

Full Length Research Paper

An ethnobotanical survey of some medicinal plants in Keban (Elazığ-Turkey)

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In this study, 61 wild plant taxa belonging to 30 families that are used as medicine are documented in Keban (Elazığ). The most encountered medicinal plant families were Lamiaceae (10 taxa), Asteraceae (8 taxa), Fabaceae (6 taxa) and Rosaceae (5 taxa), the most common preparations were infusion and decoction. These folk medicinal plants are mostly used for treatment of kidney stones, colds and flu, analgesic, cough, for skin and diabetes diseases. *Mentha longifolia* (L.) Huds. subsp. *typhoides* (Briq.) Harley var. *typhoides*, *Salvia syriaca* L., *Rosa canina* L., *Thymus kotschyanus* Boiss. & Hohen. var. *kotschyanus*, *Portulaca oleracea* L. and *Rumex acetosella* L. were the plants most used by the local people in Keban, Turkey.

Key words: Ethnobotany, medicinal plants, traditional medicine, Keban, Turkey.

INTRODUCTION

A large portion of the world population, especially in developing countries, depends on traditional medicine for the treatment of diseases and injuries. Hundreds of plant genera, to mention the most important natural resource of indigenous medicine, are used for that purpose, mainly as herbal preparations, including very potent and powerful drugs which have stood the test of time and could not be replaced by modern medical preparations (Ahmad, 1998). The World Health Organisation reported that 80% of the world population rely chiefly on indigenous medicine and that the majority of traditional therapies involve the use of plant extracts or of their active constituents (WHO, 1993, 2002).

Turkey is one of the most floristically rich countries in the world with astonishing plant diversity which has a very extraordinary rich flora and a great knowledge of folkloric medicines and consequently represents a potential resource for such studies (Hudson et al., 2000). Turkey's flora is rich and diverse with 13,181 plant taxa and 32% of endemism (Özhatay and Kültür, 2006;

Özhatay et al., 2009; Özhatay et al., 2011). Endemism is one of the most important indicators to evaluate environmental value of an area. In Turkey, the rate of endemism in plant species is relatively high when compared with other European countries (Ugulu et al., 2008). Throughout history, humans have derived many uses and benefits from the plants found in their own region. Initially, wild plants were collected from their natural habitat, followed by the cultivation of those that were used most commonly (Akan et al., 2008). A large portion of the world population, especially in developing countries, depends on traditional medicine for the treatment of diseases and injuries. Currently, nearly 80% of the world population relies on traditional medicine, mainly medicinal plants, to cure illnesses and ailments. The various botanical sources, particularly metabolites and their biological activities, alongside the different practices of preparing and applying herbal remedies devised by certain ethnic groups throughout the millennia, have become the most useful basis for the

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development of new pharmaceuticals (Jaric et al., 2007).

The demand for medicinal plants has been on a rapid increase. According to the data released by the United Nations Conference on Trade and Development (UNCTAD), the annual market volume of the medicinal plants market in the world has reached \$40 billion. The leading countries in medicinal plant trade are China, India and Germany, respectively (Bayramoğlu et al., 2009). The export rates of Turkey between 1993 and 2003 in medicinal and aromatic plants vary between 33,000 and 55,000 tons (Özgüven et al., 2005). So in the present world, traditional botanical knowledge and ethnobotanical research are playing an important role in biological investigation, economy and practical uses. However, the potential use of plants as a source of new drugs is poorly explored yet.

Out of the “as a conservative estimation” reported 265,000 species of seed plants, merely a small fraction has been investigated phytochemically and only a subsample of it has been properly studied in terms of their pharmacological properties (Stevens, 2001). Medical folklore researches about diseases in which herbal drugs are used colloquially in Turkey, their effects and names have been going on increasingly since Republican period (1923) (Baytop, 1999). East Anatolia (Turkey) has a rich flora due to its variable climate and high number of ecological zones. This diversity in flora provides a rich source of medicinal plants, which has long been utilized by Anatolian cultures, and hence accounts for the accumulation of remarkable medicinal folk knowledge in the region (Ozgoke and Ozçelik, 2004). Majority of the East Anatolian Turkish people live in rural areas so they use plants for nourishment and medical purposes. As the case in the other countries of the world, in recent years, the plants – used traditionally for curative purposes – have attracted attention of the researchers (Cakılcıoğlu et al., 2010; Polat et al., 2011 and 2012; Kargıoğlu et al., 2008; Tuzlacı et al., 2010; Bulut, 2011; Gunes and Ozhatay, 2011; Öztürk and Olcucu, 2011).

In recent years interest in herbal medicines has increased considerably both at home and abroad as they are believed to be comparatively less toxic than the synthetics (Yusuf et al., 2007). Documentation of the indigenous knowledge through ethnobotanical studies is important for the conservation and utilization of biological resources (Muthu et al., 2006). Therefore, establishment of the local names and indigenous uses of plants has significant potential societal benefits (Bagci, 2000). Ethnopharmacology has played a significant role in the progress of conventional medicine and is likely to become increasingly important in the years to come. A cooperative approach by ethnobotanists, ethnopharmacologists, physicians and phytochemists is thereby essential to spur the progress of medicinal plants research (Gilani and Rahman, 2005).

Flora and wide diversity habitats of Turkey threatened and have declined rapidly over the last 40 years. Rare

and sensitive habitats such as coastal dunes, peatlands, wetlands, heath lands, grasslands and old growth forest are under immense threat and declining fast, including many areas that have yet to be surveyed (Özhatay, 2006). Furthermore, ethno-medicinal knowledge and also the medicinal plants are depleting at an alarming rate due to availability of modern medical facilities and other socio-economic factors. Hence, in order to save knowledge on pharmaceutical and medicinal usabilities of plants from loss, some kind of affordable and effective survey strategy is needed. The ethnobotanical approach is one such method which meets this requirement and can be applied to select plants for pharmacological studies (Redzic, 2007; Kundalic et al., 2010).

Turkish people are quite interested in wild plants, due to the high proportion of people living in rural areas, and also for economic reasons. Turkey's plant diversity is very rich because of its localization meeting point of 3 phytogeographic region. While Irano-Turan elements are found in the east, Mediterranean elements are common in the South. Some formations of Euro-Siberian geographical region can also be seen in the humid areas. Much of the knowledge on medicinal plants is passed on from one generation to the next only verbally, moreover the increasing human population in the late decades has led to overexploitation of land in many areas thus reducing the biodiversity of medicinal plants. Thus, there is an urgent need to record and utilize the wealth of ethnobotanical knowledge.

The study was carried out with the aim of preserving knowledge about local use and provides preliminary information aimed at a more detailed investigation on the bioactive studies. Also, this study identified not only the wild plants collected for medical purposes by local people of Keban County in the Eastern Anatolia Region, but also the uses and local names of these plants.

MATERIALS AND METHODS

Study area was located on the east of Anatolian diagonal, in the skirts of South-Eastern Taurus Mountains, in the Upper Euphrates Region of the Eastern Anatolia Region (Sengun, 2007). Keban belongs to the Iran-Turan Plant Geography Region and falls within the B7 grid square according to the Grid classification system developed by Davis (1965 to 1985). Keban county is bounded to the east by Elazığ center, to the north by Keban Dam lake and Cemisgezek (Tunceli), to the south by Baskil and to the northwest by Malatya and Ağın (Figure 1). It is situated between longitudes 39 to 40° east and latitudes 38 to 39° north. Keban area is of an average 780 m above sea level and 543 km². Hacıosman (1900 to 2000 m) and Emirosman mountain (1800 to 1900 m) are main highest mountains of the research area. Baskil and Kuzova basins are located within the boundaries of the county. Today, the county serves as the center for 30 villages and it is situated between Elazığ, Malatya and Tunceli, it has a rich culture, influenced by both cities. A floristic study was initially conducted to determine the flora of study area, in this study, 87 families, 379 genus and 820 taxons were identified. The number of endemic taxons were 93, with a ratio of 11.3% to the total flora (Kilic and Bagci, 2011). The field work was carried out over as period of 2 years (2010 to 2011). During



Figure 1. Geographical location of the study area.

this research, 20 villages have been visited, about 150 plant taxa used for local people were collected and total of 120 local people were interviewed. 'An Ethnobotany info questionnaire' was administered to the local people through face-to-face interviews. The information for these plants, such as local names, used parts, their

usages, methods of preparation, administration dosage and duration treatments have been recorded by mean of "Ethnobotany info questionnaire" (Table 1).

Plants were identified using the standard text, "Flora of Turkey and the East Aegean Islands" Vol. 1 to 9 (Davis, 1965 to 1985),

Table 1. Info questionnaire of ethnobotany.

Province / County, village name
Date
Plant botanical name
Plant vernacular name
Which purpose collection
Collection time
Plant parts used
Utilization methods
Collection and preparation methods
Name/surname
Age/ Sex

Flora of Turkey and Aegean Islands (suppl. 1) Vol. 10 (Davis et al., 1988), Flora of Turkey and the Aegean Islands (suppl. 2) Vol. 11 (Güner et al., 2000) and were compared with the specimens in Firat University Herbarium (FUH). The names of plant families were listed in alphabetic order. Scientific names of plant species were identified according to the 'Author of Plant Names' (Brummit and Powell, 2001), in addition, whether the names of the local plants are Turkish or was checked from the web page of Turkish Language Association (TLA) (<http://tdkterim.gov.tr/bts/>).

Demographic characteristics of the respondent were determined and recorded through face-to-face interviews using the question form. Total respondents people are 83; beetwen 30 to 40 years (5 woman, 10 man), 40 to 60 years (19 woman, 29 man), over 60 years (8 woman, 12 man). Interviews were made on the busy hours of the common areas (bazaars, tea houses, farms, gardens, house etc.) visited by the citizens of Keban County and its villages. The respondents of the questionnaire are Turkish citizens. As we think that young people are not suitable for an ethnobotanical study, the questionnaire was only administered to people over 30 who knew about medicinal plants. The people who had knowledge of plants were visited at least for two times; one of these visits is particularly paid to their houses. During the interviews, demographic characteristics of the study participants, and local names, utilized parts and preparation methods of the plants were recorded. The people who participated in the study were requested to indicate the wild plants they used. These plants were collected from the work book. The researcher were accompanied during the questionnaire study by retired teacher, Ali Zahit Kilic.

The Kurdish are of the major ethnic group in the region, with small minorities of Turkish and Zazaki groups in the county. People of Turkish origin are approximately 50 million and people of Kurdish and Zazaish origin are about 12 million 600 thousand (Demirtas, 2008). Zazaish people are a community which honorably preserved their own identity and adopted being neither Turkish nor Kurdish. However, a significant part of Zazaish people adopt Kurdish upper identity today (Onder, 1999).

A floristic study was initially conducted to determine the flora of our study area (Kilic and Bagci, 2011). In this study, 87 families, 379 genera belonged to these families and totally 820 taxa were determined as species, subspecies and variety levels. The number of endemic taxons was 95, with a ratio of 11.6% to the total flora. Investigations were carried out in the following 14 places, with 83 informants: Keban center (10 informants), Asagicakmak (8 informants), Ulupinar (4 informants), Sagdiclar (3 informants), Taskesen (5 informants), Bolukcali (6 informants), Aydinlar (7 informants), Aslankasi (5 informants), Buklumlu (8 informants), Calik (5 informants), Durumlu (9 informants), Denizli (4 informants), Yahyalı (4 informants) and Kopuzlu (5 informants) villages.

Study permit was obtained from the Keban County Administration and Gendarmerie for the questionnaire administered to the citizens of the towns and villages affiliated to Keban.

RESULTS

In this study, 61 plant taxa were recorded as used for medicinal purpose, food and others in the study area. A total of 61 wild plant species, belonging to 60 genera and 30 families were recorded as medicinal plant and they are utilized in Table 2 formulations. The most represented families are Lamiaceae, Asteraceae, Fabaceae; Rosaceae with 10, 8, 6, 5 taxa, respectively, followed with 4 species were Brassicaceae and 3 species were Apiaceae. In our survey, the most frequently used plant parts were, aerial parts, accounting for 39%, followed by leaves (24%), fruits (17%), flowers (16%) and others (4%). Current state shows that people in the research area were conscious about plants uses, and each part of plant could be of different effect.

Infusion and decoction are generally the preparation method of choice, the other preparation methods cooked, as fresh, latex and raw. A total of 61 plant species have been documented during this investigation, which are used by the tribal peoples against about 40 diseases. Local people used wild plants as medicinal purpose most frequently for the threatment of kidney stones, colds and flu, diarrhoea, analgesic, indigestion, stomachache, skin diseases, constipation, cough and diabetes diseases. *Mentha longifolia* (L.) Huds. subsp. *typhoides* (Briq.) Harley var. *typhoides*, *Salvia syriaca* L., *Rosa canina* L. and *Thymus kotschyanus* Boiss. & Hohen. var. *kotschyanus*, *Portulaca oleracea* L., *Rumex acetosella* L. were the plants most used by the local people in Keban, Turkey. The medicinal plants are presented in Table 2, followed by plant family name, botanical name with collected numbers, vernaculare name, the used plant parts, preparations, uses and recorded literature uses are given. *M. longifolia* (L.) Huds. subsp. *typhoides* (Briq.) Harley var. *typhoides*, *R. canina* L., *Urtica dioica* L. and *Thymus haussknechtii* Velen. were the plants most used by the local people. *Anthemis wiedemanniana* Fisch. & Mey. and *T. haussknechtii* Velen. were found to be endemic plants used for medical purposes in Keban, Turkey. The medicinal uses of *Achillea wilhemsii* C.Koch., *Euphorbia denticulata* Lam., *Fibigia clypeata* (L.) Medik., *Nasturtium officinale* R.Br., *Pistacia terebinthus* L. subsp. *palaestina* (Boiss.) Engler and *Ziziphora capitata* L. were recorded for the first time in the research area. Representatives from the genus *Achillea*, *Rosa*, *Mentha*, *Portulaca*, *Origanum*, *Thymus*, *Salvia*, *Urtica* and *Teucrium* were thereby reported by almost 80% of the informants that used these species in preparations. Each of these species was indicated for some ailments (Table 2).

Huseyin Aslan, interviewed in Keban Durumlu village, previously suffered from difficulty in breathing; he stated

Table 2. Wild plant species used as medicinal purposes in Keban, Elazığ, Turkey.

No.	Family	Plant taxa (Collect number)	Turkish Vernacular name	Used plant part	Preparations	Uses	Recorded literature uses
1	Adiantaceae	<i>Adiantum capillus-veneris</i> L. ÖK- 2280	İshalotu	Aerial parts	Inf., int.	Appetitive, diuretic	Cough disease (1), diuretic (2)
2	Acanthaceae	<i>Acanthus dioscoridis</i> L. var. <i>dioscoridis</i> ÖK- 2849	Ayı pençesi	Leaves	Dec., ext.	For skin diseases	Wound healing (4), expectorative (1)
3	Amaranthaceae	<i>Amaranthus retroflexus</i> L. ÖK- 1505	Selmik	Leaves, branches	Inf., int.	For hemorrhoids	For hemorrhoids (3), leaves uses for food (5)
4	Anacardiaceae	<i>Pistacia terebinthus</i> L. subsp. <i>palaestina</i> (Boiss.) Engler ÖK-3309	Menengiç	Roots	Dec.,ext.	Urinary inflammations	Antiseptic, diuretic, heart disease, stomach ulcers, urinary inflammations (6, 7)
5	Anacardiaceae	<i>Rhus coriaria</i> L.ÖK- 2924	Sumak	Fruits	Inf., dec.,ext.	Antiseptic, diarrhea, stomach disease	Antiseptic, digestive, hemorrhoids, in salads (8, 9)
6	Apiaceae	<i>Eryngium billardieri</i> Delarbre ÖK- 3466	Hıyarok	Fresh, branches	-	For inflammations	Branches eaten after strip (10).
7	Apiaceae	<i>Falcaria vulgaris</i> Bernh. ÖK- 3414	Kazayağı	Aerial parts	Dec., ext.	For nourishment	Additive in food and salads, stomach disease (11).
8	Apiaceae	<i>Ferula orientalis</i> L. ÖK- 2001	Çakşır otu	Aerial parts	Dec., int.	For hemorrhoids, stomach disease	For hemorrhoids, animal food (12, 13)
9	Asteraceae	<i>Achillea wilhemsii</i> C.Koch. ÖK- 2634	Civanperçemi	Leaves	Inf., int.	For hemorrhoids	Digestive, for hemorrhoids, high cholesterol (7, 14)
10	Asteraceae	<i>Anthemis wiedemanniana</i> Fisch. & C.A.Mey. ÖK- 1987	Papatya	Flowers	Dec., int.	Antispasmodic, diabetes	Diabetes, hepatic diseases, indigestion (4, 15)
11	Asteraceae	<i>Bellis perennis</i> L. ÖK- 3766	Çayır papatyası	Flowers	Inf., int.	Antispasmodic, sedative	Antispasmodic, diuretic (3)
12	Asteraceae	<i>Crepis sancta</i> (L.) Babc. ÖK- 1355	Keklik otu	Flowers	Raw	Eye diseases, animal food	Vasodilators (7)
13	Asteraceae	<i>Helichyrsom plicatum</i> DC. subsp. <i>plicatum</i> ÖK- 3333	Altın otu	Aerial parts	Dec.	Kidney stones.	Kidney stones, abdominal pains, diabetes (40,47)
14	Asteraceae	<i>Tragopogon longirostris</i> Bisch. ex Sch. Bip. var. <i>longirostris</i> ÖK- 2072	Yemlik	Aerial parts	Inf., int.	Gastrointestinal disorders	Treat worms (16), heart diseases (2)
15	Asteraceae	<i>Tussilago farfara</i> L. ÖK- 1605	Öksürük otu	Flowers	Dec., inf., int.	Antitussive	Antitussive, coughs, expectorant, pulmonary disorders (17, 18)
16	Asteraceae	<i>Scorzonera mollis</i> M.Bieb. subsp. <i>mollis</i> ÖK - 3129	Yemlik	Aerial parts	Eating raw, Dec., int.	Food, headache	For food (19)
17	Berberidaceae	<i>Berberis vulgaris</i> L. ÖK- 1087	Sarı çalı	Fruits	-	Digestive	Antiinflammatory, antiseptic, astringent, diarrhea, digestive, disorders, diuretic, hemorrhoids (20, 18)
18	Boraginaceae	<i>Anchusa azurea</i> Mill. var. <i>azurea</i> ÖK -1490	Goruz	Flowers, leaves	Inf., int.	Stomach-ache	Diuretic, stomach-ache, wound healing (21, 22)
19	Brassicaceae	<i>Capsella bursa-pastoris</i> (L.) Medik. ÖK - 1756	Çobançantası	Aerial parts	Inf, int.	Astringent	Astringent, diabetes (23, 24)
20	Brassicaceae	<i>Fibigia clypeata</i> (L.) Medik. ÖK - 2043	Sancı otu	Aerial parts	Inf, int.	Animal disease	Not reported.

Table 2. Contd.

21	Brassicaceae	<i>Raphanus raphanistrum</i> L. ÖK - 3627	Yabani turp	Leaves, Roots	-	Appetizer	Appetizer, liver protecting, muscular pains (7, 17)
22	Brassicaceae	<i>Nasturtium officinale</i> R.Br. ÖK - 1839	Su teresi	Aerial parts	Cooked, int.	Appetizer, antiinflammatory.	Appetizer, diuretic, headache, stomachic (25)
23	Caryophyllaceae	<i>Silene vulgaris</i> (Moench) Garcke var. <i>vulgaris</i> ÖK - 2201	Cıvrıncık	Aerial parts	Dec., int.	Urinary inflammations	Urinary inflammations (7)
24	Convolvulaceae	<i>Convolvulus arvensis</i> L. ÖK - 3265	Tarla sarmaşığı	Leaves	Additive insoup and rice	For constipation	For constipation, laxative (26)
25	Dipsacaceae	<i>Scabiosa argentea</i> L. ÖK - 3395	Uyuz otu	Aerial parts	Dec., int.	Used in scabies	Diuretic, wound healing (27)
26	Euphorbiaceae	<i>Euphorbia denticulata</i> Lam. ÖK - 1701	Sütleğen	Latex	Latex is removed	Curing warts, consipation.	Constipation, curing warts, eczema, fungal infection (22, 24)
27	Fabaceae	<i>Astragalus gummifer</i> Lab. ÖK - 2023	Geven	Aerial parts	-	Animal food and fuel	For fuel (28)
28	Fabaceae	<i>Melilotus officinalis</i> (L.) Desr. ÖK - 1229	Yonca	Aerial parts	Dec., int.	Kidney stones	Antiseptic, aphrodisiac, arthritis, astringent, diuretic, gut, hepatitis (18, 22)
29	Fabaceae	<i>Glycyrrhiza glabra</i> L. var. <i>glandulifera</i> (Waldst. & Kit.) Boiss. ÖK - 2546	Meyan	Roots	Dec., int.	Common cold, digestive	Sedative, stomach and kidney disorders (29, 30)
30	Fabaceae	<i>Trifolium repens</i> L.var. <i>repens</i> . ÖK - 3744	Beyaz, Yonca	Aerial parts	Dec., int.	Demulcent, stomach disorders	Antiseptic, antispastic, colics, flu, leucorrhoea (18)
31	Fabaceae	<i>Lathyrus cicera</i> L. ÖK - 1906	Fiğ	Aerial parts	-	For food	Animal food (31)
32	Fabaceae	<i>Ononis spinosa</i> L. subsp. <i>leiosperma</i> (Boiss.) Sirj. ÖK - 3322	Kayışkıran	Roots	Inf., int.	Kidney stones	Skin disease (48), healing wounds (16)
33	Fagaceae	<i>Quercus brantii</i> Lindl. ÖK - 3598	Meşe	Aerial parts, fruits	Fruits cooked, ext.	For food and fuel	Uses for food and fuel (31).
34	Fumariaceae	<i>Fumaria asepala</i> Boiss. ÖK - 3962	Şahtere	Aerial parts	Cooked, int.	Diabetes disease	Liver disease (47) and digestive (48)
35	Hypericaceae	<i>Hypericum perforatum</i> L. ÖK - 2351	Kantaron	Flowers	Inf., int.	Sedative	Antiinflammatory, astringent, depurative, depression, dyskinesia, gastric ulcer, hemorrhoids, hepatitis, sedative (18, 32, 33)
36	Juglandaceae	<i>Juglans regia</i> L. ÖK -1833	Ceviz, goz	Fruits	Dec., raw, int.	High cholesterol	Antibacterial, antiinflammatory, antiseptic, astringent, demulcent, diarrhea, eczema, fungal infection, headache, rheumatism (22, 34, 35)
37	Lamiaceae	<i>Ajuga chamaeptyys</i> (L.) Schreb. subsp. <i>chia</i> (Schreb.) Arcang. var. <i>Chia</i> ÖK -1833	Mayasıl otu	Flowers	Inf., int.	Hemorrhoids	Hemorrhoids (21), healing wounds (40)
38	Lamiaceae	<i>Lamium macrodon</i> Boiss. & A. Huet ÖK-3237	Arı otu	Flowers	Inf, int.	For food and medicinal	For food and medicinal (36), flowers are important for honeybees (31)

Table 2. Contd.

39	Lamiaceae	<i>Mentha longifolia</i> (L.) Huds. subsp. <i>typhoides</i> (Briq.) Harley var. <i>typhoides</i> ÖK - 2699	Nane, Yarpuz	Leaves	Dec., int.	Stomach disorders, common cold	Abdominal pain, asthma, cough, digestive, rheumatism, sedative (22,24)
40	Lamiaceae	<i>Origanum vulgare</i> L. subsp. <i>gracile</i> (K.Koch) Letswaart. ÖK -2785	Kekik	Leaves	Dec., int.	Colds-flu, urinary inflammations	Epilepsy, cold and flu, digestive, diuretic, for colic, uterine disorders (22, 24, 37, 38)
41	Lamiaceae	<i>Salvia syriaca</i> L. ÖK -2480	Adaçayı	Flowers, leaves	Dec., Inf., int.	Colds and flu	Cough, digestive, flu (3, 39)
42	Lamiaceae	<i>Satureja hortensis</i> L. ÖK - 3016	Kekik	Leaves	Inf., int.	Antispasmodic, colds-flu	Stomach-ache (24)
43	Lamiaceae	<i>Teucrium chamaedrys</i> (Celak.) Rech. fil. subsp. <i>sinuatum</i> ÖK - 3382	Keselmehmut	Aerial parts	Dec., int.	Stomach disorders, headache	Stomach disorders, appetizer, headache (3,4, 24)
44	Lamiaceae	<i>Teucrium polium</i> L. ÖK - 3003	Keselmahmut	Flowers, leaves	Dec., int.	Diabetes disease, stomach-ache	Antipyretic, cold, diabetes, gastrointestinal disorders, liver disorders, inflammation, stomachic, wounds (22, 23, 24)
45	Lamiaceae	<i>Thymus haussknechtii</i> Velen. ÖK - 3266	Kekik	Leaves	Dec., Inf., int.	Colds-flu, high cholesterol	Abdominal ailments, colds, diabetes (4,7)
46	Lamiaceae	<i>Ziziphora capitata</i> L. ÖK - 3917	Dağ reyhanı	Aerial parts	Inf., int.	Colds	Stomach (48), cough and throat pains (21).
47	Malvaceae	<i>Malva neglecta</i> Walrr. ÖK - 1728	Ebegümeçi	Aerial parts	Dec., int.	Urinary inflammations, hemorrhoids	Antiinflammatory, antitussive, colds and flu, diuretic, for urinary inflammations, hemorrhoids (7, 41, 42)
48	Moraceae	<i>Morus alba</i> L. ÖK - 2900	Dut	Fruits	-	Hypoglycaemic, Constipation, food	Antiseptic, astringent, constipation, diabetes, food (31), hypoglycaemic, stomach disorders, purgative, respiratory infections (34, 35, 38)
49	Papaveraceae	<i>Papaver rhoeas</i> L. ÖK - 2257	Gelincik	Aerial parts	Inf., int.	Antitussive, sedative	Antidysenteric, antiinflammatory, antispasmodic, antitussive, cough, diabetes, sedative (18, 22)
50	Polygonaceae	<i>Rumex acetosella</i> L. ÖK - 2587	Kuzukulağı	Leaves	Dec., Raw	Diabetes, stomach and heart diseases	Fresh leaves eating, diabetes (2, 19)
51	Portulacaceae	<i>Portulaca oleracea</i> L. ÖK - 3595	Semizotu	Fresh aerial parts	Raw, cook, int.	Diuretic, gastrointestinal disorders	Eating with salads (12), intestinal disorders (43)
52	Punicaceae	<i>Punica granatum</i> L. ÖK -2814	Nar	Seeds	Raw, int.	Food, diabetes	Aphrodisiac, hypertension, immunity booster (44)
53	Rosaceae	<i>Amygdalus communis</i> L. ÖK - 3410	Badem	Seeds	Raw, int.	High cholesterol	For urinary inflammations, high cholesterol (7)
54	Rosaceae	<i>Cerasus mahaleb</i> (L.) Mill. var. <i>mahaleb</i> ÖK -1851	Mahlep	Fruits	Inf., int.	Diabetes disease	Antidiabetic, urinary inflammations, throat diseases (7, 14)
55	Rosaceae	<i>Crataegus monogyna</i> Jacq. subsp. <i>monogyna</i> ÖK - 1887	Alıç	Fruits	Inf., int.	Cardiac disorder, vasodilators	Analgesic, cardiac nervous disorders, cicatrising, respiratory, sedative, sole wounds (18, 35)
56	Rosaceae	<i>Rubus sanctus</i> Schreb. ÖK - 4303	Böğürtlen	Fruits, Leaves	Inf., int.	Diuretic, constipation	Acne, astringent, diabetes mellitus, diuretic, hemorrhoids, stomach-ache (35,45)
57	Rosaceae	<i>Rosa canina</i> L. ÖK - 2743	Kuşburnu	Fruits	Dec., inf, int.	Antiseptic, colds and flu, diabetes	Antiseptic, colds and flu, colitis, convulsive, depurative, diabetes, stomach disorders (18, 33)

Table 2. Contd.

58	Urticaceae	<i>Urtica dioica</i> L. ÖK - 3355	Isırgan	Aerial parts	Dec., inf, int.	Colds and flu, diabetes disease, for losing weight, rheumatism,	Antidiabetic, antiinflammatory, antirheumatic, antiseptic, colds and flu, diuretic, digestive, hypertension, liver diseases (18, 22, 33, 24)
59	Verbenaceae	<i>Verbena officinalis</i> L.. ÖK - 3519	Mine çiçeği	Aerial parts	Dec., int.	Cardiac disease and kidney stones	Abdominal pains and milk secretion increasing (16)
60	Vitaceae	<i>Vitis sylvestris</i> L. ÖK - 3163	Asma, üzüm	Fruits, leaves	Raw, Dec., ext., int.	Antibacterial, hemorrhoids stomach disorders	Antibacterial (36), hemorrhoids, stomach disorders, hematoplastic (2)
61	Zygophyllaceae	<i>Tribulus terrestris</i> L. ÖK - 3374	Pıtırak	Fruits	Dec., int.	Diarrhea, kidney stones	Astringent, diarrhea, diuretic, gout, hemorrhoids, kidney stones, stomatitis (18, 46)

Preparations: Inf, infusion; Dec, decoction; int, internally; ext, externally. 1. (Baytop, 1999). 2. (Tuzlacı, 2006). 3. (Ozgoke and Ozcelik, 2004). 4. (Cakılcıoğlu and Turkoglu, 2007). 5. (Ertug, 2000). 6. (Cansaran and Kaya., 2010). 7. (Cakılcıoğlu and Turkoglu, 2008). 8. (Everest and Ozturk, 2005). 9. (Yaldız et al., 2010). 10. (Gençay, 2007). 11. (Yıldırım et al., 2008). 12. (Arık, 2003). 13. (Turkoglu et al., 2006). 14. (Ozturk and Dinc, 2005). 15. (Petkeviciute et al., 2010). 16. (Cakılcıoğlu et al., 2010). 17. (Leporatti and Impieri, 2007). 18. (Tita et al., 2009). 19. (Dönmez, 2000). 20. (Hamayun et al., 2006). 21. (Mart and Turkmen, 2008). 22. (Ozturk and Olcucu, 2011). 23. (Al-Qura'n, 2009). 24. (Tuzlacı et al., 2010). 25. (Öztürk et al., 2000). 26. (Panhwar and Abro, 2007). 27. (Yapıcı et al., 2009). 28. (Yıldırım, 1991). 29. (Akan et al., 2008). 30. (Öztürk and Ölçücü, 2011). 31. (Ertug, 2000). 32. (Cornara et al., 2009). 33. (Pieroni and Giusti, 2009). 34. (Koca and Yıldırım, 2010). 35. (Koyuncu et al., 2009). 36. (Ertug, 2004). 37. (Pieroni and Quave, 2005). 38. (Shah and Khan, 2006). 39. (Akhondzadeh et al., 2003). 40. (Yesil and Akalın, 2009). 41. (Ezer and Avci, 2004). 42. (Kahraman and Tatlı, 2004). 43. (Simsek et al., 2004). 44. (Akgul, 2008). 45. (Ezer and Arisan, 2006). 46. (Uysal et al., 2010). 47. (Çimen, 2007). 48. (Ozdemir, 2005).

that *T. haussknechtii* Velen tea cleared bronchi and eased breathing; and that he constantly drunk this tea and no longer suffered from difficulty in breathing. The preparations including thyme extract alleviated cough, following common cold (Buechi et al., 2005). 65-year-old Omer Celik from Keban Yahyalı village stated that *Mentha spicata* L. subsp. *spicata* and *R. canina* L. tea was good for colds. 58-year-old Mehmet Celik stated that he used *Cerasus mahaleb* (L.) Mill. var. *mahaleb* L. leaves infusion for diabetes disease. *Cerasus mahaleb* var. *mahaleb* extract was shown to induce diabetes disease (Cakılcıoğlu and Turkoglu, 2008). *Portulaca oleracea* L. was found to be among the plants used as nutrients and salads in Keban. In Keban and vicinity, locals roast the matured fruit of *P. terebinthus* L. and drank it as coffee. Essential oils of *Pistacia* species were proved to have antimicrobial, anti-inflammatory effects and trigger gastric and duodenal anti-ulcer activity (Giner-Larza et al., 2001; Alma et al., 2004).

In the research area, the experiences of the

local people were recorded during the interviews. Some of the information obtained were compared to the previous studies. Therefore, the comments made were tried to be confirmed. During the interviews, the most mentioned medicinal plants were; *T. haussknechtii*, *U. dioica*, *R. canina*, *M. longifolia* subsp. *typhoides*, *Achillea wilhemsii* and *Origanum vulgare* subsp. *gracile*. In a previous study, unflowered, flowered and seed essential oil of *Origanum vulgare* subsp. *gracile* growing in Elazığ were analyzed and the main constituents were found as thymol, γ -terpinene, α -terpinolene, carvacrol, p-cymene (Kilic and Bagci, 2008).

DISCUSSION

In the research area, local people were found to use 61 plants from 30 families for curative purposes. These plants are used in the treatment of many diseases. By drying infusions or decoctions of these plants, local people use them during the whole seasons of the year. Elderly

population is in majority in our field of study and they have more information about herbs compared to the younger ones. Herbal treatment has become a tradition for the residents of the study region. People residing in the region through long years are more knowledgeable about herbs than the ones residing for few years. Women know more about herbs than men and most commonly used parts of the plants were the leaves, flowers and aerial parts. Comparison of the data obtained in this study from the plants growing in Keban with the experimental data obtained in the previous laboratory studies proved most of the ethnobotanical usages. Literature review showed that curative plants of Keban are used in different parts of the world in the treatment of the same or similar diseases. If a plant is used to treat the same disease in different places across the world then its pharmacologic effect could be accepted. It would be beneficial to conduct pharmacologic studies on such plants. Therefore, it is suggested that such studies may make significant contributions to indigenous ethnobotanical knowledge

as well as the studies of the sourcing of raw materials for the development of commercial pharmaceuticals.

The endemic plant flora of Keban is threatened by such factors as grazing, expansion of new agricultural lands, and unsustainable picking of plants to generate income. Steps should be taken immediately to ensure the inclusion of relevant flora within conservation designations. This study identified not only the wild plants collected for medical purposes by local people of Keban County in the Eastern Anatolia Region, but also the uses and local names of these plants. It has been tried, to generate a source for persons studying in ethnobotany, pharmacology and chemistry sciences by comparing knowledge gained from traditionally used herbs with previous laboratory studies. In the research area, uses for nutritients are upper than other uses. After uses for nutritients, uses for treatment and food are dominant. Most of the Keban people rely upon surrounding plant wealth for their health-care, food and other life accessories. Present ethnobotanical investigation generated important information that might be useful for health-care programme, economic and agricultural policy development, alternative food programme, development of essential drugs, and biodiversity conservation action plan for Eastern Anatolian Region.

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