

# PLANTS USED IN TRADITIONAL THERAPY IN PAZAR (TOKAT-TÜRKİYE) AND THEIR ETHNOBOTANICAL PROPERTIES

SIBEL ULCAIY<sup>1\*</sup> AND GULCAN SENEL<sup>2</sup>

<sup>1\*</sup>Department of Field Crops, Faculty of Agriculture, Kirşehir Ahi Evran University, Türkiye

<sup>2</sup>Department of Biology, Faculty of Arts and Sciences, Ondokuz Mayıs University Türkiye

\*Corresponding author's email: sibelulcay@gmail.com

## Abstract

The aim was to identify the plants with their local names growing in Pazar (Tokat, Türkiye) and its surroundings, used in local therapies and their usage patterns. Field study was carried out over a period of approximately two years (2015-2017). A total of 311 people participated in this study. Face-to-face interviews were conducted with the participants. As a result of the study, demographic characteristics of the participants, types of medicinal plant used by the people of the region, preparation techniques, usage patterns and frequency were determined. In addition, the use values (UV) of the plants were also reported. Local people benefit from 132 plants belonging to 49 families. The most commonly encountered medicinal plant families were Asteraceae (16 taxa) and Rosaceae (16 taxa) and the most common preparations were infusion and decoction. Fifteen disease categories were identified in which traditional medicinal plants were used. Two endemic species namely *Sempervivum gillianiae* and *Astragalus tokatensis* were also used by the local people. The highest UV was found for *Urtica dioica* and *Urtica urens*. These plants, locally called nettle, are used for joint pain, sore throat, asthma, sprain and bruise treatment, cancer treatment, as blood enhancer, expectorant and for hair loss.

In this study, edible plants such as *Capsella bursa-pastoris*, *Arum orientale*, *Bellis sylvestris*, *Taraxacum butleri*, *Tragopogon dubius*, *Sinapsis arvensis*, *Sisymbrium loeselii*, *Malva neglecta*, *Veronica persica*, *Polygonum cognatum*, and *Rumex crispus* were also identified.

As a result, with this study, edible plants and plants used in folk medicine in Pazar (Tokat-Türkiye) were determined. All the information here is based on the direct statements of local people. It should not be forgotten that plants can cause irreversible damage if not used carefully. Therefore, more detailed studies are required about the medicinal and pharmacological properties of the plants in question.

**Key words:** Traditional therapy, Folk medicine, Ethnobotany, Pazar, Tokat, Türkiye.

## Introduction

Türkiye is very rich in terms of plant diversity. The presence of three floristic regions in Türkiye is one of the main reasons for this rich diversity. These regions are Europe-Siberian Region, Mediterranean Region, and Irano-Turanian Region. The most important reason for plant richness in Türkiye is the intersection of these three floristic regions (Erik & Tarikahya, 2004; Avci, 2005).

The science of ethnobotany emerged with the desire to benefit from plants. The term "ethnobotany" includes the meaning of the study of the human and plant sciences (Erik & Tarikahya, 2004; Avci, 2005). The use of medical plants for thousands of years has played a major role in the treatment of various diseases. Ethnobotanical books or documents about the use of medical plants date from ancient times. For instance, the local names of medicinal plants and their usage patterns are always given in Hittite inscriptions, in Egyptian papyrus, and in books left from the early ages (Aksakal, 2005; Kendir & Guvenç, 2010). In general, ethnobotany is the scientific investigation of plants as used in indigenous culture for food, medicine, rituals, building, household implements, musical instruments, firewood, pesticides, clothing, shelter and other purposes (Ugulu, 2010). Having hosted many different civilizations, Türkiye is a rich research area for ethnobotanical studies both in terms of cultural and floristic structure. Traditional ethnobotanical knowledge, pharmacopeia, and prevalence of medicinal plants have been investigated in different areas of Türkiye by some authors (Baytop, 1999; Özgökçe & Özcelik, 2004;

Cansaran *et al.*, 2007; Deniz *et al.*, 2010; Selvi *et al.*, 2012, Ulcay & Senel, 2020). Ethnobotanical studies are very important in terms of transmitting the relationship between people and plants to future generations. In addition, traditional herbal treatment for various ailments will be recorded. Thus, forgetting about the use of some species will be prevented and cultivation of some species will be ensured.

Despite the extraordinary developments in modern medicine, the pharmaceutical and chemical industry, alternative treatment methods and treatment with medicinal plants are still currently used, and even in recent years, they have received increasing attention in developed countries. Billions of people in underdeveloped and developing countries still cannot benefit from modern medicines (Himanshu & Ashwani, 2011).

Chemical substances synthesized by plants are the basis of treatment of various ailments using herbal medicines. These chemicals cause some physiological changes in the body and are useful in curing some diseases. Many traditional herbs were reported to have potent antiviral activity. Active substances such as coumarins, flavonoids, tannins, alkaloids, lignans, terpenes, naphtho and anthraquinones, polysaccharides, proteins and peptides in plants may provide this antiviral effect (Jasim & Naji, 2003). It was reported that some herbs such as *Salix L. sp.*, *Catharanthus roseus (L.) G.Don*, *Catharanthus roseus (L.) G.Don*, and *Paeonia lactiflora Pall.* Used in traditional medicine which may be effective in the treatment of different types of cancer. In a study conducted in India, some ethnomedical plants

were used in the treatment of various ailments such as diabetes, dysentery, typhoid fever and jaundice, and different parts of the plants such as root, leaf, fruit and flower are used especially in the treatment of jaundice (Raghuvanshi *et al.*, 2021).

Türkiye has great economic potential in terms of medicinal and aromatic plants collected from nature and cultivated due to having different climatic and ecological conditions, and the flora includes many plant species and diversity. Tokat is a very important province according to the ethnobotanical database (Ulçay & Senel, 2020). In this study, the aim was to determine the local names, usage purpose and methods preparation techniques used for the plant species growing naturally in the Pazar (Tokat-Türkiye) region and are used in traditional medicine to determine the ethnobotanical characteristics of the in this region, and to record the traditional knowledge for the future generation. In addition, the aim was to determine the plants which are an important source of information for new pharmaceutical raw material research, and to create an important resource for all health sciences including medicine, pharmacy, nursing, and veterinary.

## Material and Methods

**Study area:** Tokat province is surrounded by Samsun and Ordu to the north, Sivas to the south, Yozgat to the southwest, and Amasya to the west. Geographical coordinates are 39° 51' - 40° 55' north latitude and 35° 27' - 37° 39' east longitude. Pazar County is located in Kazova west of the center of Tokat province. It is 25 km from the city center. Pazar County is surrounded by Tokat provincial center to the east, Turhal district to the northwest, Zile district to the west and Artova district to the south. There are mountain ranges extending in the east-west direction to the south of the province and Yeşilirmak and Kazova are located in the north. There are two towns and fifteen villages the province. Pazar County is located in the transition zone between the Black Sea climate and the continental climate of Central Anatolia.

An important part of the county is irrigated by the Yeşilirmak River.

This study area consists of Pazar district center, (Fig. 2) Bağlarbaşı village, Ballica village, Beşevler village, Çayköy, village Çiftlikköy village, Dereçaylı village, Dereköy village, Doğançali village, Kaledere village, Menteşe village, Ocaklı village, Ovacık village, Ovayurt village, Taşlık village, Tatarköy village, and Tepeçaylı village (Fig. 1).

**Interviews with local people:** The "Ethnobotanical Information Form" (Table 1) was used to determine the demographic characteristics, local names of plants, usage patterns and reasons and use value (UV) information was obtained from 311 participants. Face-to-face interviews were held with the people suggested by the village headmen. These participants were also referred by people who were thought to have deep knowledge on the subject. Detailed information was obtained from them people about the usage patterns and doses of the plants. The plants were collected together with 40 townspeople who agreed to accompany us during fieldwork.

**Plant materials:** Field study was carried out over a period of two years (2015-2017). During this period a total of 132 plant specimens were collected from the locality. The plants were pressed in the field. Plants were identified using the standard text 'Flora' of Türkiye and the East Aegean Islands" (Davis, 1965- 1985). The names of plant families were listed in alphabetic order. In addition, whether the names of the local plants are Turkish or not was checked from the web page of the Turkish Language Association (TLA) (<http://tdkterim.gov.tr/bts/>). Scientific names of species were checked from the Plant List (<http://www.theplantlist.org/>). Herbarium specimens were kept in the laboratory of Kırşehir Ahi Evran University Field Crops Department. The species given in the Table 1 were barcoded according to the information at <http://sweetgum.nybg.org/science/ih/>. Endemic taxa were arranged according to the book "List of Plants of Türkiye" in order to comply with the current nomenclature (Güner *et al.*, 2012).

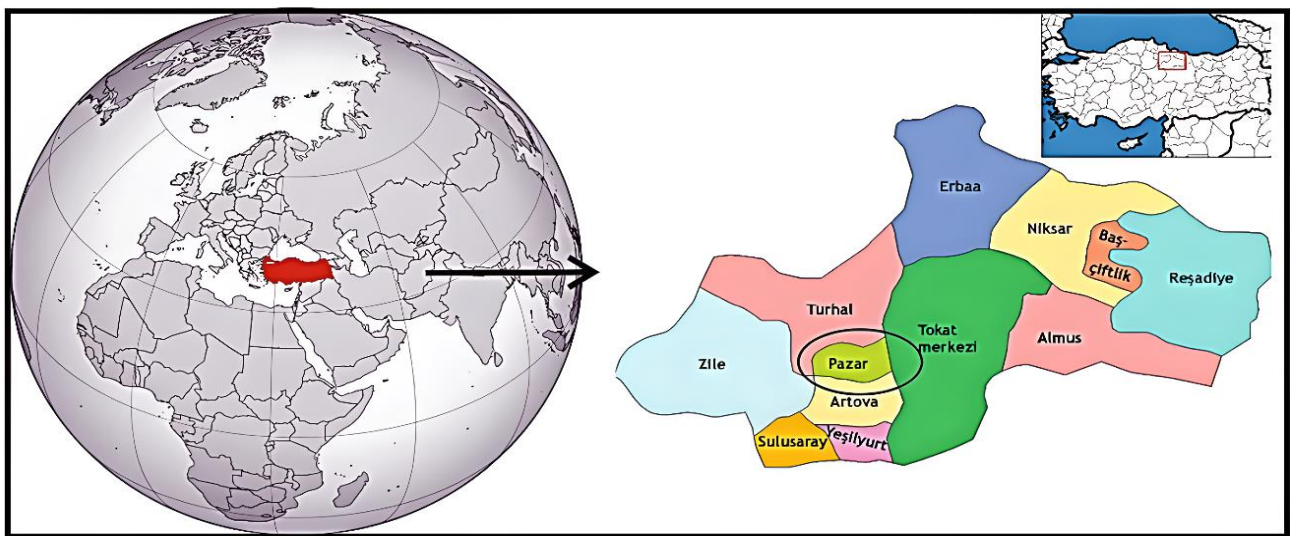


Fig. 1. Geographical location of Pazar (Türkiye).

## Calculations

Informant consensus factor (ICF) (Trotter & Logan, 1986) was calculated according to the following formula:  $ICF = \frac{N_{ur} - N_t / N_{ur} - 1}{N_t}$ , where  $N_t$ : indicates the number of taxa used and  $N_{ur}$ : indicates the number of resource persons in each category. This method is used to check homogeneity of the information. In other words, the medicinal plants that are presumed to be effective in treating a certain disease have higher Informant Consensus Factor (ICF values (Teklehaymanot & Giday, 2007). Informant Consensus Factor was abbreviated as "FIC" in previous articles (Akerreta *et al.*, 2007; Camejo-Rodrigues *et al.*, 2003; Cheikhoussef *et al.*, 2011). The Use Value (Trotter & Logan, 1986) is a quantitative method that demonstrates the relative importance of species known locally. It was also calculated according to the following formula:  $UV (Use\ value) = U/N$ , where UV is the use value of a species; U is the number of citations per species; and N is the number of informants (Cakılcıoğlu & Turkoglu, 2010).

**Table 1. Ethnobotanical information sheet.**

Name	Name of plant
Age	Purpose of usage
Educational status	Parts of the plant used
Place of residence	Preparation method
Marital status	Usage dose

## Results

### Demographic characteristics of study participants:

Demographic characteristics of the participants were ascertained and recorded through face-to-face interviews. Of the 311 participants who participated in our study, 80 were male and 231 were female. Twenty participants were single, 194 participants were married, and 17 participants were widowed. Of participants, 47 did not go to school, 98 participants were primary school graduates, 33 were high school graduates, 49 were secondary school graduates and 4 were university graduates. The number of people living in the county center was 82, 5 people lived in towns and 144 people lived in villages. Of the participants, 69 were farmers, 12 were retired, 11 were tradesmen, 186 were housewives, 3 were workers, 8 were civil servants, 24 were students, 2 were self-employed, and 3 were unemployed. Of the participants in the study, 66.3% reported that they benefited from plants very often and 274 of the participants reported that they obtained the plants by collecting them from nature. However, there were 37 participants who used to buy from the market or from the cultivator. Twenty-one of the participants reported that they used plants only for food and 94 used specifically for medical purposes. While 278 people used plants for both medicinal and food purposes, 33 people used plants for other purposes.

**Medicinal plants and associated knowledge:** The family, scientific name, local name, preparation and utilization methods of medical plants used in Pazar are given in Table 2. Species and families are listed in alphabetical order. As a result of the current study, interviews with local people living

in Pazar town and villages indicated that 132 plants belonging to 49 families were used for cure of different diseases in the study area. The medicinal plant families most commonly encountered in the study area were Asteraceae (16 taxa), Rosaceae (16 taxa), Lamiaceae (12 taxa), Brassicaceae (9 taxa), Fabaceae (9 taxa), Malvaceae (5 taxa) and Polygonaceae (4 taxa). The most common preparations were infusion and decoction. Local people were recorded to make medicinal preparations using wild plants for healing purposes via simple methods. *Urtica dioica* L. had the highest use value (UV=0.25) among the species. *Urtica dioica* is used in different ways in folk medicine (Table 2).

The preparation methods included decoction, raw, fresh application, infusion, roasting, and crushing. The most frequently used parts were aerial parts, leaves, fruits, seed, branches and roots. We were informed that the plants were used by the local people in the treatment of 15 types of diseases or as a preventive against disease. Local people used medicinal plants most frequently for the treatment of some systemic diseases such as respiratory (ICF 0.78) gastrointestinal (ICF 0.81), urinary (ICF 0.8), cardiovascular (ICF 0.92), locomotor (ICF 0.93), immunity (ICF 0.89), and gynecologic system (ICF 0.89) diseases. These plants were also used for cancer (ICF 0.91), dermatologic (ICF 0.8) and psychological problems (ICF 0.88). According to local people, various plants were used for specific diseases such as diabetes (ICF 0.93), goiter (ICF 0.92) and obesity (ICF 0.96). Also some species were used as antipyretic (ICF 0.97) and analgesic (ICF 0.91) (Fig. 3).

The use of *Rubus sanctus* Schreb. also varies. It is used for hemorrhoids, coughing, and throat infections and to reduce arthritis in the knees. The decoction of the roots of *Rubus fruticosus* is taken in the morning and evening for the treatment of hemorrhoids and calcification. Its fruits, on the other hand, have anti-inflammatory and anti-arthritis effects when fresh. *Platanus orientalis* L. is used for kidney disorders, osteoarthritis, joint pain, and asthma. *Malva sylvestris* L. and *Malva neglecta* Wallr. were used to reduce kidney and gallstones and for prostatic hypertrophy. Roots were prepared by brewing. *Alkanna orientalis* (L.) Boiss. vapor was good for colds (the flowers are brewed and drunk two or three times a week). *Avena fatua* L. was used in COPD patients with the stem brewed and drunk. The species of medicinal plants used for dermatologic disorders are as follows; *Allium cepa* L., *Chenopodium album* L., *Xanthium spinosum* L., *Valeriana officinalis*, *Hypericum perforatum* L., *Junglans regia*, *Ficus carica* L., *Morus nigra* L., *Plantago major* L., *Portulaca oleracea* L., *Nigella sativa* L., and *Cydonia oblonga* Mill.

Species such as *Capsella bursa-pastoris* (L.) Medik., *Cardamine hirsuta* L., *Allium sativum* L., *Amaranthus retroflexus* L., *Chenopodium album* *Chenopodium murale* L., *Arum orientale* M.Bieb., *Arum italicum* Mill., *Bellis sylvestris* Cirillo, *Cirsium arvense* (L.) Scop., *Helianthus tuberosus* L., *Sonchus palustris* L., *Taraxacum butleri* Soest., *Tragopogon dubius* Scop., *Brassica elongata* Ehrh., *Eruca vesicaria* (L.) Cav., *Sinapsis arvensis* L., *Sisymbrium loeselii* L. *Malva neglecta*, *Veronica persica* Poir., *Polygonum cognatum* Meissn., *Lupinus albus* L., *Rumex angustifolius* Campd., *Rumex crispus* L., and *Rumex patientia* L. are also used as raw or cooked food.

Table 2. Ethnobotanical use of plants used in the region.

Family	Scientific name	Local name	Up	Preparation, application	Diseases	Method used and duration	Herbarium barcode	U	UV
Adoxaceae	<i>Viburnum opulus</i> L.	Gilabulu, Gelibolu	Fr	Fruit is crushed, 1 cup of fruit juice is taken. Fruit is eaten, as much as a tea cup	Diabetes Hypertension Prostate hypertrophy Kidney stone	Used when blood level is elevated Used when blood pressure rises or falls For a month, one cup per day One cup per day	42119	10	0.03
Alliaceae	<i>Allium cepa</i> L.	Soğan	St	Infusion Chopped	Influenza, cold Expectorant	Morning and evening, for a week Morning evening	1504442	20	0.06
Alliaceae	<i>Allium sativum</i> L.	Sarınsak	St Ons St	Roasted Infusion. Eaten raw.	Paronychia Menstrual irregularity Hypertension	Morning and evening, for a week 3 days a week, once a day Every day, once a day	1504443	34	0.10
Amaranthaceae	<i>Amaranthus retroflexus</i> L.	Yalancı efelik	Le, br	Crushed, put in the ear. Roasted, eaten.	Ear pain.	Every day, once a day	696251	11	0.03
Amaranthaceae	<i>Beta vulgaris</i> L.	Pezüik	Le, br	Decoction	Anemia	Two to three days a week	1745478	18	0.05
Amaranthaceae	<i>Chenopodium murale</i> L.	Kazayağı	Le, br	Roasted, eaten.	Colds, lack of vitamins Immune system.	Morning and afternoon Three times a week	537298	9	0.02
Amaranthaceae	<i>Chenopodium album</i> L.	Sirken sirkencik	Le, br	Roasted, eaten. Decoction, disseminated	Digestive system regulator Itching, inflammatory desiccant	Two times a week Morning and evening.	529379	13	0.04
Anacardiaceae	<i>Pistacia terebinthus</i> L.	Çedene, biddim	Fr	Eaten raw	Urinary tract infection, rheumatism	Morning and evening. Once a day	538391	11	0.04
Apiaceae	<i>Anethum graveolens</i> L.	Dereotu	Flw	Crushed with olive oil, wrapped Powdered and eaten.	Foot spasms. Liver disorders.	It is used externally. A tea spoon is eaten in the morning and evening	42496	39	0.12
Apiaceae	<i>Foeniculum vulgare</i> Mill.		Le	Eaten raw.	Increase the amount of milk in breastfeeding women	A handful is eaten in the morning and evening.	617675		
Apiaceae	<i>Petroselinum crispum</i> (Mill.) A.W. Hill	Maydanoz	Ro Le	Decoction Eaten raw.	Goiter Kidney stone reduction Stomach disorders and stomach pain.	A bunch a day Drink a glass of water in the morning It is used twice a day during illness.	42470	42	0.13
Araceae	<i>Arum orientale</i> M.Bieb.	Nivik	Le, br	Roasted	Relieves the digestive system, good for rheumatism.	Two or three times a week	K000499296	11	0.03
Araceae	<i>Arum italicum</i> Mill.		Ro	Infusion	Analgesic for knee aches.	Two or three times a week	K000499294	9	0.02
Araliaceae	<i>Hedera helix</i> L.	Sarmaşık	Flw	Infusion	Regulate menstruation	Twice a day	2549478	14	0.04
Asteraceae	<i>Achillea setacea</i> Waldst. & Kit. <i>Achillea millefolium</i> L.	Civanperçemi	Flw	Infusion	Respiratory tract infections.	One glass a day for a month.	K000341508 216600	21	0.06
Asteraceae	<i>Anthemis cretica</i> L.	Papatya	Flw	Infusion	Sinusitis	A glass in the morning and evening, for a week	K000372821	9	0.02
Asteraceae	<i>Anthemis cretica</i> subsp. <i>umbilicata</i> (Boiss. & Huet) Grierson	Papatya	Flw	Infusion	Expectorant, pain reliever, sedative	A glass a day for one month.	4197917	35	0.11
Asteraceae	<i>Bellis sylvestris</i> Cirillo	Koyungözü	Le, br	Roast, eaten	Indigestion, appetite enhancement	Twice a week			
Asteraceae	<i>Cirsium arvense</i> (L.) Scop.	Köyğöçüren	Ro	Eaten raw	Prevents heart attack	When fresh, once a day every day	370242	22	0.07
Asteraceae	<i>Cyanus depressus</i> (M.Bieb.) Soják	Peğamber çiçeği	Le, flw	Decoction	Stomach pain	A glass drunk warm.		13	0.04
Asteraceae	<i>Helichrysum arenarium</i> (L.) Moench	Altun otu,	Flw	Infusion	Diabetes, digestive system Reduces kidney stones	Once a day, a glass Morning and evening, every day	3257114	8	0.02
Asteraceae	<i>Helianthus tuberosus</i> L.	Yerelması	Tr	Rubbed and eaten raw.	Hypertension, diabetes	Morning and evening, every day	43223	10	0.03
Asteraceae	<i>Inula helenium</i> L.	Andız otu	Ro Le	Chopped and infusion Infusion	Heals lung inflammation. Respiratory diseases.	Morning and evening every day. Drunk morning and evening every day	1070453	12	0.03
Asteraceae	<i>Oenopordum acanthium</i> L.	Kangal Gengel, Eşek Dikeni	Se	Decoction	Liver diseases and rheumatism	Drink a glass in the morning.	2225946	33	0.10
Asteraceae	<i>Silybum marianum</i> (L.) Gaertn.	Deve dikeni	Flw	Infusion	Constipation Hepatitis	A glass, three times a day	3109826	21	0.06

Table 2. (Cont'd.).

Family	Scientific name	Local name	Up	Preparation, application	Diseases	Method used and duration	Herbarium barcode	U	UV
Asteraceae	<i>Sonchus palustris</i> L.	Eşek mürülu	Le, br	Chop, roast	Immune system.	Eaten once or twice a week	3164589	8	0.02
Asteraceae	<i>Taraxacum butleri</i> Soest	Karahindiba	Le, br	Chopped, roasted	Facilitates digestion. Increases urine	Eaten once or twice a week	33(2):263	34	0.10
Asteraceae	<i>Tragopogon dubius</i> Scop.	Yemlik	Le, br	Chopped, roasted Eaten raw.	Constipation Hypertension	Two or three times a week Three times a day	44022	32	0.10
Asteraceae	<i>Xanthium spinosum</i> L.	Sarıçekirli Pıtrak	Le	Crushed, left on the skin	Inflammatory injuries	Once in the morning and evening	43180	9	0.02
Boraginaceae	<i>Alkanna orientalis</i> (L.)	Havaeva otu, yamkotu	Flw	Infusion	Colds.	Two or three times a week	2072841	11	0.03
Brassicaceae	<i>Brassica napobrassica</i> (L.) Mill.	Şalgam	Se	Decocted or eaten raw	Burn and wound healer Cardiovascular diseases. Immune system.	Morning and evening Consumed fresh from time to time.	K000914161	9	0.02
Brassicaceae	<i>Brassica elongata</i> Ehrh.	Kara kelem, karalahana	Le	Roasted, eaten Decocted, taken cold.	Heals cough Edema.	Morning and evening Morning and evening, three to four days	119725	22	0.07
Brassicaceae	<i>Capsella bursa-pastoris</i> (L.) Medik.	Çobançantası, kuşkeşmeği	Le, br	Chopped roasted, eaten	Accelerates the digestive system	Twice a week	119825	41	0.13
Brassicaceae	<i>Cardamine hirsuta</i> L.	Şeker pancar, çayır teresi	Le, br	Chopped roasted, eaten.	Regulates the digestive system	Twice a week	119955	22	0.07
Brassicaceae	<i>Erica vesicaria</i> (L.) Cav.	Roka	Br	Infusion	Protects against cancer	Every day when fresh	3200560	13	0.04
Brassicaceae	<i>Lepidium sativum</i> L.	Tere	Br	Eaten raw	Diuretic	Every day when fresh	1512698	14	0.04
Brassicaceae	<i>Sinapis arvensis</i> L.	Yabani hardal	Le, br	Chopped roasted, eaten	Regulates the digestive system.	Twice a week when fresh	411145	19	0.06
Brassicaceae	<i>Sisymbrium loeselii</i> L.	Bülbül otu	Le, br	Infusion	Cough and sore throat.	A glass, morning and evening	189178	11	0.03
Cannabaceae	<i>Humulus lupulus</i> L.	Şerbetçi otu	Flw	Infusion	Stomach ache	Drink a cup during pain	248726	8	0.02
Caprifoliaceae	<i>Valeriana officinalis</i> L.	Kedi otu, kedi kuyruğu	Le	Crushed, disseminated.	Quick wound healing	Twice a day	1070880	9	0.02
Caryophyllaceae	<i>Dianthus zonatus</i> Fenzl	Kaya karanfili	Flw/le	Infusion	Expectorant, cough remover	A glass, morning and evening	2072811	7	0.02
Cupressaceae	<i>Juniperus communis</i> L.	Ardıç	Le	Infusion and drunk Fruit is eaten fresh.	Reduces blood glucose	Twice or three times a day	22306	6	0.01
Comaceae	<i>Cornus mas</i> L.	Zoğal, kızilek	Fr	Eaten raw or crushed and fruit juice.	Reduces blood glucose Cancer, feeling of fullness, reduces intestinal worms.	Morning and evening Twenty per day	40571	44	0.14
Crassulaceae	<i>Sempervivum gillitaniae</i> Muirhead (Endemic)	Kulak otu	Le	Crushed, spread around the ear	Earache	Morning and evening	12171.000	4	0.01
Cucurbitaceae	<i>Bryonia alba</i> L.	Ülüngür	Le,	Roasted	Abdominal pain and bloating	Eaten once or twice a week	628303	9	0.02
Cucurbitaceae	<i>Cucurbita moschata</i> Duchesne	Bal kabağı	fr Fr	Roasted and eaten. Cooked with zucchini and vinegar and eaten	Anemia, indigestion Prostate enlargement, heart disease, cancer.	Two or three times a week A bowl once a day.	195601	11	0.03
Cucurbitaceae	<i>Momordica charantia</i> L.	Kudret narı	Fr	Eaten raw.	Stomach ache	Fruit is eaten once a day.	K001134350	11	0.03
Cucurbitaceae	<i>Echallium elaterium</i> (L.) A.Rich.	Eşek hıyarı	Le	Decocted.	Treatment of sinusitis.	A drop is dropped into the nose.	661868	8	0.02
Equisetaceae	<i>Equisetum arvense</i> L.	Kırk kilit otu	Le	Boiled	Muscle strengthening, multiple sclerosis.	Every day, morning and evening	3682819	14	0.04
Ericaceae	<i>Vaccinium myrtillus</i> L.	Yaban mersini	Le, flw	Infusion	Reduces blood glucose	Three glasses a day	322323	6	0.01
Fabaceae	<i>Astragalus tokatensis</i> Fisch.	Geven	Ro Ro oil	Infusion Maceration	Prevents coughing. Rheumatism	Morning and evening Three times a day	K000951984	13	0.04
Fabaceae	<i>Colutea cilicica</i> Boiss. & Balansa	Yabani sinameki	Br	Infusion	Constipation	Morning and evening	2173315	9	0.02
Fabaceae	<i>Grenista tinctoria</i> L.	Boyacı katurmağı	Le, flw	Infusion	Constipation	One cup, two times a day	2569837	13	0.04
Fabaceae	<i>Lupinus albus</i> L.	Acı bakla	Seed	Boiled, eaten.	Kidney stones and sand	Once a day	2586794	34	0.10
Fabaceae	<i>Spartium junceum</i> L.	Katurmağı	Le	Infusion	Good for stomach disease.	When there is pain.	42995	8	0.02
Fabaceae	<i>Trigonella foenum-graecum</i> L.	Çemen otu	Le, br	Infusion	Sputum reduction.	Once a glass a day for one month	K001122691	22	0.07
Fabaceae	<i>Vicia faba</i> L.	Kara bakla	Le, se	Decocted.	Forgetfulness.	Once a day	2610168	32	0.10
Fabaceae	<i>Vicia sativa</i> L.	Fiğ	Se	Crushed, infusion and taken	Constipation	Once a day	42236	27	0.08
Fagaceae	<i>Quercus pubescens</i> Willd.	Mesşe	Fr	Decocted	Tonsillitis	A glass, morning and evening	2629409	7	0.02
Geraniaceae	<i>Geranium pyrenaicum</i> Burm.f.	Gelin çiçeği, İtr	Le, flw	Infusion	Abdominal pain.	A glass, morning and evening	2530732	22	0.07

Table 2. (Cont'd.).

Family	Scientific name	Local name	Up	Preparation, application	Diseases	Method used and duration	Herbarium barcode	U	UV
Hypericaceae	<i>Hypericum perforatum</i> L.	Sarı kantaron, kılıç otu,	Le	Crushed, disseminated.	Bum	Morning and evening, fifteen minutes	40061	35	0.11
Juglandaceae	<i>Juglans regia</i> L.	Ceviz	Fr Le Insh	Kept in half a liter of olive oil Hair is washed. Decoction, drunk.	Skin disorders. Prevents hair loss Flu	Morning and evening Twice a week One glass, three times a day for one week Two tea spoons, once a day	E00311518	40	0.12
Lamiaceae	<i>Lavandula stoechas</i> L.	Karabaş otu	Le	Left in a glass of olive oil Five to six leaves are boiled with a glass of water.	Goiter COPD	A glass, morning and evening	43480	14	0.04
Lamiaceae	<i>Lycopus europaeus</i> L.	Kalkan	Se	Infusion	Toothache, headache, insomnia, stomach discomfort	A glass, morning and evening			
Lamiaceae	<i>Marrubium vulgare</i> L.	İt otu	Le	Infusion	Headache	One cup, every two to three days	K000929982	7	0.02
Lamiaceae	<i>Melissa officinalis</i> L.	Oğul otu	Le	Infusion.	Respiratory disorder, sinusitis	Once a day.	43350	9	0.02
Lamiaceae	<i>Mentha spicata</i> L.	Nome	Le, br	Eaten with honey.	Analgesic	Once or twice a day	190061	17	0.05
Lamiaceae	<i>Ocimum basilicum</i> L.	Fesleğen	Ro	Chopped, infusion	Flu, colds	Morning and evening	40584	44	0.14
Lamiaceae	<i>Origanum vulgare</i> L.	Keklik otu	Br	Infusion	Cough	Once a day	527128	38	0.12
Lamiaceae	<i>Prunella vulgaris</i> L.	Yara otu	Le	Eaten raw.	Stomachache, immune system and heart, Hypertension	One cup, once every two or three days	197439	15	0.04
Lamiaceae	<i>Rosmarinus officinalis</i> L.	Biberiye	Le, br	Eaten raw. Eaten raw or infusion Put a handful of leaves and a lemon in four cups of vinegar. Left indoors for a day, then filtered and drunk.	Easy wound healing Expectorant Weaken.	One cup, once a day when fresh Once a day A cup of tea, morning and evening.	527383 K000735206	9 12	0.02 0.03
Lamiaceae	<i>Salvia virgata</i> Jacq.	Ada çayı	Flwbr	Infusion	Indigestion, tranquilizer, throat inflammation, bronchitis, asthma.	Morning, noon, evening	3095671	39	0.12
Lamiaceae	<i>Thymbra spicata</i> subsp. <i>spicata</i> L.	Kekik	Br	Infusion	Throat inflammations.	Morning and evening	K000509366	46	0.14
Lamiaceae	<i>Thymus longicaulis</i> C.Presl	Dağ kekiği	Le, flw	Infusion	Bronchitis, asthma, loss of appetite and indigestion.	One glass a day	2710439	31	0.09
Linaceae	<i>Linum usitatissimum</i> L.	Keten	Ro	Infusion	Bronchitis, blood pressure regulator, expectorant	A glass, morning, noon, evening			
Malvaceae	<i>Abelmoschus esculentus</i> (L.) Moench	Bamya	Se	Crushed seeds are eaten.	Coughing	A half-tea spoon is consumed when hungry, once a day	497181	25	0.08
Malvaceae	<i>Althaea hirsuta</i> L.	Hatmi çiçeği	Se	Swallowed with a glass of water	Joint pain	One day.	3779376	25	0.08
Malvaceae	<i>Malva neglecta</i> Wallr.	Kömeç, Kömeç	Flw Le, flw	Crushed, eaten with honey Infusion, drunk. Cooked and eaten.	Asthma Cough, expectorant Stomach pain, diarrhea, abdominal pain	One tea spoon per day, for ten days, Every four days One glass a day	2482233 280268	33 44	0.10 0.14
Malvaceae	<i>Malva sylvestris</i> L.	Kömeç	Ro	Infusion	Prostate hypertrophy	A glass, morning and evening	2377697	45	0.14
Malvaceae	<i>Alcea biennis</i> Winterl	Gül hatmi	Flw	Infusion	Kidney stone and gallstone removal Reduces cold symptoms. Good for coughing, mouth, throat wounds.	A glass, morning, noon, evening	401 (1900)	27	0.08
Moraceae	<i>Ficus carica</i> L.	İncir	Fr	Fruit is eaten with olive oil.	Asthma	One or two each morning when hungry	663888	13	0.04
Moraceae	<i>Morus alba</i> L.	Beyaz dut	Br	Grated and wetted	Put on the aching tooth.	Morning, noon, evening	2332591	11	0.03
Moraceae	<i>Morus nigra</i> L.	Karadut	Fr	Infusion	Diuretic, digestive system	Once a day	1369146	13	0.04
Orobanchaceae	<i>Euphrasia pectinata</i> Ten.	Göz otu	Bd	Fruit is eaten	Mouth sores and warts	Three times a day	2482221	8	0.02
Papaveraceae	<i>Chelidonium majus</i> L.	Kırlangıç otu	Fr	Boiled Infusion	Eye inflammation. Diarrhea	Wait in the steam Morning and evening.	42090	7	0.02

Table 2. (Cont'd.).

Family	Scientific name	Local name	Up	Preparation, application	Diseases	Method used and duration	Herbarium barcode	U	UV
Plantaginaceae	<i>Plantago orientalis</i> L.	Çınar	Le	Infusion, drunk.	Kidney disorders, osteoarthritis, joint pain, asthma	One cup, once a day	2513991	18	0.05
Plantaginaceae	<i>Plantago major</i> L.	Bağa yaprağı, sinirli ot	Le	Crushed, disseminated	Pain relief in skin disorders	Five times a day	40932	36	0.11
Plantaginaceae	<i>Veronica beccabunga</i> L.	Yavşan otu	Le	Boiled	Diabetes	Morning and evening.	2518313	14	0.04
Plantaginaceae	<i>Veronica persica</i> Poir.	Bal bardağı	Le, br	Chopped, cooked in olive oil together with bulgur, eaten.	Muscle aches, migraine, headaches.	Twice a week	539159	11	0.03
Pinaceae	<i>Pinus sylvestris</i> L.	Çam	Co	Boiled and taken.	Asthma and bronchitis.	Two or three times a week.	40579	12	0.03
Poaceae	<i>Leymus racemosus</i> (Lam.) Tzvelev	Ayrık otu	Le	Boiled, disseminated	Low back and joint aches.	Once a cup, morning, noon, evening	1737148	11	0.03
Poaceae			Rh	Boiled and taken	Calcification, rheumatic sores, prostate hypertrophy	One tea cup per day			
Poaceae	<i>Avena fatua</i> L.	Yulaf	Ro	Infusion	Accelerate blood flow in kidney disorders.	Drink a glass in the morning and evening.			
Poaceae			St	Infusion	COPD	Drunk once a day.	1269189	19	0.06
Poaceae			Sp	Infusion	Asthma, bronchitis	Once a day, in the morning			
Poaceae			St, br, le	Crushed disseminated.	Itching	Once a day.			
Poaceae	<i>Zea mays</i> L.	Mısır	Ta	Crushed, infusion	Lung cancer	Morning and evening.	1269189	12	0.03
Polygonaceae	<i>Polygonum cognatum</i> Meissn.	Madımak	Le, br	Roasted in oil and eaten.	Urinary tract infections	A glass, twice a week	323951	56	0.18
Polygonaceae	<i>Rumex angustifolius</i> Campd.	Efelik	Le, br	Infusion	Flu	Two bowls when sick	324089	46	0.14
Polygonaceae	<i>Rumex crispus</i> L.				Stomach ache	A glass once a day.	413066		
Polygonaceae	<i>Portulaca oleracea</i> L.	Semizotu, kızıl bacak	Le	Roasted in olive oil and eaten.	Appetizer, digestive facilitator	Three times a week	430452	44	0.14
Rosaceae	<i>Alchemilla mollis</i> (Buser) Rothm.	Mide otu, aslan pençesi	Le, br, flw	Crushed, disseminated.	Urinary tract infections	A glass, morning and evening			
Rosaceae			Flw	Roasted, eaten	Shingles	Morning and evening			
Rosaceae	<i>Agrimonia eupatoria</i> L.	Koyun otu	St	Infusion	Balances blood pressure	One bowl a day	K000914197	12	0.03
Rosaceae	<i>Crataegus orientalis</i> Pall. ex M.Bieb.	Aliç	Fr	Eaten raw as stomach disease.	Stomach diseases, ulcers	A glass, morning and evening			
Rosaceae			Le	Infusion	Rheumatic aches	Morning and evening			
Rosaceae			Flw	Infusion	Breast cancer	One bowl a day	322332	21	0.06
Rosaceae	<i>Cydonia oblonga</i> Mill.	Ayva	Cr, le	Three or four cores are kept in a glass of water overnight.	Stomach disorders, kidney health	A glass, morning and evening	1070490	19	0.06
Rosaceae	<i>Malus pumila</i> Mill.	Elma	Cr	Decoction	Stomach ache	Morning and evening			
Rosaceae	<i>Mespilus germanica</i> L.	Döngel	Fr	Fruits are eaten raw.	Stomach disorders	One bowl a day	849529	35	0.11
Rosaceae	<i>Cerasus avium</i> (L.) Moench	Kiraz	Fr, st, le	Pickled.	Atherosclerosis, vascular occlusion	A glass, morning and evening	2699801	22	0.70
Rosaceae	<i>Cerasus vulgaris</i> Mill.	Vişne	Fr, st	Infusion	Pharyngitis, flu, cough	Morning and evening			
Rosaceae	<i>Cerasus mahaleb</i> (L.) Mill	Mehlep, mahlep	Le	Infusion	Stress and insomnia.	A glass, morning and evening	211036	25	0.08
Rosaceae	<i>Persica vulgaris</i> Mill.	Şeftali	Le	Boiled, drops	Cough, urinary excretion.	Morning and evening			
Rosaceae	<i>Pyrus syriaca</i> var. <i>syriaca</i> Boiss.	Çörtlük	Fr	Eaten raw.	Sore throat.	One bowl a day	16078.000	22	0.07
Rosaceae					Body aches, urinary tract infections.	A glass, morning and evening			
Rosaceae					Influenza, cold	Morning and evening	1116367	31	0.07
Rosaceae					Inflamed wounds.	One bowl a day	K000737221	23	0.07
Rosaceae					Kidneys, intestines.	A glass, morning and evening	K000809215	34	0.10

Table 2. (Cont'd.).

Family	Scientific name	Local name	Up	Preparation, application	Diseases	Method used and duration	Herbarium barcode	U	UV
Rosaceae	<i>Rosa canina</i> L.	Kuşburnu	Ro, Fr	Infusion	Asthma, flu and colds, joint aches	Morning and evening	848918	55	0.17
Rosaceae	<i>Rosa pulverulenta</i> M. Bieb.	Yerli gül	Pe	Infusion	Diarrhea, abdominal pain.	One bowl a day			
Rosaceae	<i>Rubus sanctus</i> Schreb.	Böğürflen, bük	Ro	Decoction	Stomach ulcer, diabetes	A glass, morning and evening	2206	15	0.04
			Le, br	Infusion	Sedative	Morning and evening	429657	58	0.18
			Fr	Eaten raw	Hemorrhoids, calcification	A glass, morning and evening			
Rosaceae	<i>Sanguisorba minor</i> Scop.	Çayır düğmesi	Ro	Infusion	Anti-inflammatory, anti-arthritis	Morning and evening			
Rosaceae	<i>Sorbus schemachensis</i> Zinserl.	Üvez, vez	Fr	Raw fruit is eaten.	Intestinal infections.	A glass, once a day	696227	19	0.06
Ranunculaceae	<i>Anemone blanda</i> Schott & Kotschy	Dağ lalesi	Le	Decoction	Constipation	Fifteen in the morning and evening	27800376	22	0.07
Ranunculaceae	<i>Nigella sativa</i> L.	Çörek otu	Bu	Decoction	Regulates blood glucose	Drink a glass.			
			Se	Crushed and eaten	Protects against cancer.	A tea spoon	2738426	8	0.02
			Le, br	Crushed, eaten	Expectorant.	Used externally.	K000694416	44	0.14
			Roasted	Roasted	Prevents whitening of hair	Drink a glass.	K000283364	38	0.12
			Le, fr	Boiled	Increases intestinal motility.				
Rhamnaceae	<i>Paliurus spina-christi</i> Mill.	Karaçalı	Le, fr	Boiled	Eye pain.	Used externally in case of illness.	1088422	35	0.11
Rubiaceae	<i>Rubia tinctorum</i> L.	Kına otu	Ro	Infusion	Colon health	A glass, morning and evening			
Salicaceae	<i>Salix babylonica</i> L.	Söğüt	Le	Crushed	Constipation	Morning and evening	719079	7	0.02
			Decoction	Decoction	Skin cancer	Four or five times a day.	435608	11	0.03
			Se	Crushed	Antipyretic, prevents calcification	Morning and evening			
Sapindaceae	<i>Aesculus hippocastanum</i> L.	Aikestanesi	Se	Crushed	Analgesic	Once a day	482201	12	0.03
Santalaceae	<i>Viscum album</i> L.	Gökçek gükçek	Le	Decoction	Nasal obstruction.	Morning and evening	2059127	9	0.02
	<i>Viscum album</i> subsp. <i>austriacum</i> L.	Çekem	Ro	Crushed and eaten.	Rheumatism, hypertension	Morning and evening	K000914246	8	0.02
Scrophulariaceae	<i>Linaria vulgaris</i> Mill.	Nevruz otu	Flw	Decoction	Sputum reduction	Three times a day	43353	8	0.02
Scrophulariaceae	<i>Verbascum thapsus</i> L.	Sığırkuyruğu, şalba, çalba	Le, flw	Decoction	Bronchitis, abdominal pain	Three times a day	40235	17	0.05
			St	Crushed and eaten.	Hemorrhoids.	Morning, afternoon and evening			
			Boiled, drunk.	Boiled, drunk.	Used for rheumatism, regulation of the stomach and intestines.	A glass, every morning, when hungry	190283	38	0.12
Thymelaeaceae	<i>Daphne oleoides</i> Schreb.	Defne	Le	Decoction	Analgesic.	One glass a day	2530220	12	0.03
Tiliaceae	<i>Tilia rubra</i> DC.	İhlamur	Le, flw	Decoction	Used in cough.	A glass, when hungry, four or five times a day	2557514	38	0.12
Urticaceae	<i>Urtica dioica</i> L.	Isrgan	Le	Chopped, decoction	Joint pain, sore throat.	Five to six days.	500546	79	0.25
			Ro	Decoction	Expectorant				
			Br	Decoction, drop a few drops on acne and warts.	Cancer treatment	A glass, drunk cold, once or twice a week.			
			Se	Decoction	Sore throat (warm), colon cancer (cold), hair loss.	Three glasses a day			
Urticaceae	<i>Urtica urens</i> L.	Isrgan	Se	Decoction	Immune system.	Once a day when hungry.	42747	75	0.24
Vitaceae	<i>Vitis labrusca</i> L.	Üzüm	Ro	Decoction	Cancer	Morning, noon and evening	42536	12	0.03
Vitaceae	<i>Vitis vinifera</i> L.	Üzüm	Fr	Eaten raw.	Asthma	Three to four times a day.	1534100	17	0.05
			Fr	Eaten raw.	Sprains and bruises.	Morning once a day			
			Fr	Eaten raw.	Blood enhancer				





Fig. 2. A view from Pazar district center.

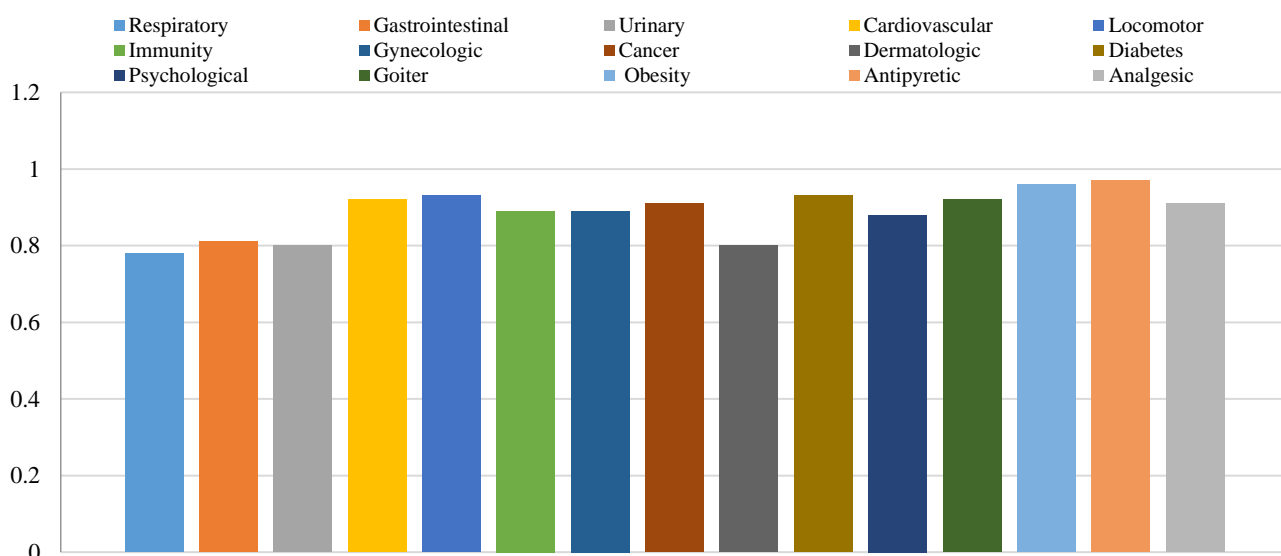


Fig. 3. Disease categories and ICF.

Fig. 4. Local people collecting *Polygonum cognatum*. Dried *Malus pumila* fruit slices.

Some species such as *Allium sativum*, *Chenopodium album*, *Pistacia terebinthus* L., *Xanthium spinosum*, *Astragalus tokatensis*, *Pinus sylvestris* L., *Portulaca oleracea*, *Salix babylonica*, and *Vitis labrusca* L. are placed on the diseased area without being cooked. The fruits of *Malus pumila* Mill. are dried and stored for the winter (Fig. 4).

Species such as *Cornus mas*, *Vaccinium myrtillus* L., *Ficus carica*, *Morus alba* L., *Morus nigra*, *Crataegus orientalis* Pall. ex M.Bieb., *Cydonia oblonga*, *Malus pumila* Mill., *Mespilus germanica* L., *Cerasus avium* (L.) Moench, *Cerasus vulgaris* Mill., *Cerasus mahaleb* (L.) Mill, *Persica vulgaris* Mill., *Pyrus syriaca* var. *syriaca* Boiss. *Rubus sanctus*, *Sorbus schemachensis* Zinserl., *Vitis labrusca*, and *Vitis vinifera* L. are consumed as raw food.

*Sempervivum gillianiae* Muirhead and *Astragalus tokatensis* Fisch. are used by the local people. *Ocimum basilicum* L., *Rosmarinus officinalis* L. *Abelmoschus esculentus* (L.) Moench, *Morus nigra* L. and *Aesculus hippocastanum* L. are cultivar plants.

Some taxa are given the same names in the region. *Achillea setacea* Waldst. & Kit. and *Achillea millefolium* L. are called yarrow, *Malva neglecta* and *Malva sylvestris* are called mallow or kömeç, *Urtica dioica* and *Urtica urens* L. are called nettle, *Vitis labrusca* and *Vitis vinifera* are called grape, and *Arum orientale* and *Arum italicum* are known as nivik.

## Discussion

In this study, the local names of plants that grew naturally in Pazar (Tokat, Türkiye), they were used to treat the diseases, their usage patterns and usage doses were determined. In the region, *Cydonia oblonga* is used in the treatment of quinsy, skin moisturizer, pharyngitis, flu, and cough. Local people benefit from *Anthemis cretica* subsp. *umbilicata* and *Ecballium elaterium* for the treatment of sinusitis. It was stated by the local people that *E. elaterium* can be dangerous, so the dose should be adjusted carefully. In Pazar *Hypericum perforatum* is used for fever and skin disorders, *Inula helenium* L. for respiratory diseases, *Juglans regia* for hair loss, flu and goiter, *Morus alba* as diuretic and digestive system regulator, *Platanus orientalis* for kidney disorders, osteoarthritis, joint pain and asthma, *Rosmarinus officinalis* for expectorant and *Paliurus spina-christi* for eye pain and colon disorders. In various studies, *Cydonia oblonga* was reported to be used for gastrointestinal complaints (Minaiyan, 2012), *Ecballium elaterium* for sinusitis and rheumatism (Ekici, 1998; Sezik & Yeşilada, 2004), *Hypericum perforatum* for gastrointestinal problems (Woelk, 1994), *Inula britannica* L., for asthma (Khan, 2010), *Juglans regia* for diabetes (Sarahroodi, 2009), *Matricaria chamomilla* L. for influenza and cancer (Srivastata, 2010), *Morus rubra* for diabetes (Sharma, 2010) *Platanus orientalis* as analgesic and for nephralgia and rheumatism (Hajhasnemi, 2011), *Rosmarinus officinalis* for hypercholesterolemia (Ibarra, 2011), and *Paliurus spina-christi* for diabetes (Mosaddegh, 2004). According to Ezer & Avci (2004), while *Bryonia alba* L. was used for menstrual cramps, it was used as an analgesic in our study. *Quercus pubescens* Willd. is used for medicinal purposes. *Quercus brantii* Lindl. was reported to be used to make molasses (Satil *et al.*, 2021). In Pazar, *Taraxacum butleri* was used to facilitate digestion and urination. Raghuvanshi *et al.* reported that *Taraxacum officinale* G. was used for the treatment of jaundice (Raghuvanshi *et al.*, 2021). *Vitis vinifera* was used in the treatment of itching in India (Bhat *et al.*, 2014). It is used as a blood enhancer in the region of our study.

There was just one study conducted in the west of Anatolia (Türkiye), in which the ICF value was calculated. When articles calculating ICF were examined, for example in the study from the west of Türkiye by Polat & Satil (2012), the category of blood pressure diseases had the highest ICF score (0.87), followed by anorexia (0.84 ICF), hemorrhoids (0.80 ICF), and healing cuts and wounds (0.74 ICF). When a study from east of Türkiye by Cakilcioglu and Turkoglu (2010) is examined, the category of hemorrhoids had the highest value (0.62 ICF), followed by diabetes (0.56 ICF), gastrointestinal diseases (0.48 ICF),

and respiratory and throat diseases (0.28 ICF). In another study from the east of Türkiye by Cakilcioglu *et al.*, (2011), the category of rheumatism had the highest ICF (0.58 ICF) followed by cardiovascular disorders (0.51 ICF), hemorrhoids (0.48 ICF), diabetes (0.40 ICF), respiratory and throat diseases (0.36 ICF) and gastrointestinal diseases (0.31 ICF) (Srivastata, 2010). When other studies that calculated ICF value are investigated, Akerreta *et al.*, (2007) found the ICF value was 0.65. It was stated that this value was high; however, it is lower than the values obtained in studies conducted in various areas of the Iberian Peninsula with values of 0.85 and 0.91 for Portuguese and Catalan regions, respectively (Bonet & Valles, 2003). The ICF values are high. In other words, the ICF value is close to 1. The medicinal plants that are presumed to be effective in treating a certain disease have higher ICF values (Teklehaymanot & Giday, 2007). AlQura'n (2009) examined diseases in 10 categories. In these categories, the highest ICF value was reported to be 0.55, while the lowest ICF value was reported to be 0.25. As a result of our study 15 categories of diseases were revealed (Fig. 4). While the highest ICF value was obtained in the antipyretic category (0.97), the lowest value was determined for respiratory diseases (0.78).

## Conclusion

With this study, the local names of the plants growing naturally in Pazar (Tokat, Türkiye), used to treat diseases, the method of use, and the dosage of use were determined. Local people benefit from 132 plants belonging to 49 families. The most commonly encountered medicinal plant families were Asteraceae (16 taxa) and Rosaceae (16 taxa); the most common preparations were infusion and decoction. Fifteen disease categories (respiratory, locomotor, dermatologic, obesity, gastrointestinal, immunity, diabetes, antipyretic, urinary, gynecologic, psychological, analgesic, cardiovascular, cancer, goiter) were identified in which traditional medicinal plants were used. Two endemic species *Sempervivum gillianiae* and *Astragalus tokatensis* were also used by the local people. The highest UV was found for *Urtica dioica* and *Urtica urens*. These plants, locally called nettle, which are used for joint pain, sore throat, asthma, sprains and bruises, cancer treatment, as blood builder, expectorant and hair loss.

All the information here is based on the direct statements of local people. It should not be forgotten that plants can cause irreversible damage if not used carefully. Therefore, more detailed studies are required about the medicinal and pharmacological properties of the plants in question.

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