Plants biodiversity utilisation in Bardarash, Kurdistan Region, Iraq

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Abstract: Plants have been used as medicine by humans from the beginning of recorded history. WHO reports that between 65% and 80% of the population in developing nations uses only natural remedies. It should be noted that the research area was selected due to the rich traditional knowledge of its people and the wide range of flora and fauna found there. The goal of these studies is to strengthen local knowledge by compiling a list of valuable plants for traditional medicine. Expert sampling method was utilised in the study with aid of an in-depth interview guide. Fourty two informants were interviewed from the period of September 2021-June 2022. Dominance of men were observed in the study 73.8 %. Age range of 56-65 dominated the study with 38.1%. The current study uncovered 42 plants from 24: Laminaceae (19.2%), Composite (12.8%), Brassica (6.4%), and Leguminosae (6.4%) and the remaining families each (2.1 %). Leaves and fruits are the most frequent used part of the plant at 24.5 % respectively. For the first time, the ethno botanical application of plant species from Bardarash was documented. Illegal collection, trading, and marketing have jeopardized the quantity and distribution of some high-value medicinal plants. The significance of preserving floral diversity is essential.

1. Introduction

Throughout history, people have relied on plants for treatment and illness prevention [1]. The use of medicinal plants as remedies for humans and animals has been practiced for thousands of years [2]. Traditional medicine is gaining popularity worldwide despite the advancement of industrialization [3]. Utilization of native plant species is rising worldwide. There has been a rise in the primary care sector's utilization of medicinal plants across the globe [4]. Stories, poems, proverbs, and songs are common ways in which knowledge is verbally transmitted from one generation to the next [2].

Folk knowledge documentation has become increasingly important around the world, especially after the Nagoya Protocol was ratified to preserve cultural assets [2]. More than 80% of the world's population used traditional medicinal plants [5]. Plant bioactive compounds and phytochemicals can be used as a therapeutic agent or in the development of pharmaceuticals to treat a wide range of illnesses [6].

Traditional medicine is at risk of extinction unless medicinal plant inventories are done [4]. As a result, these ethno botanical investigations were carried out in the Bardarash, which has a wide range of lithological and floristic diversity. The goal of these studies is to add to indigenous knowledge by compiling a list of medicinal plants found in the study area. Indeed, it is critical to convert this traditional knowledge into scientific knowledge to revalue, conserve, and properly apply it.

2. Materials and Methods

2.1 Sampling and Interview Sessions

Expert sampling method was used with the aid of an open-ended interview guide [9]. Three experts validated the interview guide, then it was administered to pilot study before it was used in the study (Figure 1).

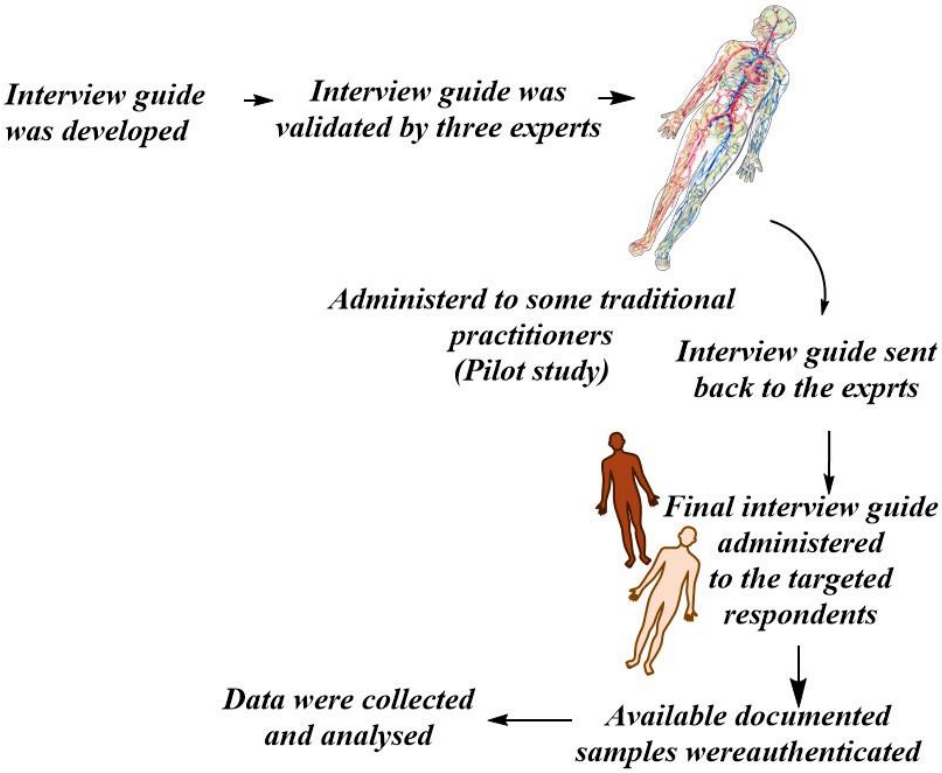

Figure 1. Follow chat of the methodology (Source, Author)

2.2 Plant Collection and Herbarium Deposition

Herbarium specimens were constructed from plant samples taken in the wild, cultivated gardens and from the respondents. The plants were identified by a trained taxonomist Dogara A.M in the Department of Biology, Faculty of Education, Tishk International University and authenticated at the Salahaddin University' herbarium, Kurdistan, Iraq. World Flora Online, an online database, was utilized to double-check the names' authenticity. http://www.worldfloraonline.org/.

2.3 Data Collection

The information used in this study was gleaned via in-depth interviews with the informant that took place between September 2021 and June 2022. Three to four visits were made to each responder to guarantee the quality of the information gathered. When there was a contradiction between what had been said before and what was heard on future visits to the same plant, the earlier information was disregarded as unreliable. Local languages were used to collect data using 42 informants.

2.4 Analysis of Data

1. Excel 2016 was used to calculate descriptive statistics. Frequencies and percentages were determined using the following data (Socio-demographic information of the respondents), Gender, Educational level Occupational status
2. Using plant taxonomic information, the following frequencies and percentages were also computed:

Occurrence of families, Part of the plant used, Method of administration, Method of preparation Experience

3. The following quantitative ethno botany indices were determined:

I. Used Value: UV is equal to Ui / N. Where Ui is the total number of users reported by each respondent, and N represents the total number of informants interviewed [9].

II. Relative Frequency of Citation (RFC): = Fc/N, where Fc is the number of people who mentioned a particular plant species and N is the overall number of respondents interviewed [9].

3. Results and Discussion

3.1 Demographic Profile of the Informants

Ethno botanical investigations rely heavily on their informants. Their age, gender, education level, and occupation provide valuable insight into the survey and facilitate the analysis and interpretation of the data provided within a more realistic social setting [7].

Forty-two informants representing a wide variety of ages and cultural backgrounds participated in the current ethno botanical investigation. Because cultural norms restrict women from interacting with strangers, only 23.8 % of informants were female, while 73.2 % were male (Table 1). The following study agrees with [8]. This gender imbalance can be explained by women's traditionally caring roles within society and their steadfast adherence of preparing food and care for their families at home. Ages 56–65 were the most common range among the informants (38.1%).

The age distribution of the informants provided insight into the level of expertise present in the community (Table 1). Traditional medical expertise has been passed down through generations in the region, as evidenced by the presence of this younger age group. The educational background of the informant revealed majority of them have western education at level of their life except 26. 2% (Table 1). This is to ensure they are conversant with the field of contemporary medicine. Only traditional practitioners and elderly people (non-practitioner) are considered as informant in the following study (Table 1). Experience of the informant domesticated how knowledgeable they are Table 1, with 21-25 accounting 28.6 %.

Table 1. Demographic profile of the informants

Parameters	Frequency	Percentage %
Gender		
Men	31	73.8
Women	11	26.2
Age		
35-45	5	11.9
46-55	11	26.2
56-65	16	38.1
66>	10	23.8
Education		
Primary school	10	23.8
High school	14	33.3
Tertiary	7	16.7
None	11	26.2
Status		
Traditional Practitioner	33	78.6
Non-Practitioner	9	21.4

Experience (Years)		
10-15	11	26.2
16-20	9	21.4
21-25	12	28.6
26->	10	23.8

3.2 Diversity of the Plants species

The current study uncovered 47 plants from 24 families that are utilized in the community to treat and manage of high blood pressure. Stomach pain, sexual dysfunction, liver disease, skin infection, diarrhea, and other medical problems (Table 2). The percentages of documented families; Laminaceae (19.2%), Composite (12.8%), Brassica (6.4%), and Leguminosae (6.4%) and the remaining families each (2.1 %) (Figure 2 and Table 2). The present investigation revealed how abundant therapeutic plants are in the community. The study is not agreement with the previous study carried in different community of Kurdistan Choman where high abundance of Asteraceae [9].

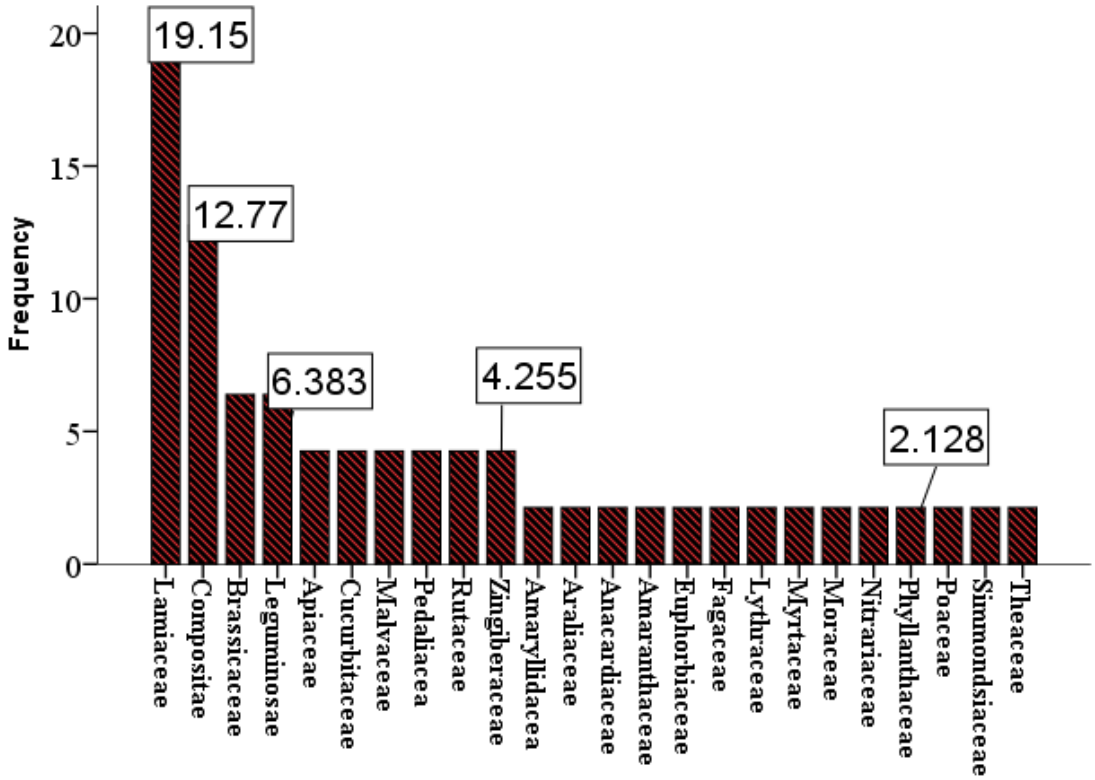

Figure 2. Family distribution of medicinal plants in Bardarash community in

3.3 Quantitative ethno botany

In the following research, quantitative indices were used to measure the usefulness of the documented plants in the treatment and management of various diseases in the study area. All described herbs were quite helpful and were used by respondents to provide to their patients for well-being. High Used value (UV) and Relative Frequency citations (RFC) value was recorded (Table 3). As reported previously, plants with high fidelity value are good indicators of containing compounds with high medicinal value [9-12]. The following plants can be fully utilised to produce herbal medicine and in the pharmaceutical industry.

3.4 Parts of the plants, method of preparations and administration, dosage and toxicity

Figure 3 displays the plant parts proportions employed in the area for disease treatment and management. According to the study, the most widely used plant parts (24.5%) are leaves and fruits (Figure 3). The ease with which leaves, and fruits can be obtained explains why these parts are so popular among the people. The fact that leaves are the site of photosynthesis and thus the repository for most secondary metabolites may explain their widespread use [10].

Decoction has the highest number of reportages (52.1%), infusion (43.8%) and poultice (4.2%). The informants believed the decoction collects the plant content in a short period. The oral way of administration received the most attention (Table 2). In traditional medicinal herbs, oral administration is the most common method of administration [9]. This is because of the synergistic effect it has on the body as a whole [9]. Although some informants have stated that age and disease severity play a role in the quantities they propose, the participants in this survey stated that there is no predetermined amount that patients should take. This disagreement or variation could be due to learnt traditional knowledge from elders or communal experience [10].

Knowledge of traditional medicine in Bardarash is not written down but rather orally passed down from generation to generation. The study concluded that the interest of the current generation in preserving knowledge is on the decline due to the global trend toward industrialization and the destruction of natural habitats. Traditional medical knowledge has been lost mostly due to the causes.

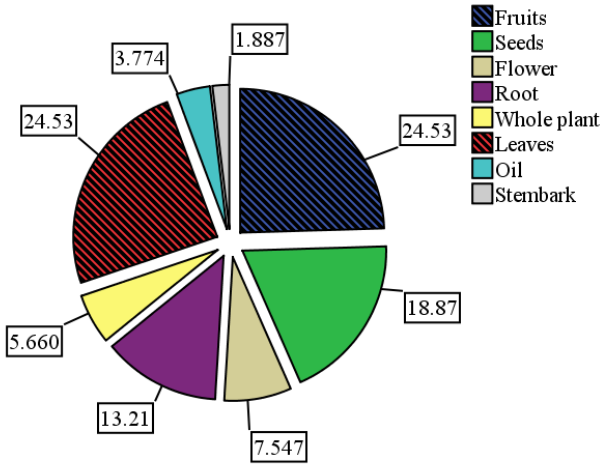

Figure 3. Parts of the plant used in the Bardarash in %

Table 2. Diversity of the documented plants

S/N	Family	Scientific name	Kurdish name	Part of the plant
1	Amaryllidacea	*Allium sativum* L.	زەنجەفیل لەیمون سیر	Fruit
2	Apiaceae	*Pimpinella anisum* L.	رازیانە	Whole plant
		Coriandrum sativum L.	گژنیش	Seed & flower
3	Araliaceae	*Panax ginseng* C.A.Mey.	گیسنگ	Fruit, root
4	Anacardiaceae	*Pistacia atlantica* Desf.	قەزوان	Fruit
5	Amaranthaceae	*Beta vulgaris* L.	چەوەندەر	Root
6	Brassicaceae	*Brassica oleracea* L.	کەلەم	Leaves
		Eruca vesicaria (L.) Cav.	جەرجیر	Leaves
		Sinapis alba L.	خەردەل	Oil

7	Cucurbitaceae	*Cucurbita andreana* Naudin	کودی	Fruit
		Citrullus colocynthis (L.) Schrad	شفتی تالک	Fruit
8	Compositae	*Achillea millefolium* L.	یارۆ	Flower and seed
		Matricaria chamomilla L.	بەیبون	Whole plant
		Artemisia vulgaris L.	زەنگۆلە	Leaves
		Gundelia tournefortii L.	کەنگر	Root
		Silybum marianum (L.) Gaertn.	قیڤار	Flower, seed
		Echinops aberdaricus R.E.Fr.	درکە شەکرۆکە	Root
9	Euphorbiaceae	*Ricinus communis* L.	گەنەگەرچەک	Leaves
10	Fagaceae	*Quercus infectoria* G.Olivier	جاترە مازی	Fruit
11	Lamiaceae	*Salvia officinalis* L.	گولە پوران	Leaves
		Stachys sylvatica L.	پینگ	Flower
		Origanum acutidens (Hand.-Mazz.) Ietsw	جاترە	Oil
		Ocimum basilicum L.	رەیحان	Leaves
		Mentha pulegium L.	پینگ	Leaves and stem
		Origanum acutidens (Hand.-Mazz.) Ietsw	جاترە	Leaves
		Origanum acutidens (Hand.-Mazz.) Ietsw	جاترە	Leaves
		Salvia rosmarinus Schleid	ئیکلیل جەبەل	Leaves
		Origanum majorana L.	بەردەقوش	Leaves & flower
12	Leguminosae	*Trigonella foenum*-graecum L.	شملی	Seed
		Lupinus perennis L.	تەرمس	Seed
		Prosopis farcta (Banks & Sol.) J.F.Macbr	خورنیک	Root
12	Lythraceae	*Punica granatum* L.	هەنار	Fruit, leaves
13	Malvaceae	Malva aegyptia L.	تولکە	Whole plant
		Tilia tomentosa Moench	زیزفون	Flower
14	Myrtaceae	*Myrcianthes pungens* (O.Berg) D.Legrand	میتک	Fruit
15	Moraceae	*Morus alba* L.	توو	Leaves
16	Nitrariaceae	*Peganum harmala* L.	ئیسفەند & حەرمل	Seed
17	Pedaliacea	*Sesamum indicum* L.	کونجی	Seed
		Sesamum indicum L.	کونجی	Seed
18	Phyllanthaceae	*Phyllanthus abditus* G.L.Webster	ئەملەج	Fruit
19	Poaceae	*Avena sativa* L.	شۆفان	Seed
20	Rutaceae	*Citrus limon* (L.) Osbec	پرتەقال & لەیمون	Fruit
		Citrus assamensis R.M.Dutta	سندی	Fruit
21	Simmondsiaceae	*Simmondsia chinensis* (Link) C.K. Schneid	جۆجۆبە	Seed
22	Theaceae	*Camellia sinensis* (L.) Kuntze	تۆچا	Leaves
23	Zingiberaceae	*Curcuma longa* L.	زەردەچۆ	Root
		Zingiber officinale Roscoe	زەنجەفیل	Root

Note. S/N = Serial Number

Table 3. Method of preparations, method of administrations, diseases treated and quantitative values

S/N	Scientific name	Method of preparation	Method of administration	Diseases treated	UV	RFC
1	*Allium sativum* L.	Infusion	Oral	Hight blood pressure	0.09	0.8
2	*Pimpinella anisum* L.	Decoction	Oral	stomach acid	0.2	0.6
3	*Coriandrum sativum* L.	Decoction	Oral	Anemia	0.04	0.6
4	*Panax ginseng* C.A.Mey.	Decoction	Oral	Erectile dysfunction, relieve fatigue, increase natural immunity, and improve blood circulation	0.2	0.7
5	*Pistacia atlantica* Desf.	Infusion	Oral	Colon	0.1	0.7
6	*Beta vulgaris* L.	Decoction	Oral	Liver diseases	0.04	0.8
7	*Brassica oleracea* L.	Decoction	Oral	Skin tumor	0.09	0.7
8	*Eruca vesicaria* (L.) Cav.	Decoction	Oral	Increase immunity	0.04	0.5
9	Sinapis alba L.	Infusion	Oral	Breast inflammation, increase immunity	0.2	0.4
10	*Cucurbita andreana* Naudin	Infusion	Dermal	Breast inflammation	0.09	0.4
11	*Citrullus colocynthis* (L.) Schrad	Decoction	Oral	Diabetes	0.04	0.6
12	*Achillea millefolium* L.	Decoction	Oral	Tooth warm	0.1	0.8
13	*Matricaria chamomilla* L.	Decoction	Dermal	Breast knot inflammation	0.09	0.4
14	*Artemisia vulgaris* L.	Infusion	Oral	Helminths	0.04	0.5
15	Gundelia tournefortii L.	Decoction	Oral	Diarrhea	0.1	0.6
16	*Silybum marianum* (L.) Gaertn.	Decoction	Oral	Hepatic diseases	0.09	0.5
17	*Echinops aberdaricus* R.E.Fr.	Infusion	Oral	Increase immunity	0.04	0.4
18	*Ricinus communis* L.	Infusion	Dermal	Skin diseases	0.2	0.7
19	*Quercus infectoria* G.Olivier	Infusion	Oral	Mouth infection	0.07	0.4
20	*Salvia officinalis* L.	Decoction	Oral	Inflammation	0.2	0.6
21	*Stachys sylvatica* L.	Decoction, infusion	Oral, dermal	Headache wound	0.07	0.4
22	*Origanum acutidens* (Hand.-Mazz.) Ietsw	Infusion	Oral	Mouth inflammation	0.09	0.5
23	*Ocimum basilicum* L.	Decoction	Oral	Hypertension	0.2	0.8
24	*Mentha pulegium* L.	Decoction, infusion	Oral	Diabetes	0.07	0.4
25	*Origanum acutidens* (Hand.-Mazz.) Ietsw	Decoction	Oral	Cough, inflammation	0.2	0.7
26	*Origanum acutidens* (Hand.-Mazz.) Ietsw	Decoction	Oral	Kidney disorders	0.2	0.5
27	*Salvia rosmarinus* Schleid	Decoction	Oral	Arteriosclerosis	0.07	0.4
28	*Origanum majorana* L.	Decoction	Oral	Cold	0.07	0.7
29	*Trigonella foenum*-graecum L.	Infusion	Oral	Urine bladder	0.2	0.5
30	Lupinus perennis L.	Decoction	Oral	Lose weight		0.8
31	*Prosopis farcta* (Banks & Sol.) J.F.Macbr	Decoction	Oral	Kidney crystals	0.09	0.5
32	*Punica granatum* L.	Decoction	Dermal	Bladder inflammation	0.1	0.6
33	Malva aegyptia L.	Decoction	Oral	stomach problems	0.1	0.4

34	*Tilia tomentosa* Moench	Infusion	Oral	Fever	0.09	0.5
35	Myrcianthes pungens (O.Berg) D.Legrand	Infusion	Oral	Headache	0.09	0.7
36	*Morus alba* L.	Infusion	Dermal	skin knot	0.1	0.5
37	*Peganum harmala* L.	Infusion	Oral	flat worms	0.1	0.4
38	*Sesamum indicum* L.	Poultice	Dermal	Burned skin	0.1	
39	*Sesamum indicum* L.	Poultice/ infusion	Oral	Cholesterol, skin infection	0.2	0.7
40	Phyllanthus abditus G.L.Webster	Decoction	Dermal	Hair loses	0.09	0.5
41	*Avena sativa* L.	Infusion	Oral	Weight problems	0.09	0.4
42	*Citrus limon* (L.) Osbec	Infusion	Oral	Cholesterol, decrease weight	0.2	0.7
43	*Citrus assamensis* R.M.Dutta	Infusion	Oral	Diabetes	0.07	0.6
44	*Simmondsia chinensis* (Link) C.K. Schneid	Poultice	Dermal	Acne. Eczema, psoriasis	0.1	0.5
45	*Camellia sinensis* (L.) Kuntze	Decoction	Dermal	Eyes pain	0.2	0.7
46	*Curcuma longa* L.	Infusion	Oral	Clean colon	0.09	0.5
47	Zingiber officinale Roscoe	Infusion	Oral	Tooth pain, gum inflammation	0.07	0.6

Note. S/N = Serial Number, UV = Used Value, RFC = Relative Frequency of Citations

4. Conclusion

For the first time, the ethno botanical application of plant species from Bardarash District was discovered. This study discovered that in Bardarash there are abundant important medicinally plant species, as well as a thorough understanding of ethno botanical plant utilization. Further research on the biological and chemical contents of the documented plants with high RFC should be carried out. The following study will serve as avenue for further research. There is need for preserving floral diversity through community collaboration.

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