plants is *P. dactylifera*; fruit is taken (fresh and dry). The local people also prepare sweet dishes. Some

other important fruits are *F. carica*, *O. europaea*, *Ziziphus mauritiana*, *M. alba*, *P. granatum*, *Malus domestica*, and *Vitis vinifera*.

The *A. cepa* and *A. sativum* bulb is used for cooking curry. It is usually served raw as a salad or part of a prepared savory dish. It can also be used to make pickles and chutneys. The *L. sativa* leaves are taken raw as salad. *Launaea nudicaulis* and *Launaea* sp. are also taken raw as salad. *Helianthus annuus* is a commercially important plant oil used for cooking, and its seeds are used as dry fruit. *Brassica napus* (Shalghum) and *Pisum sativum* a vegetables cooked as food and salad. The *R. raphanistrum* Jangli muli, *Brassica* sp. (Jarjeer), *Brassica* sp. (Roath (thrup), *Lepidium aucheri*, *Medicago sativa*, and *M. polymorpha* are also taken raw as salad. *Citrus lemon* and *C. medica* fruit juice are used for making drinks and adding taste to different vegetables. It can also be used to make pickles. *Triticum aestivum* is another economically important crop cultivated in the area. *Coriandrum sativum* fresh leaves are used as condiments. Fresh leaves of *C. sativum* mixed with *M. piperita* and green chilies are used to make the sauce. Seeds of *C. sativum* are used as spices in cooking different dishes.

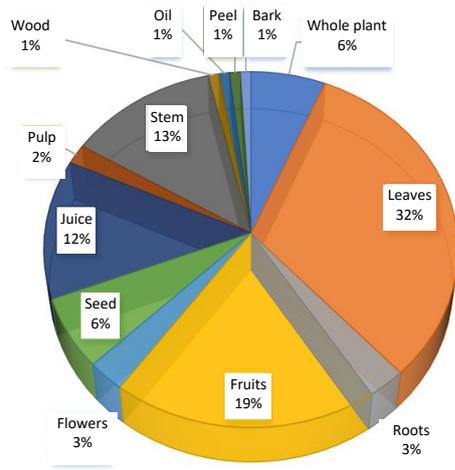


Figure 1. Plant parts used by the indigenous people

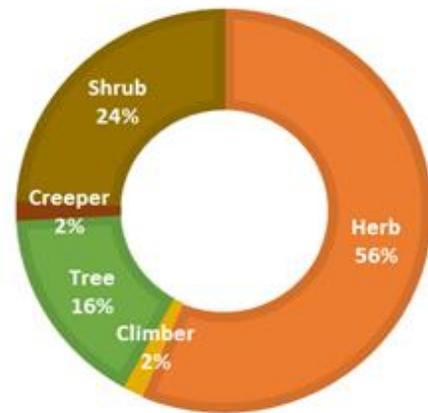


Figure 2. Life form of plants used for ethnobotanical practices

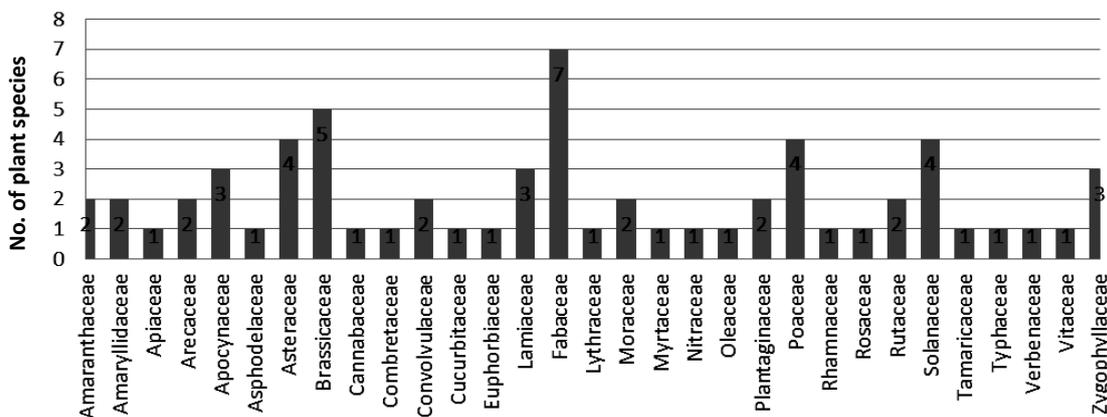


Figure 3. Representation of the plant families and the number of species in the study area

Fuel wood and hedges

One of the important uses of plants is their wood as fuel. The plants used as biofuel are *Convolvulus spinosus*, *Nannorrhops ritchieana*, *Prosopis juliflora*, *Typha domingensis*, *Eucalyptus camaldulensis*, *Zygophyllum sp.*, *Z. mauritiana*, and *Vitex agnus-castus*. *V. agnus-castus* is also planted for flood control near gardens. *E. camaldulensis* is also used in making huts. *Senegalia senegal* is commonly used as fuel but also for making shades. *Conocarpus erectus* is also used for hedging. *Alhagi maurorum* and *Z. clinopodioides* are spread on huts for cooling purposes.

Different products

Traditional carpets, prayer mats, baskets, brooms, and bed ropes are made with leaf and *N. ritchieana*. Local people of the area made the wooden pen and flute with *A. donax*. Handles of utensils and mats are made with the *Triplidium ravennae* and used in making huts.

Fodder

One of the important uses of plants in the Panjgur District is livestock. Local people feed their animals on these plants. The plants used as fodder are *C. album*, *Launaea sp.*, *C. arvensis*, *Crotalaria persica*, *M. sativa*, *T. aestivum*, *Z. mauritiana*, *Cynodon dactylon*, *A. donax*, *Zygophyllum sp.*, and *Withania somnifera*. The *P. major* is the best fodder used for the rabbit.

Ornamental

Some plants are cultivated in the area for ornamental purposes. These plants include *O. basilicum*, *A. vera*, *C. nocturnum*, and *Nerium oleander*.

Cosmetic products

The valuable plants are used in cosmetic products. Local women in the area have used these plants daily for centuries. The oil extract of *O. basilicum* is used in making scents and perfumes. The *A. vera* gel is used for making creams and lotions. Gel is also used in making soaps. The *E. camaldulensis* oil is used on the face for smooth acne prone.

Fertilizers and pesticides

The *C. procera* and *R. stricta* are used as fertilizers for land in the area, especially for the date palm. The *R. stricta* extract in water is used as a pesticide.

Informant consensus factor

The ICF shown in Table 5 reveals the use of plant species to treat different ailments. The highest ICF values were recognized as more effective and commonly used to treat certain diseases. Lower ICF values indicated that the informants disagreed on the taxa for treatment within the disease category. The total use of citations for all the plant species used to cure various ailments was the highest for stomachic problems (171). followed by Throat infection (71), Anti-acne and skin allergy (49), Joint Pain (33), Anti-diabetics and blood pressure (31).

Discussion

Traditionally, women are recognized as housekeepers with greater knowledge of medicinal and edible plants daily. They are familiar with more species and have used them differently for centuries. In addition, the elder women share more information with each (Camou-Guerrero et al. 2008; da Costa et al. 2021). Talking about the age of interviewees over 18 and that studies related to model selection concerning sex are more related to the stage of childhood (Torres-Avilez et al. 2019). In our study, most informants were 15-30 years old. This is similar to the percentage of young people in the community. Plants are used in different ways. Some are used for just single use, some are dual, and some are for multiple uses; Our finding is similar to earlier studies (Ahmad and Husain 2008; Abbasi et al. 2010; Ajaib et al. 2014).

This study showed that most plant parts were consumed fresh and cooked. Wild edible plants are mainly consumed in many ways according to local traditions (Ali-Shtayeh et al. 2008). This study also showed that leaves were the most consumed plant parts, followed by fruits, flowers, and stems. Green leafy vegetables are good sources of calcium (Misra et al. 2008). The *T. aestivum* is an important cultivated crop of the area; seeds are heated, dried, ground, and then mixed with sugar and water to make a paste called "Pesht," a delicious traditional recipe.

Edible plant parts included leaves, fruits, and seeds. The majority of plants recorded are eaten raw. For example: *A. cepa*, *A. sativum*, *C. sativum*, *L. sativa*, *B. napus*, *Mentha sp.*, *F. carica*, *M. alba*, *P. granatum*, *Z. mauritiana*, *C. lemon*, *C. medica*, and *V. vinifera*. The results of this study are consistent with that of earlier reports (Ahmed et al. 2019, Ajaib et al. 2014, Ali et al. 2019). People use various methods to preserve plants and food for long-term storage and during the off-season. Drying in plastic bags, handmade baskets made up of leaves of *N. ritchieana*, and rubber bottles were the most common preservative method. For example, the fruits of *P. dactylifera* are shade-dried and kept inside handmade baskets, plastic bags or rubber bottles, and Tin. Other methods of preserving date fruit included refrigeration and freezing. Other plants, such as fruits of *F. carica*, *P. granatum*, and *V. vinifera*, are dried and then stored in glass utensils and plastic bags. Similar preservative methods had been reported in earlier studies (Aziz et al. 2016; Al-Dashti et al. 2021).

This study revealed that 25% of plants recorded had medicinal properties. For example, the decoction of *P. harmala* and *P. major* seeds was used to treat fever and cough, respectively, consistent with earlier reports (Nasab and Khosravi 2014; Koleva et al. 2015). Padal et al. (2013) reported medicinal uses of *C. lemon* and *C. medica* for treating various diseases, such as fever, indigestion, liver disease, and diarrhea. Some studies recorded the uses of fruit jams and juices of *C. lemon*, *C. medica*, and *Z. mauritiana* (Das and Teron 2014). Wagay (2014) reported that *C. sativa* and *F. carica* were used as narcotics for treating cough, respectively.

Table 4. List of plants collected from the study area, their use value, and relevant details

Plant family and botanical name	Local name	Plant type (cultivated or wild)	Habit	Part used	Uses	Mode of use	Use value
Amaranthaceae							
<i>Chenopodium album</i> L.	Kalper	Wild	H	L	Fodder	Fresh	1.83
<i>Spinacia oleracea</i> L.	Paalik	Cultivated	H	L	Food	Cooked	0.47
Amaryllidaceae							
<i>Allium cepa</i> L.	Peemaz	Cultivated	H	L, ST	Food, medicinal	Cooked, fresh	0.12
<i>A. sativum</i> L.	Serk	Cultivated	H	L, ST	Food, medicinal	Cooked, infusion	0.4
Apiaceae							
<i>Coriandrum sativum</i> L.	Dhanya (Gehneech)	Cultivated	H	L, Fr	Food	Fresh	0.08
Arecaceae							
<i>Nannorrhops ritchieana</i> (Griff.) Aitch.	Daaz	Wild	T	L, Fr, R, SD, ST	Fuel	Fresh, dry	0.42
<i>Phoenix dactylifera</i> L.	Hurmag, Mach, Khajur	Wild, cultivated	T	L, Fr, R, SD, ST	Food, medicinal	Fresh, dry	1
Apocynaceae							
<i>Calotropis procera</i> (Aiton) W.T. Aiton	Kark	Wild	S	L	Medicinal, fertilizer	Heat	0.31
<i>Nerium oleander</i> L.	Jor	Cultivated	S	WP	Medicinal, ornamental	Infusion, powder	0.33
<i>Rhazya stricta</i> Decne.	Eshark	Wild	S	ST, L,	Medicinal, fertilizer, pesticide	Powder, infusion, decoction	0.35
Asphodelaceae							
<i>Aloe vera</i> (L.) Burm.f.	Alovera	Wild, cultivated	H	L	Medicinal, cosmetics, ornamental	Decoction	2
Asteraceae							
<i>Helianthus annuus</i> L.	Roch gardan (saahig gardan)	Cultivated	H	ST	Food	Dry	0.6
<i>Lactuca sativa</i> L.	Salaad (Grencho)	Cultivated	H	L	Food	Fresh	1
<i>Launaea nudicaulis</i> (L.) Hook.f.	Mary halakko	Wild	H	L	Food, medicinal	Cooked	0.04
<i>Launaea</i> sp.	Brinj-o-gosht (Naan-o-gosht)	Wild	H	L, ST	Food, fodder	Fresh	0.25
Brassicaceae							
<i>Brassica napus</i> L.	Shalghum	Cultivated	S	L, ST	Food	Cooked, fresh	0.12
<i>Brassica</i> sp.	Jarjeer	Cultivated	H	L	Food	Fresh	0.33
<i>Brassica</i> sp.	Roath (thrup)	Cultivated	H	L	Food	Fresh	0.09
<i>Lepidium aucheri</i> Boiss	Garbusk	Wild	H	L	Food	Cooked	0.09
<i>Raphanus raphanistrum</i> L.	Jangli muli	Wild	H	L, ST	Food, medicinal	Cooked	0.18
Cannabaceae							
<i>Cannabis sativa</i> L.	Bhang	Wild	H	L, Fr	Medicinal	Infusion, powder	3
Combretaceae							
<i>Conocarpus erectus</i> L.	Mustafa kamal	Cultivated	S	WP	Ornamental		0.16
Convolvulaceae							
<i>Convolvulus arvensis</i> L.	Bakkar walli	Wild	H	WP	Fodder	Fresh	1
<i>C. spinosus</i> Burm. f.	Delko	Wild	H	WP	Fuel	Dry	0.5
Cucurbitaceae							
<i>Citrullus colocynthis</i> (L.) Schrad.	Kolkolushtag	Wild	CR	Fr	Medicinal	Fresh, powder, infusion	1.3

Euphorbiaceae							
<i>Euphorbia helioscopia</i> L.	Gorbagund	Wild	H	L	Medicinal fodder	Fresh	0.5
Fabaceae							
<i>Alhagi maurorum</i> Medik.	Shenz	Wild	S	WP	Medicinal, fodder	Infusion	0.5
<i>Crotalaria persica</i> (Burm. f.) Merr.	Lato	Wild	H	WP	Fodder	Fresh	0.5
<i>Medicago sativa</i> L.	Sposth	Cultivated	H	L	Food, fodder	Fresh	0.05
<i>M. polymorpha</i> L.	Shemsh	Cultivated	H	L	Food	Cooked, fresh	0.10
<i>Pisum sativum</i> L.	Matar	Cultivated	H	F, SD	Food	Cook	0.04
<i>Prosopis juliflora</i> (Sw.) DC.	Babbur	Wild	T	WP	Fuel	Dry	1
<i>Senegalia senegal</i> (L.) Britton	Kahoor	Wild	T	ST, R	Fuel	Dry	0.08
Lamiaceae							
<i>Mentha piperita</i> Linn.	Podina	Cultivated	H	L	Food	Fresh, cook, powder	0.3
<i>Ocimum basilicum</i> L.	Naaz bow	Cultivated	H	L	Medicinal, ornamental, aromatic	Fresh, powder	0.42
<i>Ziziphora clinopodioides</i> Lam.	Purchenk	Wild	H	L	Medicinal, food	Grind, fresh	1
Lythraceae							
<i>Punica granatum</i> L.	Anaar	Cultivated	S	Fr, ST	Food, medicinal	Fresh, heat, Powder	0.07
Moraceae							
<i>Ficus carica</i> L.	Enjeer	Cultivated	S	Fr	Food, medicinal	Fresh, dry	0.07
<i>Morus alba</i> L.	Tooth	Cultivated	T	L, Fr, ST	Food, fodder, fuel	Fresh, dry	0.06
Myrtaceae							
<i>Eucalyptus camaldulensis</i> Dehnh.	Baam	Cultivated	T	L, ST	Cosmetic, wood, fuel	Powder	0.07
Nitraceae							
<i>Peganum harmala</i> L.	Spantan	Wild	S	SD, L	Medicinal	Powder, heat	0.36
Oleaceae							
<i>Olea europaea</i> L.	Zetoon	Cultivated	T	Fr, L, SD	Medicinal, food	Powder, oil extract, cook, decoction	0.21
Plantaginaceae							
<i>Plantago amplexicaulis</i> Cav.	Daanichk (Spaghol)	Wild	H	Fr	Medicinal, cosmetic	Infusion, powder	0.45
<i>P. major</i> L.	Hari gosh	Wild	H	L, Fr, SD	Medicinal, fodder	Decoction	0.45
Poaceae							
<i>Arundo donax</i> L.	Nall	Wild	H	L, ST	Wood, fuel, fodder	Fresh, dry	2
<i>Cynodon dactylon</i> (L.) Pers.	Chadd	Wild	H	L	Fodder	Fresh	0.07
<i>Tripsidium ravennae</i> (L.) H.Scholz	Kaash	Wild	H	L	Fodder	Fresh, dry	0.66
<i>Triticum aestivum</i> L.	Heeth	Cultivated	H	L, Fr	Food, fodder	Cooked	0.04
Rhamnaceae							
<i>Ziziphus mauritiana</i> Lam.	Konar	Cultivated	T	R, Fr, ST, B, L	Food, fuel, fodder	Fresh	0.06
Rosaceae							
<i>Malus domestica</i> (Suckow) Borkh.	Soap (small)	Cultivated	T	F	Food	Fresh	0.07
Rutaceae							
<i>Citrus lemon</i> (L.) Osbeck.	Lembo (lemon)	Cultivated	T	F	Food, medicinal	Cooked, fresh, dry, powder	0.09
<i>C. medica</i> L.	Thrunj	Cultivated	T	F	Food	Cook, fresh	0.2

Solanaceae							
<i>Cestrum nocturnum</i> L	Rath ki rani	Cultivated	S	WP	Ornamental	Fresh	1
<i>Lycium shawii</i> Roem. & Schult	Tolangoor	Wild	S	Fr	Medicinal	Fresh	0.5
<i>Withania coagulans</i> (Stocks.) Dunal.	Paner baad	Wild	H	Fr, SD	Medicinal	Powder, dry	0.25
<i>W. somnifera</i> (L.) Dunal.	Kaakenk	Wild	H	L	Fodder	Fresh	0.33
Tamaricaceae							
<i>Tamarix dioica</i> Roxb. ex Roth	Gazz (taa gazz, goo gazz, saakodi, syah gazz, shinger, kawachar, porant)	Wild	S	ST	Medicinal, fuel	Dry, decoction	0.05
Typhaceae							
<i>Typha domingensis</i> Pers.	Kull	Wild	H	L	Fuel, fodder	Fresh	0.25
Verbenaceae							
<i>Vitex agnus-castus</i> L.	Gwanikk	Wild	S	W	Wood	Fresh	0.5
Vitaceae							
<i>Vitis vinifera</i> L.	Angoor	Cultivated	CL	F	Food	Fresh, dry	0.05
Zygophyllaceae							
<i>Fagonia</i> sp.	Karkawag	Wild	H	WP	Medicinal	Grind, infusion	0.6
<i>Zygophyllum fabago</i> L.	Banklek	Wild	S	Fr	Food	Heat, cooked	0.03
<i>Zygophyllum</i> sp.	Kerech	Wild	S	R, L, Fr	Medicinal, fodder, fuel	Decoction, infusion, dry	0.12

Note: Habit: H: Herb, S: Shrub, T: Tree, CL: Climber, CR: Creeper. Part used: B: Bark, Fr: Fruit, L: Leave, R: Root, SD: Seed, ST: Stem, W: Wood, WP: Whole Plant

Table 5. Categories of ailments and Informant Consensus Factor (ICF) for each category

Use categories	Number of plants (Nt)	Number of use report (Nur)	ICF
Stomach disorder	153	171	0.1
Throat infection	50	71	0.3
Anti-acne and skin allergy	34	49	0.3
Joint Pain	26	33	0.2
Anti-diabetics, blood pressure	18	31	0.4
Gynecological and female hormonal problems	12	21	0.5
Kidney problems	3	21	0.9
Cardiovascular disorder	13	20	0.4
Hepatitis	11	16	0.3
Fever	12	13	0.1
Male fertility	4	12	0.7
Live Stock	7	12	0.5
Teeth and gum infection	6	9	0.4
Bone fracture	2	8	0.9
Typhoid	6	7	0.2
Obesity	3	7	0.7
Toxic sting and thorn treating	4	6	0.4
Asthma	3	5	0.5
Malaria and Dengue fever	3	5	0.5
Paralysis	2	3	0.5
Ear problems	1	3	0.0
Navel disorder	1	2	1.0

The literature revealed that the plant had been used to cure different diseases. For example, *Z. clinopodioides* treat stomach disorders (Koleva et al. 2015). Some studies reported multiple uses of *P. harmala* (Hamidi et al. 2014; Hayta et al. 2014), which was consistent with the results of this study. The pharmacological review of this plant showed that it had been used as: antiseptic, anthelmintic, antidiabetic, antihypertensive, emmenagogue, antivenom, digestive and cutaneous problems, diarrhea, nausea, fever, asthma, headache, stomachic, anti-inflammatory, antimalarial, cooling purposes, and intestinal worms. The secondary metabolites in these plants increase milk production and protect the animals against different diseases (Ahmed et al. 2020a; Mahmood et al. 2020; Afzal et al. 2021). The *P. harmala*, *F. carica*, and *P. major* are used in multiple uses. The same plant has been reported to be used against abdominal problems, asthma, blood pressure, and jaundice. Medicinal plants have previously been shown to be commonly used by rural communities in Pakistan Balochistan (Durrani and Hussain 2005; Tareen et al. 2010; Sarangzai et al. 2013; HAQ et al. 2021).

In conclusion, the present study is the first report on the ethnobotanical inventory of wild food plants and wild medicinal plants of the Panjgur District. The most used life forms were herbs (56%). The results of this study revealed valuable information about the ethnobotanical uses of medicinal and wild food plants, and thus help to preserve indigenous knowledge and attract younger generations toward such traditional and unique practices of disease treatments. However, there has been a gradual loss of traditional knowledge among younger generations. Thus, it

is imperative to document and reconstitute the remains of the ancient practices in the study area and other parts of the region and preserve this traditional knowledge for future generations. In addition, there is a need for further analysis of the phytochemical and pharmacological properties of the recorded medicinal plants. Finally, this study result could be used to explore their potential plants for herbal drug discovery.

REFERENCES

- Abbasi AM, Khan MA, Ahmad M, Qureshi R, Arshad M, Jahan S, Zafar M, Sultana S. 2010. Ethnobotanical study of wound healing herbs among the tribal communities in Northern Himalaya Ranges District Abbottabad, Pakistan. *Pak J Bot* 42: 3747-3753.
- Afzal A, Hussain T, Hameed A. 2021. *Moringa oleifera* supplementation improves antioxidant status and biochemical indices by attenuating early pregnancy stress in Beetal goats. *Front Nutr* 8: 700957. DOI: 10.3389/fnut.2021.700957.
- Ahmad SS, Husain SZ. 2008. Ethno medicinal survey of plants from salt range (Kallar Kahar) of Pakistan. *Pak J Bot* 40: 1005-1011.
- Ahmed A, Hameed A and Saeed S. 2020a. Biochemical profile and bioactive potential of thirteen wild folk medicinal plants from Balochistan, Pakistan. *PLoS ONE* 15 (8): e0231612. DOI: 10.1371/journal.pone.0231612.
- Ahmed A, Hameed A, Saeed S. 2020b. Ecological distribution, morphological and molecular characterization of Zygophyllaceae from diverse ecological zones of Balochistan, Pakistan. *Appl Ecol Environ Res* 18: 2445-2462. DOI: 10.15666/aecer/1802_24452462.
- Ahmed W, Qureshi R, Arshad M. 2019. Floristic, frequency and vegetatio-biological spectra of Murree-Kotli Sattian-Kahuta National Park, Pakistan. *Pak J Bot* 51: 637-648. DOI: 10.30848/PJB2019-2(20).
- Ajaib M, Khan Z, Zikrea A. 2014. Ethnobotanical survey of some important herbaceous plants of District Kotli, Azad Jammu & Kashmir. *Biologia (Pakistan)* 60: 11-22.
- Al-Dashti YA, Holt RR, Keen CL, Hackman RM. 2021. Date palm fruit (*Phoenix dactylifera*): Effects on vascular health and future research directions. *Intl J Mol Sci* 22: 4665. DOI: 10.3390/ijms22094665.
- Ali S, Shah SZ, Khan MS, Khan WM, Khan Z, Hassan N, Zeb U. 2019. Floristic list, ecological features and biological spectrum of district Nowshera, Khyber Pakhtunkhwa, Pakistan. *Acta Ecologica Sinica* 39: 133-141. DOI: 10.1016/j.chnaes.2018.08.007.
- Ali-Shtayeh MS, Jamous RM, Al-Shafie JH, Wafa'A E, Kherfan FA, Qarariah KH, Nasrallah HA. 2008. Traditional knowledge of wild edible plants used in Palestine (Northern West Bank): A comparative study. *J Ethnobiol Ethnomed* 4 (1): 1-13. DOI: 10.1186/1746-4269-4-13.
- Aziz MA, Abbasi AM, Saeed S, Ahmed A, Pieroni A. 2022. The inextricable link between ecology and taste: Traditional plant foraging in NW Balochistan, Pakistan. *Econ Bot* 76: 34-59. DOI: 10.1007/s12231-022-09543-w.
- Aziz MA, Adnan M, Khan AH, Rehman AU, Jan R, Khan J. 2016. Ethno-medicinal survey of important plants practiced by indigenous community at Ladha subdivision, South Waziristan agency, Pakistan. *J Ethnobiol Ethnomed* 12: 53. DOI: 10.1186/s13002-016-0126-7.
- Balick MJ, Cox PA, Plants P. 1996. *Culture: The Science of Ethnobotany*. Scientific American Library, New York.
- Baloch AH, Baloch IA, Ahmed I, Ahmed S. 2017. A study of poisonous plants of Balochistan, Pakistan. *Pure Appl Biol* 6: 989-1001. DOI: 10.19045/bspab.2017.600105.
- Camou-Guerrero A, Reyes-García V, Martínez-Ramos M, Casas A. 2008. Knowledge and use value of plant species in a Rarámuri community: A gender perspective for conservation. *Hum Ecol* 36: 259-272. DOI: 10.1007/s10745-007-9152-3.
- Cunningham AB. 2001. *Applied Ethnobotany: People, Wild Plant Use and Conservation*. Earthscan, Virginia.
- da Costa FV, Guimarães MFM, Messias MCTB. 2021. Gender differences in traditional knowledge of useful plants in a Brazilian community. *PLoS ONE* 16: e0253820. DOI: 10.1371/journal.pone.0253820.

- Das C, Teron R. 2014. Ethnobotanical notes of the Rabha community in Matakhar reserve forest of Kamrup district, Assam, India. *Res J Rec Sci* 2277: 2502.
- Durrani MJ, Hussain F. 2005. Ethnoecological profile of plants of Harboi rangeland, Kalat, Pakistan. *Intl J Biol Biotech* 2: 15-22.
- Gazzaneo LRS, Lucena RFP, Albuquerque UP. 2005. Knowledge and use of medicinal plants by local specialists in a region of Atlantic Forest in the state of Pernambuco. *J Ethnobiol Ethnomed* 1: 9. DOI: 10.1186/1746-4269-1-9.
- Hamayun M, Khan A, Khan MA. 2003a. Common medicinal folk recipes of District Buner, NWFP, Pakistan. *Ethnobot Leaflet* 2005 (1): 45.
- Hamayun M, Khan MA, Begum S. 2003b. Marketing of medicinal plants of Utror-Gabral valleys, Swat, Pakistan. *Ethnobot Leaflet* 2005: 44.
- Hamidi N, Lazouni H, Moussaoui A, Ziane L, Djellouli M, Belabbesse A. 2014. Ethnopharmacology, antibacterial and antioxidant activities, phytochemical screening of bioactive extracts from the aerial parts of *Fagonia longispina*. *Asian J Nat Appl Sci* 3: 53-63.
- Haq A, Saeed S, Ahmed A. 2021. Species diversity and ethnobotanical inventory of wild flora used by the folk community of Shinghar Balochistan, Pakistan. *Nusantara Biosci* 13: 148-157. DOI: 10.13057/nusbiosci/n130203.
- Hayta S, Polat R, Selvi S. 2014. Traditional uses of medicinal plants in Elazığ (Turkey). *J Ethnopharmacol* 154: 613-623. DOI: 10.1016/j.jep.2014.04.026.
- Heinrich M, Ankli A, Frei B, Weimann C, Sticher O. 1998. Medicinal plants in Mexico: Healers' consensus and cultural importance. *Soc Sci Med* 47: 1859-1871. DOI: 10.1016/S0277-9536(98)00181-6.
- Koleva V, Dragoeva A, Nanova Z, Koynova T, Dashev G. 2015. An ethnobotanical study on current status of some medicinal plants used in Bulgaria. *Intl J Curr Microbiol Appl Sci* 4 (4): 297-305.
- Le NT, Ho DV, Doan TQ, Le AT, Raal A, Usai D, Sanna G, Carta A, Rappelli P, Diaz N. 2020. Biological activities of essential oils from leaves of *Paramignya trimera* (Oliv.) Guillaum and *Limnocitrus littoralis* (Miq.) Swingle. *Antibiotics* 9: 207. DOI: 10.3390/antibiotics9040207.
- Mahmood N, Hameed A, Hussain T. 2020. Vitamin E and selenium treatment alleviates saline environment-induced oxidative stress through enhanced antioxidants and growth performance in suckling kids of beetal goats. *Oxid Med Cell Longev* 2020: 4960507. DOI: 10.1155/2020/4960507
- Martin GJ. 1995. *Ethnobotany: A Method Manual*. Kew Botanic Garden, UK.
- Misra S, Maikhuri RK, Kala CP, Rao KS, Saxena KG. 2008. Wild leafy vegetables: A study of their subsistence dietetic support to the inhabitants of Nanda Devi Biosphere Reserve, India. *J Ethnobiol Ethnomed* 4 (1): 1-9. DOI: 10.1186/1746-4269-4-15.
- Mustafa NR, Verpoorte R. 2007. Phenolic compounds in *Catharanthus roseus*. *Phytochem Rev* 6: 243-258. DOI: 10.1007/s11101-006-9039-8.
- Nantongo JS, Odoi JB, Abigaba G, Gwali S. 2018. Variability of phenolic and alkaloid content in different plant parts of *Carissa edulis* Vahl and *Zanthoxylum chalybeum* Engl. *BMC Res Notes* 11: 1-5. DOI: 10.1186/s13104-018-3238-4.
- Nasab FK, Khosravi AR. 2014. Ethnobotanical study of medicinal plants of Sirjan in Kerman Province, Iran. *J Ethnopharmacol* 154 (1): 190-197. DOI: 10.1016/j.jep.2014.04.003.
- Niroula G, Singh N. 2015. Religion and conservation: A review of use and protection of sacred plants and animals in Nepal. *J Inst Sci Technol* 20: 61-66. DOI: 10.3126/jistv20i2.13950.
- Ntie-Kang F, Njume LE, Malange YI, Günther S, Sippl W, Yong JN. 2016. The chemistry and biological activities of natural products from northern african plant families: From Taccaceae to Zygophyllaceae. *Nat Prod Bioprospect* 6: 63-96. DOI: 10.1007/s13659-016-0091-9.
- Padal SB, Chandrasekhar P, Satyavathi K. 2013. Ethnomedicinal investigation of medicinal plants used by the tribes of Pedabayalu Mandalam, Visakhapatnam District, Andhra Pradesh, India. *Intl J Comput Eng Res* 3: 8-13.
- POWO. 2021. *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet.
- Pudziuvelyte L, Liaudanskas M, Jekabsone A, Sadauskiene I, Bernatoniene J. 2020. *Elsholtzia ciliata* (Thunb.) Hyl. extracts from different plant parts: Phenolic composition, antioxidant, and anti-inflammatory activities. *Molecules* 25: 1153. DOI: 10.3390/molecules25051153.
- Sarangzai AM, Ahmed A, Laghari SK. 2013. Traditional uses of some useful medicinal plants of Ziarat District Balochistan, Pakistan. *Fuust J Biol* 3 (1 June): 101-107.
- Sulaiman N, Pironi A, Sökand R, Polesny Z. 2022. Food behavior in emergency time: Wild plant use for human nutrition during the conflict in Syria. *Foods* 11: 177. DOI: 10.3390/foods11020177.
- Tareen RB, Tahira B, Khan MA, Ahmad M, Zafar M, Hina S. 2010. Indigenous knowledge of folk medicine by the women of Kalat and Khuzdar regions of Balochistan, Pakistan. *Pak J Bot* 42 (3): 1465-1485.
- Torres-Avilez W, Nascimento ALBd, Santoro FR, Medeiros PMd, Albuquerque UP. 2019. Gender and its role in the resilience of local medical systems of the Fulni-ô people in NE Brazil: Effects on structure and functionality. *Evid-Based Complement Alternat Med* 2019: 8313790. DOI: 10.1155/2019/8313790.
- Wagay NA. 2014. Medicinal flora and Ethno-botanical knowledge of Baramulla Tehsil in Jammu and Kashmir, India. *Intl J Adv Biotechnol Res* 5 (3): 539-546.