



Ethnobotanical study in the highland of Alvand and Tuyserkhan, Iran

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Abstract

Background and objectives: Medicinal plants are widely used by people in the treatment of various diseases. These resources are usually regarded as part of cultural traditional knowledge. The aim of this study was to identify the information about the medicinal plants used by indigenous people of some regions of Hamedan province, Iran. **Methods:** The present ethnobotanical study was conducted in the Alvand mountainous area of Hamedan and Tuyserkhan. Interviews were done in 27 villages and totally 53 informants were interviewed. Ethnobotanical indices like relative frequency of citation (RFC) and cultural importance index (CI) were calculated. **Results:** Our study reports 80 traditionally used plant species, belonging to 31 plant families. Asteraceae with 12 species was the most used family in this area. The most used parts were aerial parts (18.57%), leaves (21.42%), and flowers (17.14%), respectively. The most treated ailments were digestive problems. The highest number of ethnobotanical indices RFC and CI were observed in *Stachys lavandulifolia* Vahl. and *Thymus lancifolius* Celak., respectively. **Conclusions:** Hamedan province possesses considerable knowledge about medicinal plants for treating common health problems.

Keywords: Alvand, ethnobotany, Hamedan, Tuyserkhan, traditional medicine

Introduction

Ethnobotanical studies are significant in revealing locally important plant species especially for the discovery of new drugs [1]. From ancient times, the documentation of traditional knowledge especially about the medicinal uses of plants has led to the introduction of new medicines. Traditional medicine still remains the main source for majority of people in developing countries for

treating health problems, because medicinal plants are accessible and inexpensive [2]. Iran is located in middle-east, Asia which contains rich ecosystems and biodiversity due to the various climatic conditions and geographical characteristics [3]. Some researchers have investigated the traditional pharmacopoeia and medicinal plants in different areas of the country [4-9].

Hamedan province with a long history in traditional medicine of Iran has shown to be one of the main centers of production and supply of herbal plants in Iran. The province covers 19,493 square kilometers and is located in the west of Iran [10]. Hamedan province lies in a temperate region in the east of Zagros mountains. It is in vicinity of the Alvand Mountains and has a cold, mountainous climate with snowy winters. In fact, it is one of the coldest cities in Iran.

Kalvandi *et al.* have collected 6000 herbaceous species from different regions of Hamedan province among them 315 medicinal plants were identified which were related to 71 families and 209 genus but the ethnobotanical information of the plants had not been investigated [11].

We have previously collected the ethnobotanical information in two villages of Hamedan in first step [12] and in the present survey we specifically focused on ethnobotanical knowledge and medicinal plants used by indigenous people and performed quantitative survey of the information in region of Alvand Mountain of Hamedan and Tuyserkhan.

Experimental

Study setting

The present ethnobotanical study was conducted in the highlands of Alvand in Hamedan and Tuyserkhan. These are parts of Zagros mountains of Iran and are located between northern latitude 34° 40' and eastern longitude 48° 39'. The altitude of most of the studied places were between 1568-2617 m above the sea level. The study was done during March 2012 to September 2013. Interviews were conducted in 27 villages. All data has been collected from conversations with local people who worked and lived close to plants, to ensure the reliability of the information. This model is what anthropologists known as semi-structured [13].

Collected data during the fieldwork were analyzed with Microsoft Access software. Data about the medicinal plant uses were collected from people of tribes who were expert in medicinal plants. Informants were asked to come

to the field and the plants were shown to them. In cases that were not possible to do so, plants were collected from around the villages and were shown to confirm the plant names. Interviews have been recorded for documentation. Each time a plant use was mentioned, it was considered as a single "use record". Mentions were then divided into use categories following Cook [14]. Voucher samples were also collected for each plant, identified by using floristic and taxonomic references, especially Flora Iranica and were deposited at the Herbarium of the Traditional Medicine and Materia Medica Research Center (TMRC), Shahid Beheshti University of Medical Sciences, Tehran, Iran. Information on medicinal plants including their local names, parts used, methods of preparation and administration routes, disorders treated/medicinal effects, were documented.

Data analysis

Some classical quantitative ethnobotanical indices were calculated:

Relative frequency of citation (RFC) is obtained by dividing the number of informants who mention the use of the species (FC) by total number of informants in the survey. This index does not consider the use category and varies from zero, when nobody refers to the plants as useful, to one in case that every informant would mention it as useful [15].

Cultural importance index (CI) was also calculated. This index is the sum of the proportion of informants that have mentioned each species use. It shows the number of participants who mentioned each use of the species divided by total number of informants. In this case, each taxon referred by an informant within a medical use category was counted as a use-report (UR) [16].

Informant consensus factor or informant agreement ratio (IAR) [17] is the ratio between the number of UR in each use category minus the number of used taxa and the number of UR minus one, that concerns what plants to use for specific use categories. It is a comparison of the

number of mentions in a use category and the total number of taxa used in the category concerned. The highest value can be one, which indicates the largest agreement of informants on the use of one species in one use category [18].

Results and Discussion

In the present study, 80 traditionally used plants in Hamedan and Tuyserkar were recorded. The plant families, scientific names, local names, parts used, methods of preparation, administration routes, disorders treated/medicinal effects, frequency of citation (FC), number of use reports (UR), number of uses (NU) and voucher numbers are listed in table 1. Totally, 200 interviews with 53 informants were done. Six informants were woman and 47 were men aged from 28 to 84 years. The documented species corresponded to 61 genera, arranged in 31 plant families. As shown in figure 1 Asteraceae with 12 species was the most used family in the area.

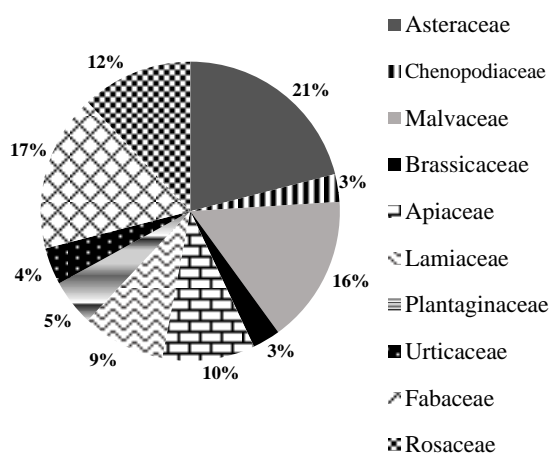


Figure 1. Usage of plant families (%)

In other studies conducted in Iran like in Kohgiluyeh va Boyer Ahmad [15] and Hormozgan provinces [19], Asteraceae and Lamiaceae were the most used families. In Hezar mountain in south-east of Iran, Saravan region from Baluchistan of Iran [20] and Kerman provinces [21] the largest number of medicinal species family has been Lamiaceae. Totally, 30

medicinal plants from the west Azerbaijan villages were reported by Miraldi *et al.* [8]. Naghibi *et al.* represented 46 genera and 410 species and subspecies from Lamiaceae family in Iran that several members of this family were used in traditional and folk medicine [9].

Local people use different parts of the plants for variety of purposes. The most used parts in this study were leaves (21.42%), aerial parts(18.57%), and flowers (17.14%), respectively (figure 2).



Figure 2. Percentage of used plant parts

The reason why leaves and aerial parts were mostly used could be that they are easily accessible and are active in photosynthesis and production of metabolites. The most method of preparation was infusion and decoction. In the region of Turkmen Sahra, north of Iran, decoction [22] and in Hezar mountains decoction and infusion were repeated to be the most used method of preparation [20]. Most dosage forms were syrup and tea which means the most administration rout was oral.

Fifty eight use records were classified in 21 medicinal use categories. The most treated use categories by plants presented in this study include digestive problems (23.19% citation, 17.68% species), Infections/Infestations (11.79% citation, 12.15% species) and respiratory problems (9.51% citation, 11.05% species) (figure 3) while in another province, Kohgiluyeh va Boyer Ahmad, digestive system disorders, musculoskeletal disorders and infections had the highest number of records [15].

Table 1. Plants used in Hamedan province

Voucher Number	Family	Scientific Name	Local Name's Pronunciation	Plant part	Method of Preparation	Administration Route	Use
3419	Asteraceae	<i>Achillea biebersteinii</i> Afan	/bu:ma:dæɾʌn/	Flower, Leaf, Root, Whole Plant	Extraction, Infusion, Decoction	Oral	Fever, hypoglycemia, hypothermia, carminative, infection, stomachache
3670	Asteraceae	<i>Achillea vermicularis</i> Trin.	/bu:ma:dæɾʌn/	Flowering Aerial part	Crude		Fever
3680	Asteraceae	<i>Achillea vermicularis</i> Trin.	/bu:ma:dæɾʌn/	Aerial Part	Crude, Decoction	Topical, Oral	Infection
3645	Asteraceae	<i>Achillea vermicularis</i> Trin.	/bu:ma:dæɾʌn/	Shoot	Infusion	Oral	Stomachache
3389	Asteraceae	<i>Achillea wilhelmsii</i> C. Koch	/bu:ma:dæɾʌn/	Aerial Part	Extraction	Oral	Stomachache, backache
3402	Asteraceae	<i>Achillea wilhelmsii</i> C. Koch	/bu:ma:dæɾʌn/	Flower	Decoction	Oral	Anemia, fever, dizziness, stomachache
3696	Malvaceae	<i>Alcea arbelensis</i>	/gɔ:l-e xætmr/	Flower	Infusion, Decoction, Crude	Oral, Topical	Constipation, coughs, sores
3435	Malvaceae	<i>Alcea calvertii</i> Boiss.	/gɔ:l-e xætmr/	Flower	Maceration	Oral	Respiratory system, coughs, infection, asthma
3438	Malvaceae	<i>Alcea tarica</i> Pakravan. & Ghahremani	/gɔ:l-e xætmr/	Flower	Infusion, Decoction, Extraction	Oral, Inhalation	Throat, joint pains, fever, respiratory system
3415	Malvaceae	<i>Alcea flavovirens</i> (Boiss. & Buhse) Ijijn	/xætmr/	Flower	Decoction	Oral	Stomachache
3387	Malvaceae	<i>Alcea koelzii</i> I. Riedl.	/gɔ:l-e xætmr/	Flower	Decoction	Oral	Infection, respiratory system
3392	Malvaceae	<i>Alcea kurdica</i> Alef.	/gɔ:l-e xætmr/	Flower	Infusion	Oral	Carminative-veterinary, coughs
3399	Malvaceae	<i>Alcea rechingeri</i> (Zohary) I. Riedl	/xætmr/	Flower	Decoction	Oral	Respiratory system
3440	Alliaceae	<i>Allium iranicum</i> (Wendelbo) Wendelbo	/si:r-e væhfɪr/	Bulb, Leaf	Decoction	Oral	Hypothermia, kidney stone, carminative
3457	Rosaceae	<i>Amygdalus communis</i> L.	/ba:da:m/	Seed	Crude	Topical, Oral	Joint pains, osteoporosis, hypoglycemia, cramp
3444	Rosaceae	<i>Amygdalus lycioides</i> Spach	/ba:da:m-e væhfɪr/	Fruit, Seed	Crude	Oral	Hyperlipidemia, hypoglycemia
3432	Boraginaceae	<i>Anchusa azurea</i> Mill.	/gɔ:lku:/	Flower, Root	Decoction	Oral	nervous system, asthma
3412	Apiaceae	<i>Anethum graveolens</i> L.	/fævrɪd/	Flower, Leaf, Aerial Part	Infusion	Oral	Cold, hyperlipidemia, hypertension
3660	Asteraceae	<i>Arctium minus</i> (Hill) Bernh.	/tɔ:gʌ bærg/	Leaf & Root	Extraction	Oral	Skin, diabetes, infection

Table 1. Continued

Voucher Number	Family	Scientific Name	Local Name's Pronunciation	Plant part	Method of Preparation	Administration Route	Use
3456	Rosaceae	<i>Armeniaca vulgaris</i> Lam.	/zærdɑ:lu:/	Fruit	Crude	Oral	Anthelmintic
3639	Fabaceae	<i>Astragalus verus</i> Olivier	/gævæn/	Aerial part & Leaf	Maceration	Topical, Oral	Hair, coughs
3672	Asteraceae	<i>Centaurea depressa</i> M. B.	/gɔ:l ku:/	Aerial Part	Crude, Decoction	Topical	Injuries, hair, skin
3423	Asteraceae	<i>Centaurea solstitialis</i> L.	/ʃæsbertekɑn/	Whole Plant	Decoction	Oral	Kidney Stone
3661	Rosaceae	<i>Cerasus vulgaris</i> Miller	/ʌlbɑlu/	vegetative part	Decoction	Oral	Kidney Stone
3448	Ranunculaceae	<i>Ceratocephalus falcatus</i> (L.) Pers	/peykɔ:L/	Spine, Aerial Part	Decoction	Oral	Kidney Stone
3439	Chenopodiaceae	<i>Chenopodium album</i> L.	/sælmɑntære/	Leaf	Crude, Decoction	Oral	Hyperthermia, carminative, respiratory system
3443	Fabaceae	<i>Cicer anatolicum</i> Alef.	/nɔ:xɔ:d sryɑ: væhʃi/	Whole Plant, Fruit	Decoction	Oral	Diarrhea, kidney stone, constipation
3648	Asteraceae	<i>Cichorium intybus</i> L.	/KAsnɪ/	Aerial Part, Root	Infusion, Decoction, Extraction	Oral	Respiratory system, hypertension, fever and chills, kidney stone
3426	Cucurbitaceae	<i>Citrullus lanatus</i> (Thumb.) Matsum & Nakai	/hendevɑ:ne deym/	Fruit	Cooked	Oral	Kidney stone
3646	Convolvulaceae	<i>Convolvulus arvensis</i> L.	/Lu: Lu:/	Aerial Part	Infusion	Oral	Liver, hypercholia
3653	Apiaceae	<i>Coriandrum sativum</i> L.	/geʃni:z/	Aerial Part, Seed	Extraction	Oral	Hyperlipidemia, diabetes, carminative-veterinary
3669	Apiaceae	<i>Echinophora platyloba</i> DC.	/dɑtɑ du:tɑx/	Leaf	Extraction	Oral	Cold
3668	Boraginaceae	<i>Echium amoenum</i> Fisch. & C. A. Mey.	/gɔ:lɡɑ:vzæbɑn/	Flower	Infusion	Oral	Nervous system, sedative, cold
3452	Elaeagnaceae	<i>Elaeagnus angustifolia</i> L.	/serendʒek/	Seed, Fruit	Crude	Oral	Osteoporosis, diarrhea
3652	Apiaceae	<i>Falcaria vulgaris</i> Bernh.	/xæzejʌæxt/	Aerial Part	Crude	Topical, Oral	Wound, stomachache
3446	Apiaceae	<i>Falcaria vulgaris</i> Bernh.	/xæzejʌæxt/	Leaf	Crude	Topical	wound
3667	Apiaceae	<i>Foeniculum vulgare</i> Mill.	/rɑ:zryɑ:ne/	Seed	Decoction, Infusion	Oral	Gallstones, lactation stimulant, carminative
3678	Fumariaceae	<i>Fumaria asepalis</i> Boiss.	/ʃɑhtære/	Aerial Part, Leaf	Crude, Extraction, Infusion	Topical, Oral	Infection, sores, blood system disorders, infection, skin
3430	Rubiaceae	<i>Galium verum</i> L.	/æʌfdʒu:ʃ/	Aerial Part	Crude	Topical	Wound

Table 1. Continued

Voucher Number	Family	Scientific Name	Local Name's Pronunciation	Plant part	Method of Preparation	Administration Route	Use
3442	Fabaceae	<i>Glycyrrhiza glabra</i> L.	/ʃi:rn bæyʌn/	Root, Latex	Decoction	Oral, Topical	Gastric ulcer, stomachache, joint pains, wound, inflammation, gastric ulcer, fracture
3644	Asteraceae	<i>Gundelia tournefortii</i> L.	/kæŋær/	Aerial Part	Extraction	Oral	Hyperlipidemia
3647	Hypericaceae	<i>Hypericum perforatum</i> L.	/gɔ:lə tʃa:yr/	Flower	Infusion	Oral	Nervous system, pains
3665	Juglandaceae	<i>Juglans regia</i> L.	/gerdu:/	Leaf	Crude	Topical	Pains, diabetes
3451	Oleaceae	<i>Ligustrum ovalifolium</i> Hassk.	/bærg-e nɔ:/	Seed, Flower	Crude, Infusion	Oral	Hypercholia, vomiting, diarrhea
3663	Linaceae	<i>Linum album</i> Ky. Ex Boiss.	/kæm/	Aerial Part, Leaf, Stem	Crude	Topical	Fracture, wart
3699	Malvaceae	<i>Malva sylvestris</i> L.	/tu:le/	Flower, Leaf	Infusion, Decoction	Oral	Constipation, stomachache, hair, coughs
3408	Fabaceae	<i>Medicago sativa</i> L.	/jɔ:ndʒe/	Leaf	Extraction, Decoction	Oral	Heart disease, coagulation, stomachache
3433	Fabaceae	<i>Melilotus officinalis</i> (L.) Desr.	/dæle jɔ:ndʒe/	Aerial Part, Leaf	Decoction, Juice	Oral	Hypoglycemia, hypotension, coagulation, wound, hypercholia
3417	Lamiaceae	<i>Mentha longifolia</i> (L.) Hudson	/pu:ne/	Aerial Part, Leaf, Flower	Extraction, Decoction, Crude	Oral	Carminative, vomiting, stomachache, hypertension, diarrhea, poisoning, asthma, fever
3414	Lamiaceae	<i>Mentha spicata</i> L.	/næna:/	Leaf, Aerial part, Flower, Stem	Extraction	Oral	Diarrhea, stomachache, nausea
3675	Lamiaceae	<i>Nepeta crispa</i> Willd	/mefrʌh/	Aerial Part	Infusion	Oral	Hypothermia
3640	Lamiaceae	<i>Nepeta crispa</i> Willd	/mefrʌh/	Aerial Part	Infusion, Decoction	Oral	Nervous system, diarrhea
3418	Fabaceae	<i>Ononis spinosa</i> L.	/gælem bʌrɪmʌdʒr/	Leaf, Root	Decoction	Oral, Topical	Stomachache, skin, pains
3450	Orchidaceae	<i>Orchis palustris</i> Jacq.	/sæɔləb/	Leaf	Crude	Oral	Respiratory system
3437	Liliaceae	<i>Ornithogalum brachystachys</i> C. Koch	/gi:lɑ:se/	Leaf	Cooked	Oral	Infection, anthelmintic
3421	Papaveraceae	<i>Papaver argemone</i> L.	/sɔ:r tʃæŋr/	Flower, Seed	Decoction, Infusion, Crude	Oral	Headache, coughs, drug dependence
3447	Rosaceae	<i>Persica vulgaris</i> Mill.	/hɔ:lu:/	Leaf	Crude	Anal	Hemorrhoids
3650	Fabaceae	<i>Phaseolus vulgaris</i> L.	/lu:bi:/	Seed	Crude		Respiratory system
3698	Plantaginaceae	<i>Plantago lanceolata</i> L.	/ræŋki:je/	Leaf, Seed	Crude, Maceration	Topical, Orally	Scabies, throat, wound, hemorrhage, infection

Table 1. Continued

Voucher Number	Family	Scientific Name	Local Name's Pronunciation	Plant part	Method of Preparation	Administration Route	Use
3385	Plantaginaceae	<i>Plantago major</i> L.	/ba:rhæɪ/	Seed	Infusion	Oral	Respiratory system
3643	Platanaceae	<i>Platanus orientalis</i> L.	/tʃena:r/	Leaf	Infusion	Oral	Fever
3664	Portulacaceae	<i>Portulaca oleracea</i> L.	/xɔ:rfe/	Aerial Part, Leaf, Seed	Crude	Oral, Topical	Skin
3671	Anacardiaceae	<i>Rhus coriaria</i> L.	/sɔ:ma:ɪ/	Fruit, Seed	Crude, Maceration	Oral	Wound, diabetes, hyperlipidemia
3658	Rosaceae	<i>Rosa damascena</i> Mill.	/rɔ:z/	Flower	Extraction, infusion,	Oral	Stomachache, constipation
3453	Rosaceae	<i>Sanguisorba minor</i> Scop.	/reveleks/	Bulb, Root	Decoction	Oral	Hypothermia, infection, hemorrhoids
3454	Asteraceae	<i>Senecio vulgaris</i> L.	/ka:hu ku:hr/	Whole Plant	Decoction	Oral	Drug dependence
3409	Brassicaceae	<i>Sisymbrium brassiciforme</i> C. A. Mey	/xɑ:kʃi:r/	Seed	Maceration	Oral	Hyperthermia, fever, cold
3403	Brassicaceae	<i>Sisymbrium gaubae</i> Rech. f. & Bomm.	/xɑ:kʃi:r/	Seed	Extraction	Oral	Constipation, hyperthermia
3697	Solanaceae	<i>Solanum tuberosum</i> L.	/si:b zæmi:nr/	Root Tuber	Juice	Oral	Gastric ulcer
3384	Fabaceae	<i>Sophora alopecuroides</i> L.	/ʃi:rn bæyan/	Root	Crude	Topical	Fracture
3642	Lamiaceae	<i>Stachys lavandulifolia</i> Vahl.	/tulkrdʒe/	Flower, Aerial part	Infusion, Decoction, Extraction	Oral, Topical	Pains, nervous system, cold, burn, hypertension, infection, hyperlipidemia, stomachache, carminative
3659	Asteraceae	<i>Tanacetum parthenium</i> (L.) Schultz-Bip.	/sɑtɑ kelkɑnɑ/	Flower	Extraction, Infusion	Oral, Topical	Headache, hair, nervous system, kidney, sedative, headache
3641	Lamiaceae	<i>Thymus lancifolius</i> Celak.	/ʌzɔ:rbe/	Aerial Part	Infusion, Extraction	Oral	Fever, cold, stomachache, sedative, gastric ulcer, hypothermia, carminative
3428	Asteraceae	<i>Tragopogon rechingeri</i> M. Ownbey	/ʃeng/	Leaf, Aerial Part	Cooked, Crude	Oral	Anemia, stomachache
3429	Asteraceae	<i>Tripleurospermum disciforme</i> (C. A. Mey.) Schultz	/ri:ʃe gæzr/	Flower	Decoction	Oral	Kidney stone
3390	Urticaceae	<i>Urtica dioica</i> L.	/gæzæne/	Leaf	Crude, infusion, Decoction	Topical, Oral	Pains, kidney stone, diabetes, hypoglycemia
3655	Scrophulariaceae	<i>Verbascum macrocarpus</i> Boiss.	/xærgu:ʃæk/	Aerial Part	Juice	Topical	Hair

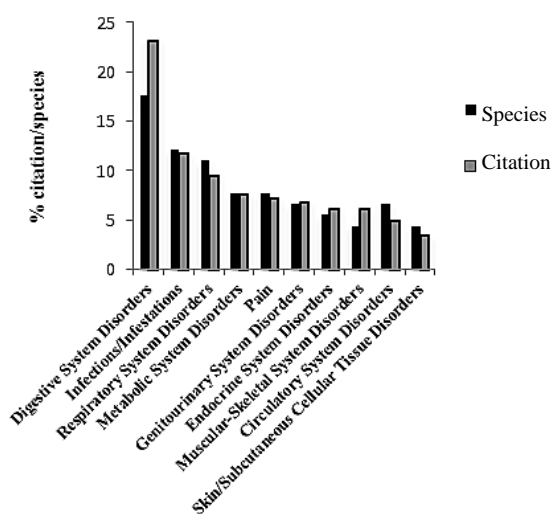


Figure 3. Percentage of species and citation in each use category

IAR was calculated in order to assess reliability and consistency of medicinal plant uses. Culturally important plants were those that were used by a large number of healers for the same category of indigenous use, while plants that were cited as useful by only one or two informants were considered to be of low cultural importance [23]. The highest value of IAR was related to the use category of pregnancy/ birth/ puerperium disorders. In five use categories (inflammation, mental disorders, defined symptoms, nutritional disorders and sensory system disorders) the number of plants and the number of citations for each species, in each use category were the same, which resulted to the value zero for IAR. That means there was no agreement between informants on the use of species. A similar observation was reported in an ethnobotanical study of Hani ethnicity located in Yunnan, China [13]. Interestingly, the number of species and the number of citations was the highest in digestive system category, but it did not show the highest value in the IAR ranking (table 2).

Quantitative data collection from ethnobotanical studies is turning to be essential for further information evaluation and for carrying out more

comparisons between ethnobotany works that use the same methodology.

The highest number of informants was ten which belonged to *Thymus lancifolius* Celak. (figure 4). It means the plant was the most known plant in this province. *Stachys lavandulifolia* Vahl. showed the maximum number of use-reports (figure 5).

Ethnobotanical indices of RFC and CI also showed the highest number in *Thymus lancifolius* Celak. and *Stachys lavandulifolia* Vahl., respectively (table 3).

Table 2. Informant agreement factor for different use categories

Use Category	n _{ur}	n _t	IAR
Digestive System Disorders	61	32	0.4833
Infections/Infestations	31	22	0.3
Respiratory System Disorders	25	20	0.2083
Metabolic System Disorders	20	14	0.3158
Pain	19	14	0.2778
Genitourinary System Disorders	18	12	0.3529
Muscular-Skeletal System Disorders	16	8	0.5333
Endocrine System Disorders	16	10	0.4
Circulatory System Disorders	13	12	0.0833
Skin/Subcutaneous Cellular Tissue Disorders	9	8	0.125
Injuries	6	5	0.2
Inflammation	6	6	0
Blood System Disorders	6	4	0.4
Poisoning	4	3	0.3333
Mental Disorders	4	4	0
Nervous System Disorders	3	2	0.5
Pregnancy/Birth/Puerperium Disorders	2	1	1
Sensory System Disorders	1	1	0
Nutritional Disorders	1	1	0
Defined Symptoms	1	1	0

n_t = number of taxa, n_{ur} = number of citation in each use category; IAR= informant agreement ratio

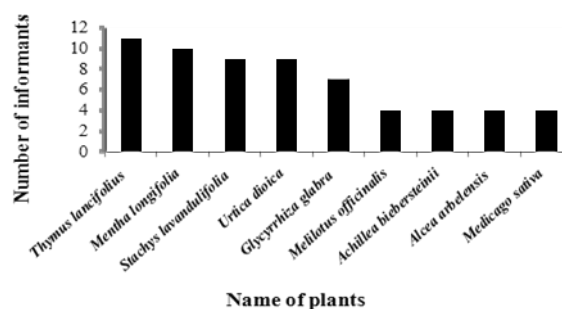


Figure 4. Species with the highest number of informants

RFC directly depends on the number of informants mentioning the use of the plant. The CI index measure is independent to the number

of informants and considers diversity of use. Culturally important plants are those that are used

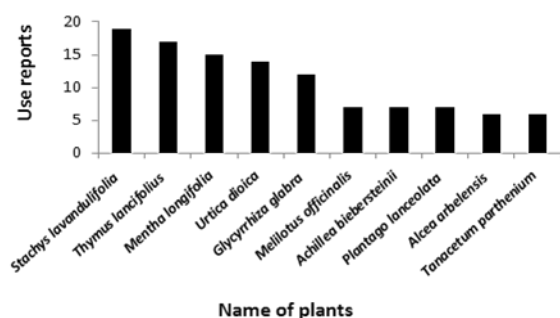


Figure 5. Species with the highest number of use reports

Table 3. The highest value of RFC and CI in plants

NO.	Scientific Name	CI	RFC
1	<i>Stachys lavandulifolia</i> Vahl.	0.358	0.17
2	<i>Thymus lancifolius</i> Celak.	0.321	0.208
3	<i>Mentha longifolia</i> (L.) Hudson	0.283	0.189
4	<i>Urtica dioica</i> L.	0.264	0.17
5	<i>Glycyrrhiza glabra</i> L.	0.226	0.132
6	<i>Achillea biebersteinii</i> Afan	0.132	0.075
7	<i>Melilotus officinalis</i> (L.) Desr.	0.132	0.075
8	<i>Alcea arbelensis</i> Boiss. & Hausskn	0.113	0.075
9	<i>Ceratocephalus falcata</i> (L.) Pers	0.094	0.075
10	<i>Medicago sativa</i> L.	0.094	0.075

by a large number of people for the same category of use [24]. In this paper we focused mainly on species by medicinal uses, but some species had other interests; mostly as food. From the 50 species reported in this paper, thirty-eight plants had both medicinal and non-medicinal uses. Most of the edible plants were used as food additives. Five species including *Medicago sativa* L., *Chenopodium album* L., *Mentha spicata* L., *Mentha longifolia* L., *Tragopogon rechingeri* M. Ownbey, were used as raw vegetables.

Two species including *Rumex acetosa* L. and *Heracleum persicum* Desf. ex Fischer were recorded only as edible plants. *Sophora alopecuroides* L. was used as insecticide and fungicide. *Elaeagnus angustifolia* L. and *Ononis spinosa* L. were used for producing colors and *Alcea tarica* Pakravan. & Ghahremani was used as detergent.

30 plants from 50 species such as *Achillea biebersteinii* Afan, *Senecio vulgaris* L., *Thymus lancifolius* Celak. were used for feeding animals in this region. This might be a big threat for these plants. Special attention should be given to protect these species of the region.

Recognition of plants in each province helps in better identification of restorable natural resources and characteristics of the medicinal plants and their applications. Hamedan province has good ethnobotanical potential for medicinal plants. It is a suitable place for further ethnobotanical and ethnopharmacological studies. We are aware that this study was not exhaustive. More similar studies are necessary to gather ethnobotanical knowledge, including all kinds of useful plants, in the various regions of Hamedan province.

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Declaration of interest

The authors declare that there is no conflict of interest. The authors alone are responsible for the content of the paper.

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