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Ethnobotanical survey of wild plants used in Gümüşhane province (Turkey)

[Estudio etnobotánico de plantas silvestres utilizadas en la provincia de Gümüşhane (Turquía)]

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Abstract: This study aimed to document the traditional uses of plants in Gümüşhane province. Ethnobotanical data on 74 taxa from 135 informants were collected between March 2018 and September 2019. Data were analyzed using quantitative indices of use-value (UV), information consent factor (ICF), and fidelity level (FL). The plants were used for different purposes, mainly for medicinal, food, and equipment. *Malva neglecta*, was the most used taxa for medicinal purposes. *Polygonum aviculare* was the most used taxon for food. *Quercus petraea* subsp. *iberica* and *Pinus sylvestris* were the most preferred species for equipment. *Salvia verticillata, Rhamnus cathartica, Bilacunaria microcarpa, Taraxacum bessarabicum, Silene vulgaris, Carduus nutans, Helichrysum plicatum, Euphorbia esula* subsp. *tommasiniana, Thymus pubescens*, and *Phlomis herba-venti* subsp. *pungens* are reported for the first time in the present study for various purposes.

Keywords: Ethnobotany; Food plants; Gümüşhane; Medicinal plants; Traditional knowledge

Resumen: Este estudio tuvo como objetivo documentar los usos tradicionales de las plantas en la provincia de Gümüşhane. Se recopilaron datos etnobotánicos sobre 74 taxones de 135 informantes entre marzo de 2018 y septiembre de 2019. Los datos se analizaron utilizando índices cuantitativos de valor de uso (UV), factor de consentimiento de información (ICF) y nivel de fidelidad (FL). Las plantas se utilizaron para diferentes propósitos, principalmente para uso medicinal, alimenticio y de equipamiento. *Malva neglecta*, fue el taxón más utilizado con fines medicinales. *Polygonum aviculare* fue el taxón más utilizado como alimento. *Quercus petraea* subesp. *iberica* y *Pinus sylvestris* fueron las especies preferidas para el equipamiento. *Salvia verticillata, Rhamnus cathartica, Bilacunaria microcarpa, Taraxacum bessarabicum, Silene vulgaris, Carduus nutans, Helichrysum plicatum, Euphorbia esula* subsp. *tommasiniana, Thymus pubescens* y *Phlomis herba-venti* subsp. *pungens* se reportan por primera vez en el presente estudio para varios propósitos.

Palabras clave: Etnobotánica; Plantas alimenticias; Gümüşhane; Plantas medicinales; Conocimiento tradicional

INTRODUCTION

Centuries ago, people realized the healing aspects of plants and benefited from them. There is a strong bond between plants that are the source of life and humans. Plants are at the center of our well-being as essential components of our cultures, religions, and medicines (Schaal, 2019).

Information obtained from archaeobotanical fields is yield as evidence that the plants' classification for different purposes such as food and treatment began in ancient times (Heinrich *et al.*, 2018).

Despite the significant developments in medicine, people sometimes turned to nature for treatment-purpose and continue to benefit from plants for healing purposes by transferring their experiences of thousands of years to future generations. The desire to benefit from the facilities provided by technological developments has paved the way for the human-plant bond to break slowly (e.g., supplanting the broom plant with a vacuum cleaner, supplanting the plow with the tractor, supplanting the horse cart with Autocar). Technological development has moved people away from the wild, and this has attracted the attention of scientists. The effort to record the past and present-day usage of plants in a scientific language has led to the emergence of ethnobotanical science (Ertuğ, 2014).

Turkey has been incorporating various cultures throughout the ages and has preserved the works left by these cultures until today. In addition to this, its physical structure and geographical location, different climatic types, rich biological diversity have made it a significant place in terms of ethnobotanical research (Ertuğ, 2014). Therefore, Turkey has become a center of attraction for many biologists, ethnobotanists, ethnopharmacologists, and anthropologists, and much research has been done on the traditional uses of plants (Lyle-Kalças, 1974; Bottema & Woldring, 1990; Ertuğ, 2000).

Ethnobotanical data began to be recorded in Turkey in 1928 (Kendir & Güvenç, 2010). The Black Sea and Central Anatolia have been the regions where the most research has been carried out until today (Sadıkoğlu & Alpınar, 2004). It is possible to see some ethnobotanical studies in some cities such as Trabzon (Akbulut & Özkan, 2014), Rize (Saraç *et al.*, 2013), and Erzurum (Karakaya *et al.*, 2019; Karakaya *et al.*, 2020) where are neighboring Gümüşhane. Ethnobotanical studies were carried out in Torul district of Gümüşhane province (Karaköse *et al.*, 2019) and in the Köse Mountains (Kandemir & Beyazoğlu, 2002). However, no studies were found covering the city center and its villages.

Ethnobotanical studies still have too much research potential in Turkey. It creates a basis for many fields such as medicine, chemistry, pharmacology, food, paint industry and provides opportunities for new researches. The study aim was to determine and inventory the unwritten traditional uses of natural plants by local people in the countryside of Gümüşhane province, following the essence of ethnobotanical studies.

MATERIALS AND METHODS

Study area

Gümüşhane is situated in the north of Turkey. The province is neighbors with Trabzon from the north, Erzincan from the south, Bayburt from the east, and Giresun from the west. Also, it has a significant position as it has an area both in the Eastern Black Sea Region and the Eastern Anatolia Region. Its area is 6575 km^2 and it has a height of approximately 1250 m (Akyürek & Karabulut, 2017) (Figure No. 1). Gümüşhane belongs to the Euro-Siberian flora region and falls within the southeast part of the A7 grid square according to the grid system (Davis, 1965). Dominant vegetation types are forest and steppe. Forest areas are predominant in the north of the region and steppe areas in the south. The main tree species of forest vegetation are *Picea orientalis*, *Pinus sylvestris*, *Fagus orientalis*, *Quercus petraea* subsp. *iberica*, *Populus tremula*, and *Abies nordmanniana*. The forest areas in the region spread along the Harşit valley between 800 m and 2000 m altitudes. Steppe vegetation is widespread with the effect of terrestrial climate. This vegetation covers wide open space between 1800 m and 2900 m altitude. *Astragalus acmophyllus*, *A. microcephalus*, *Onobrychis sativa*, *Achillea biebersteinii*, *Anthemis tinctoria*, *Helichrysum plicatum*, *Artemisia caucasica*, *Bromus erectus*, and *Polygonum alpinum* are in the composition of the steppe vegetation (Küçük & Eyüboğlu, 2002; TC Gümüşhane Valiliği, 2021).

The province, which takes its name from Argryopolis, meanings the silver city, has been known in history for its mines, especially with the silver one. The region dominated formerly by many states such as Rome, Byzantium, the Arab States, and

Seljuk State, has hosted many civilizations (Uzunçarşılı, 2011).

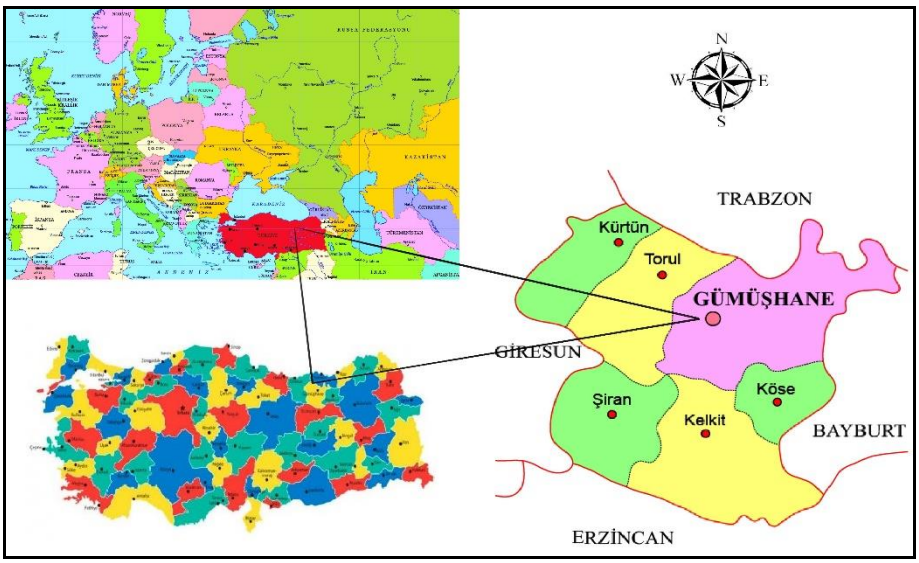

Figure No. 1
The geographical location of Gümüşhane province (Depositphotos, 2020; Linktel, 2020; Pinterest, 2020)

Data collection
Ethnobotanical data were collected between March 2018 and September 2019. A total of 135 informants were interviewed in the study area. Informants were selected using the snowball method from the study locations in Gümüşhane province (Table No. 1). Those who had information about the culture and history of the region were given priority in the interviews. The interviews were held in crowded places such as bazaars and tea houses (Figure No. 2).

Table No. 1
Number of interviews and study locations

Study area	Locations	No of interviews	Locations	No of interviews
Gümüşhane province (Turkey)	Yeniköy village	9	Uğurtaş village	6
	Çaltılı village	6	Aşağı Alıçlı village	7
	Pirahmet village	5	Yukarı Alıçlı village	3
	Esenyurt village	4	Harmancık village	6
	Üçkol village	8	Tekke village	9
	Gümüşkale village	5	Olukdere village	7
	Kızılca village	9	Kov Kalesi village	4
	Kırıklı village	10	Kov tableland	11
	Mescitli village	6	Minarlı tableland	13
	Gökçepınar village	7		

In the villages visited, people were interviewed face to face, and a questionnaire was applied (Appendix A). Informants were asked questions about their demographic characteristics, the plants they use, the purpose of use, and the usage. Informants were asked to show the plants they used, and samples were collected from these plants. Also, all plants were photographed. During the study, 74

plant taxa used by local people were collected and identified. Voucher specimens were collected, identified and named according to The Plant List (The Plant List, 2020) and the Flora of Turkey by the authors (Davis, 1965-1985; Davis *et al.*, 1988; Güner *et al.*, 2000). The voucher specimens and other herbarium specimens were deposited in the Karadeniz Technical University Forest Faculty Herbarium (KATO) in Turkey.

Figure No. 2
Informants interviews

Data analysis

Data analyses were made based on ethnobotanical information provided by the informants and using various statistical methods. Use-value (UV), informant consensus factor (ICF), fidelity level (FL) of plants in the study area were calculated and was evaluated importance to the community.

UV is a method used to determine how often local people actively use plants in their daily lives. In calculating the UV, the formula UV = U / N was used (where U is the number of use citations by informants for any species, N is the number of informants) (Trotter & Logan, 1986).

ICF is a method used to determine the level of homogeneity between a specific disease and the plants used in its treatment and the effectiveness of the plants. In calculating the ICF, the formula ICF = Nur - Nt / Nur - 1 is used (where Nur is the number of citations in each category and Nt is the number of species used) (Heinrich *et al.*, 1998; Trotter & Logan, 1986).

FL refers to the specificity of the plant species of choice for the diseases most frequently reported by informants. The high FL of a plant indicates the prevalence of a specific disease in the studied population and the utilization of plants by the local people to treat it. In calculating the FL, the formula FL (%) = (Ip / Iu) * 100 was used (Ip is the number of informants that suggested the use of a plant for a specific ailment and Iu is the total number of informants who mentioned that a species is used to treat any ailment) (Friedman *et al.*, 1986).

RESULTS

Demographic characteristics of the informants

The distribution of informants by gender, educational level, age groups, and occupation were given in Table No. 2.

According to Table No. 2, a total of 135 informants consisting of 82 females and 53 males. The age of the informants ranged from 20 to 102 years old and the average age was 59. The most of the female informants were housewives (Figure No. 3). The greater parts of informants had primary education (48.15%) and are residents (78%) of the region all year round.

Table No. 2
Demographic profile of informants

Indicator	No of informants	Percentage
Gender		
Male	53	39.2
Female	82	60.7
Educational level		
Illiterate	27	20
Primary school	65	48.15
Middle school	28	20.74
High school	6	4.44
University	9	6.67
Age groups		
21-40	10	7.4
41-60	82	60.7
>60	43	31.8
Occupation		
Self-employed	10	7.4
Housewife	75	55.5
Student	3	4.5
Retired	23	17
Farmer	7	5.2
Worker	17	12.6

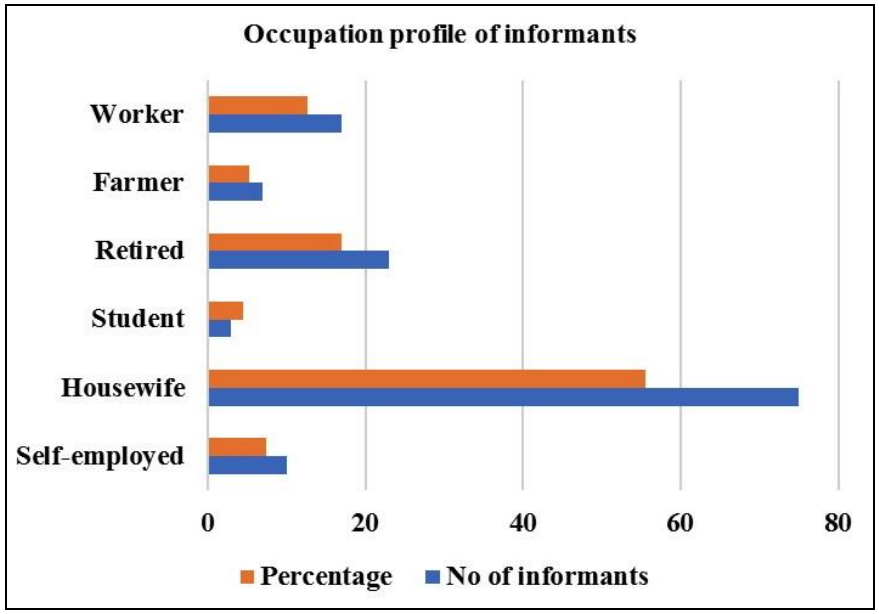

Figure No. 3
Occupation profile of informants

Traditional knowledge and uses of plantsç

Data on the traditional use of 74 taxa belonging to 38 families are given in Table No. 3. Taxonomic order was done alphabetically according to scientific names. Data on the traditional use were compared with primarily ethnobotanical studies in Turkey and then were compared with other countries.

The most used families are Asteraceae (12 taxa), Lamiaceae (9), and Apiaceae (5) (Figure No. 4). The family that contains the most taxa in medical

uses is Asteraceae.

Table No. 3
Traditional uses of plants in Gümüşhane province (Turkey)

Species/Subspecies (voucher specimen)	Botanical family	Vernacular names	Part used[a]	Preparation	Use	UV
Abies nordmanniana (Steven) Spach. (KATO 19684)	Pinaceae	Köknar	Br	Cut and combined	Broom	0.19
Achillea arabica Kotschy (KATO 19256)	Asteraceae	Sarı civanperçemi	Se, L	Infusion	Cold and flu, backache, and rheumatic pain	0.07
Achillea setacea Waldst. & Kit. (KATO 19255)	Asteraceae	Tilkikuyruğu, Civanperçemi	L, Cp, Se	Infusion, fresh, crushed	Gynecological diseases, diuretic, expectorant, wound healing	0.21
Alcea hohenackeri (Boiss. & Huet) Boiss. (KATO 19293)	Malvaceae	Hatmi çiçeği, Horoz ibibiği	L, Se	Infusion	Expectorant, antitussive, cold and bronchitis	0.24
Allium scorodoprasum L. (KATO 19287)	Amaryllidaceae	Soğaniza	Ap	Cooked by frying	Food	0.26
Amaranthus hybridus L. (KATO 19252)	Amaranthaceae	Küllüce	L	Cooked by boiling	Food	0.07
Berberis vulgaris L. (KATO 19262)	Berberidaceae	Kızambık	Fr, Br	Decoction, syrup, fresh eaten, cut and combined	Diabetes, hypertension, food, broom	0.36
Bilacunaria microcarpa (M.Bieb.) Pimenov & V.N.Tikhom (KATO 19317)	Apiaceae	Casır otu	Fl	Infusion	Wound healing	0.11
Bunium microcarpum (Boiss.) Freyn & Bornm. (KATO 19313)	Apiaceae	Garzel	Tu	Fresh eaten, cooked by roasting	Food	0.09
Falcaria vulgaris Bernh. (KATO 19671)	Apiaceae	Kazayağı	L	Fresh eaten	Food	0.04
Capsella bursa-pastoris (L.) Medik. (KATO 19270)	Brassicaceae	Çoban çantası	Fl	Infusion	Kidney ailments, gynecological diseases, nosebleeds	0.15
Carduus nutans L. (KATO 19254)	Asteraceae	Deve dikeni	Cp, St, Se	Infusion, fresh eaten	Stomach disorders, appetite-stimulant, against food poisoning (with honey), food	0.07
Cephalaria procera	Caprifoliaceae	Gevreğen otu	Ap	Fresh	Fodder	0.12

Fisch. & Avé-Lall. (KATO 19272)						
Chenopodium album L. (KATO 19264)	Amaranthaceae	Hoşveren, hoşmeren, Lita, Tel pancarı	L	Cooked by boiling	Food	0.21
Cichorium intybus L. (KATO 19258)	Asteraceae	Yabani hindiba	Cp	Infusion	Appetite-stimulant, headache, diabetes, circulatory system disorders	0.26
Consolida orientalis (J.Gay) Schrödinger (KATO 19305)	Ranunculaceae	Morçiçek	Fl	Infusion, fresh	Skin diseases, nervous system diseases, ornament	0.10
Corylus avellana L. (KATO 19677)	Betulaceae	Fındık	Br	Cut and combined	Basket, beanpole	0.30
Crataegus orientalis Pall. ex M.Bieb. (KATO 19308)	Rosaceae	Alıç	Fl, L, R, Fr	Decoction, infusion, pickle	Nervous system diseases, diarrhea, digestive problems, hypertension, diabetes, cardiovascular diseases, sedative, food	0.37
Cyanus triumfettii (All.) Dostál ex Á.Löve & D.Löve (KATO 19260)	Asteraceae	Peygamber çiçeği	L, Cp	Infusion, decoction	Circulatory system disorders, analgesic, physical and mental health	0.07
Dactylorhiza euxina (Nevski) Czerep. (KATO 19682)	Orchidaceae	Salep	Tu	Powder	Immunity booster, food	0.22
Dactylorhiza urvilleana (Steud.) Baumann & Künkele (KATO 19295)	Orchidaceae	Salep	Tu	Powder	Immunity booster, food	0.22
Dryopteris filix-mas (L.) Schott. (KATO 19302)	Dryopteridaceae	İfteri, Kızılot	L	Fresh	For animals in the barns	0.15
Echinops ossicus K.Koch (KATO 19674)	Asteraceae	Boğa dikeni	L, St	Infusion, fresh eaten	Weight loss, reduce fever, food	0.05
Echium italicum L. (KATO 19756)	Boraginaceae	Havacüve	R	Decoction	Antitussive, bronchitis	0.21
Equisetum palustre L. (KATO 19275)	Equisetaceae	Atkuyruğu	Ap	Infusion	Urinary tract disorders, kidney sand, shortness of breath, antitussive	0.07
Euphorbia esula subsp. *tommasiniana* (Bertol.) Kuzmanov	Euphorbiaceae	Yaban sütleğeni, Sütlüce	Ap	Latex	Calluses and athlete's foot, anthelmintic	0.04

(KATO 19274)						
Foeniculum vulgare Mill. (KATO 19672)	Apiaceae	Rezene	Se	Infusion	Diuretic, increasing breast Increasing breast milk, digestive system diseases, gynecological diseases	0.25
Globularia trichosantha Fisch. & C.A.Mey. (KATO 19276)	Plantaginaceae	Mayasır otu	L	Infusion	Hemorrhoids, antifungals	0.12
Helichrysum plicatum DC. (KATO 19261)	Asteraceae	Yayla çiçeği, Sarıçiçek	Se, Cp	Infusion, fresh	Weight loss, urinary tract disorders, jaundice, infertility, relieving gastroenteritis	0.33
Hyoscyamus niger L. (KATO 19689)	Solanaecae	Pat pat otu	Se, L	Infusion, crushed	Insomnia, analgesic, rheumatic pain	0.04
Inula oculus-christi L. (KATO 19675)	Asteraceae	Sarıpapatya	Cp, L	Infusion, crushed	Stomach disorders, headaches, wound healing	0.21
Malva neglecta Wallr. (KATO 19292)	Malvaceae	Ebegümeci	L	Cooked by roasting, crushed,	Food, antitussive, expectorant, wound healing, toothache	0.57
Medicago sativa L. (KATO 19288)	Fabaceae	Karayonca	L	Infusion	Relieve the abdominal pain	0.16
Melampyrum arvense L. (KATO 19314)	Orobanchaceae	Koyun otu	Se	Infusion	Digestive system diseases	0.08
Mentha longifolia (L.) L. (KATO 19286)	Lamiaceae	Yabani nane	L	Dried eaten	Spice	0.32
Morus alba L. (KATO 19681)	Moraceae	Dut	Fr, L	Infusion, marmalade	Diabetes, relieve anemia, food	0.36
Onobrychis transcaucasica Grossh. (KATO 19289)	Fabaceae	Goranga	Ap	Fresh and dried	Fodder	0.03
Origanum acutidens (Hand.-Mazz) Ietsw. (KATO 19279)	Lamiaceae	Sarı adaçayı	L	Infusion	Sedative, kidney stone, circulatory system disorders	0.19
Origanum vulgare subsp. *viridulum* (Martrin-Donos) Nyman (KATO 19278)	Lamiaceae	Dağ anığı, Çay otu	Ap, L	Decoction, dried eaten	Cancer cure, spice	0.21
Paeonia arietina G.Anderson. (KATO 19683)	Paeoniaceae	Ayı gülü, Guk guk otu	Fr	Fresh	Ornament	0.22

Papaver argemone L. (KATO 19297)	Papaveraceae	Haşhaş	L	Cooked by boiling	Food	0.07
Peganum harmala L. (KATO 19320)	Nitrariaceae	Üzerlik	Se	Infusion, dried seeds hung in houses	Eczema, hemorrhoids, anthelmintic, diaphoretic, weakening, strengthen the memory, remove inflammation in the eye, superstitiously and ornaments	0.24
Phlomis herba-venti subsp. *pungens* (Willd.) Maire ex DeFilipps. (KATO 19280)	Lamiaceae	Yarpuz otu	L	Cooked by boiling	Sarma as food	0.02
Pimpinella aromatica M.Bieb. (KATO 19670)	Apiaceae	Ezerteli	Se	Dried eaten	Spice	0.02
Pinus sylvestris L. (KATO 19685)	Pinaceae	Çam	St	Cut and combined	Equipment such as troughs, chairs, laundry troughs, bread troughs, ladders, rolling pins for animals	0.39
Plantago major L. (KATO 19298)	Plantaginaceae	Damar yaprağı, Bağ yaprağı, Siğir otu	L	Crushed, infusion, cooked by boiling	Analgesic, anti-inflammatory, wound healing, higher cholesterol, sarma as food	0.50
Polygala anatolica Boiss. & Heldr. (KATO 19303)	Polygalaceae	Tutuye	Fl	Infusion	Sedative	0.04
Polygonum aviculare L. (KATO 19299)	Polygonaceae	Madımak	L	Cooked by boiling and roasting	Food	0.57
Portulaca oleracea L. (KATO 19686)	Portulacaceae	Pirpirim otu, Semizotu	L	Fresh, cooked by boiling	Stomach and intestinal bleeding, diuretic, anemia, food	0.27
Potentilla crantzii (Crantz) Beck ex Fritsch (KATO 19310)	Rosaceae	Eşek otu	Ap	Fresh	Rheumatic pain	0.04
Quercus petraea subsp. *iberica* (Steven ex M.Bieb.) Krassiln. (KATO 19680)	Fagaceae	Pelit	L, Br	Cut and combined, dried	Saddle, fodder	0.40
Ranunculus constantinopolitanus (DC.) d'Urv.	Ranunculaceae	Asparada	Ap	Crushed	Rheumatic pain, wound healing	0.13

(KATO 19306)						
Rhamnus cathartica L. (KATO 19307)	Rhamnaceae	İt üzümü	L	Crushed	Hemorrhoids, wound healing	0.12
Rosa iberica Steven ex M.Bieb. (KATO 19311)	Rosaceae	Kuşburnu	Fr	Decoction, marmalade	Antipyretic, hemorrhoids, cold and flu, relieve anemia, food	0.56
Rubus canescens DC. (KATO 19687)	Rosaceae	Böğürtlen, More	Fr, L	Infusion, marmalade	Expectorant, diarrhea, vomiting problems, dental problems, mouth sores, tonsillitis, relieve anemia, food	0.27
Rumex scutatus L. (KATO 19301)	Polygonaceae	Kuzukulağı, Ekşicen	L	Infusion, fresh eaten, cooked by boiling	Diuretic, anthelmintic, food	0.10
Rumex tuberosus L. (KATO 19300)	Polygonaceae	Evelik	L	Cooked by boiling, dried eaten	Sarma as food,	0.04
Salvia nemorosa L. (KATO 19284)	Lamiaceae	Hanımana otu	L	Dried eaten	Spice	0.08
Salvia sclarea L. (KATO 19283)	Lamiaceae	Kıtırak otu	L	Fresh	Sedative	0.08
Salvia verticillata L. (KATO 19281)	Lamiaceae	Çıban otu	L	Crushed	Wound healing	0.18
Scorzonera tomentosa L. (KATO 19676)	Asteraceae	Sakızotu	R	Latex	Chewing gum	0.04
Sedum spurium M.Bieb. (KATO 19269)	Crassulaceae	Çoban azığı	L	Fresh	Bronchitis, food	0.08
Silene vulgaris (Moench) Garcke (KATO 19263)	Caryophyllaceae	Gelincik parmağı	L	Infusion, cooked by boiling	Diabetes, food	0.05
Sinapis arvensis L. (KATO 19678)	Brassicaceae	Hardal, Eşek turpu	Se	Infusion	Appetite-stimulant, toothache, chest diseases	0.03
Taraxacum bessarabicum (Hornem.) Hand.-Mazz. (KATO 19257)	Asteraceae	Karahindiba, Çatlankuş	L, Cp, P	Infusion, fresh, latex	Diabetes, anticancer, weight loss, circulatory system disorders, jaundice, toothache, wart, food, instrumental material (whistle)	0.23
Teucrium chamaedrys subsp. *syspirense*	Lamiaceae	İlaç otu	Ap	Infusion	Diabetes	0.18

(K.Koch) Rech. f. (KATO 19282)						
Thymus pubescens Boiss. & Kotschy ex Celak (KATO 19285)	Lamiaceae	Kekik	Fl, L	Infusion, powder	Expectorant, sinusitis, antitussive, spice	0.24
Tragopogon buphthalmoides (DC.) Boiss. (KATO 19268)	Asteraceae	Yemlik otu, Zunzuna	L	Cooked by roasting	Increases breast milk, food	0.14
Trifolium pratense L. (KATO 19290)	Fabaceae	Yonca	Ap	Fresh and dried	Fodder	0.07
Trifolium repens L. (KATO 19679)	Fabaceae	Üç beyaz çiçek, Üç yapraklı yonca	L	Fresh	Superstitiously	0.10
Tussilago farfara L. (KATO 19673)	Asteraceae	Öksürük otu, At nalı	L	Infusion	Antitussive, expectorant.	0.24
Urtica dioica L. (KATO 19319)	Urticaceae	Isırgan, Sırgan	L, Se	Cooked by frying, crushed, infusion	Food, wound healing, cancer cure	0.39
Vaccinium myrtillus L. (KATO 19273)	Ericaceae	Yaban çileği	Fr	Fresh eaten, marmalade	Diabetes, food,	0.44
Viscum album subsp. *austriacum* (Wiesb.) Vollm. (KATO 19688)	Santalaceae	Ökseotu, Çakum	L, Fr	Decoction, fresh eaten	Asthma, cardiovascular diseases, food	0.23

[a] Parts used: Ap-Aerial parts, Br-Branch, Cp-Capitulum, Fl-Flower, Fr-Fruit, L-Leaf, P-Pedicel, R-root, Se-Seed, St-Stem, Tu-Tuber

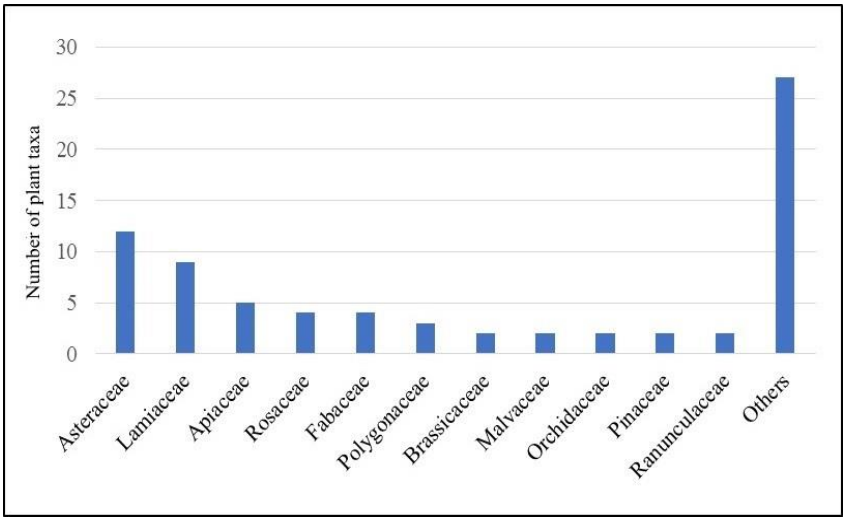

Figure No. 4
The most frequently used plant families in the study area

Plants are mainly used for medicinal (51 taxa) and food (29) purposes, followed by equipment (5), spice (5), fodder (4), ornaments (3), superstitiously (2), and other purposes (3) (Figure No. 5).

Asteraceae and Polygonaceae are the most preferred families for food use. In the region, *Polygonum aviculare*, *Rumex scutatus*, *R. tuberosus* belonging to the Polygonaceae family are used for food purposes. *P. aviculare* and *R. scutatus* are boiled and then roasting in a pan with butter and onions. *R. tuberosus* is used for sarma using bulgur or rice when fresh. its dried form, it is used to make soup in winter.

Lamiaceae is the most preferred family as a spice. Of the five herbs used as spices, four belong to the Lamiaceae and one to the Apiaceae. These plants are *Mentha longifolia*, *Origanum vulgare* subsp. *viridulum*, *Salvia nemorosa*, *Thymus pubescens* and *Pimpinella aromatica*. The seeds of *Pimpinella aromatica* are used as spices, while the leaves of other plants are used.

The highest UV values were calculated for *Polygonum aviculare* (0.57) for food purposes and *Malva neglecta* (0.57) for medical purposes. According to the informants, the most cited other plants were *Rosa iberica* (0.56), *Plantago major* (0.50), *Vaccinium myrtillus* (0.40), *Urtica dioica* (0.39), and *Crataegus orientalis* (0.37). These plants are used as food and for medicinal purposes. The most preferred plants for equipment purposes are *Quercus petraea* subsp. *iberica* (0.40) and *Pinus sylvestris* (0.39). Other types used in equipment making are *Berberis vulgaris*, *Corylus avellana*, and *Abies nordmanniana.* These plants are used in making household and agricultural items (stool, laundry troughs, bread troughs, ladders, rolling pins, etc.). The whetstone made of *Pinus sylvestris* is called "köstere" and the basket made of *Corylus avellana* is called "yığlık" in the region (Figure No. 6). These species are preferred because they are durable and easy to shape.

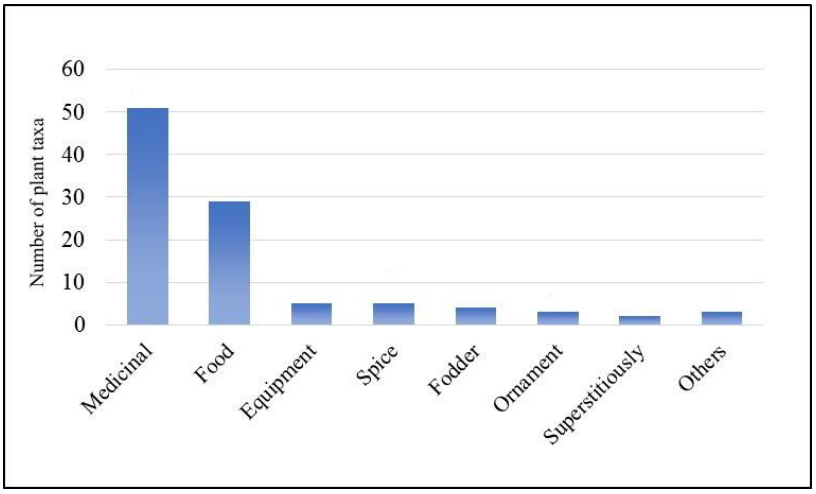

Figure No. 5
Number of ethnobotanical usages of the plants in Gümüşhane
(Some plants have more than one use. See Table No. 3)

Figure No. 6
Traditional types of equipment: (a) Ware, rolling pin (*Pinus sylvestris* and *Abies nordmanniana*); (b) Stool and bread trough (*Pinus sylvestris*); (c) Broom (*Berberis vulgaris*); (d) Köstere (*Pinus sylvestris*); (e) Basket (Yığlık) (*Corylus avellana*); (f) Saddle (*Quercus petraea*)

Plants used as fodder are *Cephalaria procera*, *Onobrychis transcaucasica*, *Trifolium pratense*, and *Quercus petraea* subsp. *iberica*. However, *Q. petraea* subsp. *iberica* is preferred more because it grows in very large areas in the region and can be stored more easily during the long winter months. Since animals are grazed free in summer, other fodder crops are consumed fresh.

The plant parts used for different purposes are leaves (39 taxa), seeds (12), aerial parts (10), fruits (8), capitulum (7), flowers (6), and the other parts (stems, roots, tubers, branches, pedicel, etc.) (Figure No. 7). The leaves are used mostly for food and medicinal purposes. The most used parts of the plants used as food are leaves. Seeds and aerial parts are also used for medicinal purposes.

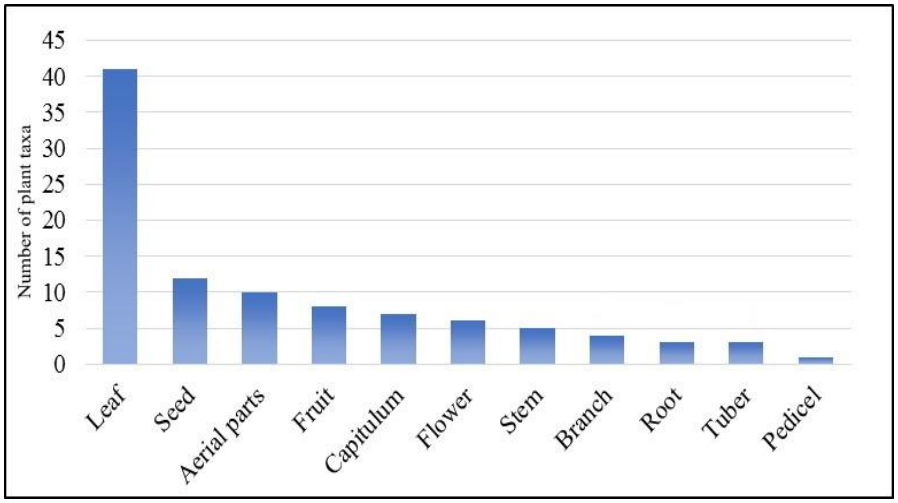

Figure No. 7
Plant parts used

The most common traditional preparation method of plants material is infusion (33 taxa), followed by fresh (22 taxa), boiling (10), crushed (9), decoction (7), roasting (4), latex (3), frying (2), and syrup (1). Some of the plants are conserved in various ways in order to use them for a long time, especially in winter. The traditional conservation methods are drying (9 taxa), cutting-combining (5), marmalade (4), powder (3), and pickle (1). The infusion is preferred mostly for medicinal purposes, followed by decoction. Fresh and boiling are preferred mostly for food purposes.

In the study, it was determined that 51 plants were used for medicinal purposes. According to the information gathered from the informants, the ailments were classified into 12 categories and the ICF values of each were indicated in Table No. 4. The ICF values in the study ranged from 0.40 to 0.86.

Table No. 4
Informant consensus factor (ICF) for each ailment

Ailment categories	No of citations (Nur)	No of taxa (Nt)	ICF
Wound healing	57	9	0.86
Diabetes	45	8	0.84
Respiratory diseases	49	10	0.81
Gastrointestinal diseases	39	10	0.76
Jaundice	5	2	0.75
Cardiovascular diseases	22	7	0.71
Analgesic	17	6	0.69
Skin disorders	7	3	0.67
Sedative	20	8	0.63
Gynecological diseases	11	5	0.60
Urinary tract diseases and urologic diseases	16	8	0.53
Mouth and teeth health	6	4	0.40

According to local people, the medicinal plants most frequently are used for wound healing (57 use reports). The other most reported diseases are respiratory diseases (49), diabetes (45), and gastrointestinal diseases (39). Wound healing has the highest ICF value (0.86). Diabetes has the second highest ICF value (0.84), respiratory diseases have the 3rd highest ICF value (0.81). The lowest ICF value with 0.40 corresponds to mouth and teeth health.

The highest fidelity levels (FL) are between 65 to 100%. The plants in the study area with a high FL are *Malva neglecta* (100%) and *Plantago major* (99) for wound healing, *Rosa iberica* (100) for respiratory diseases, *Vaccinium myrtillus* (87) for diabetes, *Urtica dioica* (79) for prostate cancer, *Crataegus orientalis* (74) for cardiovascular diseases, and *Helichrysum plicatum* (65) for urinary tract diseases and urologic diseases.

DISCUSSION

Wild plants were mainly used for medicinal and food purposes in the study area, and the most preferred families are Asteraceae, Lamiaceae, Rosaceae, and Apiaceae. Karakaya *et al.* (2019), Karaköse *et al.* (2019), and Thakur *et al.* (2020) reported similar results.

The most preferred use method in the study area is infusion, and the most used part is leaves. It appears that a similar situation exists When compared with previous ethnobotanical studies in Turkey such as Karlıova (Nadiroğlu *et al.*, 2019), Edremit Gulf (Polat & Satıl, 2012), and Ayvacık (Uysal *et al.*, 2012). The most preferred plant part for medicinal and food use is leaves in the present study, as highlighted by Hussein & Dhabe (2018), Jadid *et al.* (2020), and Orozco-Martínez *et al.* (2020).

As far as we know, *Salvia verticillata*, *Rhamnus cathartica*, and *Bilacunaria microcarpa* are recorded for the first time to be used for wound healing.

One of the most common ailments in the region is diabetes. It has been determined that the species used in diabetes were *Cichorium intybus, Berberis vulgaris, Vaccinium myrtillus, Morus alba,* and *Portulaca oleracea* (Dalar, 2018; Mustafa *et al.*, 2012; Tuzlacı & Şenkardeş, 2011). The medicinal use of *Taraxacum bessarabicum* and *Silene vulgaris* for diabetes are also recorded for the first time.

The medicinal use of *Carduus nutans* (against food poisoning), *Helichrysum plicatum* (infertility, relieving gastroenteritis), and *Euphorbia esula* subsp. *tommasiniana*'s latex (anthelmintic) are new records in the present study.

Phlomis species are used in traditional medicine to treat various diseases such as diabetes, diuretic, sedative, gastrointestinal complaints, hemorrhoids, inflammation, wounds (Aghakhani & Kharazian, 2019; Taşkın *et al.*, 2018). However, the use of *Phlomis herba-venti* subsp. *pungens* as food is recorded in this study.

All *Thymus* species are generally used for similar purposes such as digestive ailments, cold, anti-inflammatory, antiseptic, appetizers, and spice (Monira *et al.*, 2012; Janaćković *et al.*, 2019). It recorded that *Thymus pubescens* is used for anemia in the study area.

Superstition is prevalent in the region. Especially young girls of marriageable age keep the 4-leaf *Trifolium repens* for luck. When young girls put this leaf under the pillow, they believe that they will see the person they will marry in their dreams.

Informant consensus factor (ICF) ranges from 0 to 1. The high ICF values, that is, close to one, suggest that the medicinal plants used in the treatment of certain diseases are more effective. The ICF values of ailment categories in the present study are not similar to other studies in Turkey. In the present study, wound healing, diabetes, and respiratory diseases have the highest ICF value (0.86, 0.84, and 0.81 in the same order). In Torul district, Turkey, cold and flu had the highest ICF (0.83), followed by stomach disorders (0.75) (Karaköse *et al.*, 2019). According to Ugulu *et al.* (2009), cold and flu had the highest ICF (0.82), followed by respiratory tract diseases (0.73) and stomach disorders (0.68). Polat & Satil (2012) reported a highest ICF (0.87) for anorexia and hypertension stabilizer in Balıkesir, followed by hemorrhoids (0.80). Gürdal & Kültür (2013) reported a highest ICF (0.73) for rheumatism, followed by diabetes and urinary disease (0.57 and 0.56 in the same order) in Maramaris (Muğla). According to Polat *et al.* (2015), dermatological disorders had the highest ICF (0.62), followed by gastrointestinal disorders (0.56) and respiratory tract problems (0.49).

Malva neglecta with the highest FL value is used as a wound healing in the present study. Polat (2019) reported that the same plant had the highest FL value as an anti-inflammatory and urinary

inflammation. In the same study, *Plantago major* had a high FL value both as urinary inflammations and wound healing. In this study, *Urtica dioica* with a high FL value (79%) is used for medical purposes for prostate cancer. Sargin (2015) reported that *Urtica pilulifera* was used for a similar purpose, even though it had a lower FL value (11%) in his study in Mersin. In many studies, a common result was obtained for the *Crataegus* genus, although the ailment categories and plants differ concerning the FL value. It had been reported that many species of the *Crataegus* genus were used in cardiovascular diseases with high FL values in different studies (Sargin, 2015; Polat, 2019; Varga *et al*., 2019).

CONCLUSION

Gümüşhane province is an important transition area of the historical Silk Road. Therefore, it is a suitable resource area for ethnobotanical research. Recording most unwritten traditional information is very important to prevent the loss of cultural values. This study allowed us to collect information about traditional uses of wild plants in the Gümüşhane province. For this purpose, it was gathered information about plant use from 135 interviewees in the province. Ethnobotanical usage of 74 taxa was determined and recorded. The interviews revealed that the plants in the study area are still widely used by the local people for various purposes in their daily lives.

We reported some different uses for the first time in the studied area. *Salvia verticillata*, *Rhamnus cathartica*, *Bilacunaria microcarpa*, *Taraxacum bessarabicum*, *Silene vulgaris*, *Carduus nutans*, *Helichrysum plicatum*, *Euphorbia esula* subsp. *tommasiniana*, and *Thymus pubescens* are reported for the first time in the present study for various medicinal purposes. *Phlomis herba-venti* subsp. *pungens* is also reported as the first time for food use. There are also two endemic species (*Origanum acutidens* and *Scorzonera tomentosa*) with traditional use in the region. The unconscious consumption of these species may pose a threat to the continuation of generations. Therefore, local people should be made aware of this issue.

The fact that Gümüşhane is a more virgin area compared to its surroundings encouraged the local people to use plants for medicinal purposes. This new information is important as it will contribute to medicine, pharmacy, and similar fields. Migration is a primary problem in Gümüşhane province as in Turkey's rural areas. Therefore, the fact that there are still people who know how to use plants is an important opportunity to record such information.

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REFERENCES

Aghakhani F, Kharazian N. 2019. Flavonoid diversity and morphological variations among seven *Phlomis* species in Zagros, Iran. **J Sci Technol Trans A Sci** 43: 415 - 431. **https://doi.org/10.1007/s40995-017-0344-4**

Akbulut S, Özkan ZC. 2014. Traditional usage of some wild plants in Trabzon region (Turkey). **Kastamonu Univ J Forest Fac** 14: 135 - 145.

Akyürek S, Karabulut B. 2017. Assessment of agro-tourism potential of Gümüşhane province. **Turk J Food Agric Sci** 5: 1737 - 1743. **https://doi.org/10.24925/turjaf.v5i13.1737-1743.1530**

Bottema S, Woldring H. 1990. **Anthropogenic indicators in the pollen record of the Eastern Mediterranean**. In Man's Role in the shaping of Eastern Mediterranean Landscape Ed. AA Balkema Press, Rotterdam, Netherlands.

Dalar A. 2018. Plant taxa used in the treatment of diabetes in Van province Turkey. **Int J Second Metab** 5: 171 - 185. **https://doi.org/10.21448/ijsm.430703**

Davis PH. 1965. **Flora of Turkey and the East Aegean Islands**, Vol 1. Edinburgh University Press, Edinburgh, UK.

Davis PH. 1965-1985. **Flora of Turkey and the East Aegean Islands**, Vol 1–9. Edinburgh University Press, Edinburgh, UK.

Davis PH, Mill RR, Tan K. 1988. **Flora of Turkey and the East Aegean Islands**, Vol 10. Edinburgh University Press, Edinburgh, UK.

Depositphotos. Provinces of Turkey. **https://tr.depositphotos.com/vector-images/t%C3%BCrkiye-siyasi-harita.html**

Ertuğ F. 2000. An ethnobotanical study in Central Anatolia (Turkey). **Econ Bot** 54: 155 - 182. **https://doi.org/10.1007/BF02907820**

Ertuğ F. 2014. **Etnobotanik**. In Resimli Türkiye Florası, Cilt 1, Ed. Güner A, Ekim T. Ali Nihat Gökyiğit Vakfı, Flora Araştırmaları Derneği ve Türkiye İş Bankası Kültür Yayını, İstanbul, Türkiye.

Friedman J, Yaniv Z, Dafni A, Palewitch D. 1986. A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert, Israel. **J Ethnopharmacol** 16: 275 - 287. **https://doi.org/10.1016/0378-8741(86)90094-2**

Güner A, Özhatay N, Ekim T, Başer KHC. 2000. **Flora of Turkey and the East Aegean Islands**, Vol 11. Edinburgh University Press, Edinburgh, UK.

Gürdal B, Kültür Ş. 2013. An ethnobotanical study of medicinal plants in Marmaris (Mugla, Turkey). **J Ethnopharmacol** 146: 113 - 126. **https://doi.org/10.1016/j.jep.2012.12.012**

Heinrich M, Barnes J, Prieto-Garcia JM, Gibbons S, Williamson EM. 2018. **Fundamentals of pharmacognosy and phytotherapy**. Elsevier Limited, China.

Heinrich M, Ankli A, Frei B, Weimann C, Sticher O. 1998. Medicinal plants in Mexico: healers' consensus and cultural importance. **Soc Sci Med** 47: 1859 - 1871. **https://doi.org/10.1016/s0277-9536(98)00181-6**

Hussein S, Dhabe A. 2018. Ethnobotanical study of folk medicinal plants used by villagers in Hajjah district Republic of Yemen. **J Med Plants Stud** 6: 24 - 30.

Jadid N, Kurniawan E, Himayani CES, Andriyani, Prasetyowati I, Purwani KI, Muslihatin W, Hidayati D, Tjahjaningrum ITD. 2020. An ethnobotanical study of medicinal plants used by the Tengger tribe in Ngadisari village, Indonesia, **Plos One** 15: e0235886. **https://doi.org/10.1371/journal.pone.0235886**

Janaćković P, Gavrilović M, Savić J, Marin DM, Stevanović ZD. 2019. Traditional knowledge on plant use from Negotin Krajina (Eastern Serbia): an ethnobotanical study. **Indian J Tradit Know** 18: 25 - 33.

Kandemir A, Beyazoğlu O. 2002. Köse Dağları'nın (Gümüşhane) tıbbi ve ekonomik bitkileri. **SDÜ Fen Bil Enst Der** 6: 148 - 157.

Karakaya S, Polat A, Aksakal Ö, Sümbüllü YZ, İncekara Ü. 2019. An ethnobotanical investigation on medicinal plants in south of Erzurum (Turkey). **Ethnobot Res Appl** 18: 1 - 18. **https://doi.org/10.17348/era.18.13.1-18**

Karakaya S, Polat A, Aksakal Ö, Sümbüllü YZ, İncekara Ü. 2020. An ethnobotanical investigation on medicinal plants in south of Erzurum (Turkey). **Turk J Pharm Sci** 17: 211 - 220. **https://doi.org/10.4274/tips.galenos.2019.24392**

Karaköse M, Akbulut S, Özkan Z. 2019. Ethnobotanical study of medicinal plants in Torul district, Turkey. **Bangladesh J Plant Taxon** 26: 29 - 37. **https://doi.org/10.3329/bjpt.v26i1.41914**

Kendir G, Güvenç A. 2010. Ethnobotany and a general view of ethnobotanical studies in Turkey. **Hacettepe Univ J Fac Pharm** 30: 49 - 80.

Küçük M., Eyüboğlu Ö. 2002. **The vegetation studies in the Pure Stands of Kürtün (Gümüşhane) Forests in Turkey.** Biodiversity. Ed. Springer, Boston, USA.

Linktel. Gümüşhane. **http://www.linktel,com.tr/urun-gUmUShane-1669.html**

Lyle-Kalças E. 1974. **Food from the fields, edible wild plants of Aegean Turkey**. Ed. I Birlik Matbaası, İzmir, Turkey.

Monira A, El KA, Naima Z. 2012. Evaluation of protective and antioxidant activity of thyme (*Thymus vulgaris*) extract on paracetamol-induced toxicity in rats. **Aust J Basic & Appl Sci** 6: 467 - 474.

Mustafa B, Hajdari A., Hoxha E, Ademi H, Quave CL, Pieroni A. 2012. Medical ethnobotany of the Albanian Alps in Kosovo. **J Ethnobiol Ethnomed** 8: 1 - 14.

Nadiroğlu M, Behçet L, Çakılcıoğlu U. 2019. An ethnobotanical survey of medicinal plants in Karlıova (Bingöl-Turkey). **Indian J Tradit Know** 18: 76 - 87.

Orozco-Martínez J, Lira-Saade R, Jiménez-Estrada M, Ávila-Acevedo JG, Serrano-Parrales R, Hernández-Delgado

T. 2020. Medicinal plants of Oaxaca, Mexico: Ethnobotany and antibacterial activity. **Bol Latinoam Caribe Plant Med Aromat**, 19: 221 - 235. **https://doi.org/10.37360/blacpma.20.19.2.14**

Pinterest. 2020. Avrupa siyasi haritası (European political map). **https://tr.pinterest.com/pin/629941066622718449**

Polat R. 2019. Ethnobotanical study on medicinal plants in Bingöl (City center) (Turkey). **J Herb Med** 16: 100211. **https://doi.org/10.1016/j.hermed,2018.01.007**

Polat R, Çakılcıoğlu U, Kaltalıoğlu K, Ulusan MD, Türkmen Z. 2015. An ethnobotanical study on medicinal plants in Espiye and its surrounding (Giresun-Turkey). **J Ethnopharmacol** 163: 1 - 11. **https://doi.org/10.1016/j.jep.2015.01.008**

Polat R, Satil F. 2012. An ethnobotanical survey of medicinal plants in Edremit Gulf (Balıkesir – Turkey). **J Ethnopharmacol** 139: 626 - 641. **https://doi.org/10.1016/j.jep.2011.12.004**

Sadıkoğlu N, Alpınar K. 2004. An evaluation of Turkish ethnobotanical studies (1928-1997). **İstanbul Ecz Fak Mec** 37: 61 - 66.

Saraç DU, Özkan ZC, Akbulut S. 2013. Ethnobotanic features of Rize/Turkey province. **BIODICON** 6: 57 - 66.

Sargin SA. 2015. Ethnobotanical survey of medicinal plants in Bozyazı district of Mersin, Turkey. **J Ethnopharmacol** 173: 105 - 126. **https://doi.org/10.1016/j.jep.2015.07.009**

Schaal B. 2019. Plants and people: our shared history and future. **Plants people planet** 1: 14 - 19. **https://doi.org/10.1002/ppp3.12**

Taşkın T, Çam ME, Bulut G, Hazar Yavuz AN, Kabasakal L, Bitiş L. 2018. Antioxidant and anti-inflammatory activities of *Phlomis pungens* and *Coridothymus capitatus.* **Marmara Pharm J** 22: 80 - 85. **https://doi.org/10.12991/mpj.2018.44**

TC Gümüşhane Valiliği. Gümüşhane ili 2018 yili çevre durum raporu. **https://webdosya.csb.gov.tr/db/icerikler/gumushane_2018_-cdr_rev-ze-20190902122338.pdf**

Thakur M, Sharma PK, Asrani RK, Patil, RD, Gautam H. 2020. Traditional therapeutic uses of some important medicinal and aromatic plants of the tribal area of Lahaul valley of Himachal Pradesh, India. **Indian J Tradit Know** 19: 761 - 775.

The Plant List. 2020. A working list of all plant species (Internet). **http://www.theplantlist.org**

Trotter RT, Logan MH. 1986. **Informant consensus: a new approach for identifying potentially effective medicinal plants.** In Plants in Indigenous Medicine and Diet, Behavioural Approaches. Ed. Etkin NL, Redgrave Publishing Company, New York, USA.

Tuzlacı E & Şenkardeş İ. 2011. Turkish folk medicinal plants, X: Ürgüp (Nevşehir), **Marmara Pharm J** 15: 58 - 68.

Uysal I, Gücel S, Tütenocakli T, Oztürk M. 2012. Studies on the medicinal plants of Ayvacık – Çanakkale in Turkey. **Pak J Bot** 4: 239 - 244.

Uzunçarşılı İH. 2011. **Osmanlı Tarihi**, Vol 4. Türk Tarih Kurumu, Ankara, Turkey.

Ugulu I, Baslar S, Yorek N, Dogan Y. 2009. The investigation and quantitative ethnobotanical evaluation of medicinal plants used around Izmir province, Turkey. **J Med Plant Res** 3: 345 - 367.

Varga F, Šolić I, Jug Dujaković M, Łuczaj Ł, Grdiša M. 2019. The first contribution to the ethnobotany of inland Dalmatia: medicinal and wild food plants of the Knin area, Croatia. **Acta Soc Bot Pol** 88: 3622. **https://doi.org/10.5586/asbp.3622**

Appendix A.

1. Name, surname, age, gender, occupation, educational level, permanent address.
2. What is the vernacular name of the plants?
3. For which purposes do you use the plants? (medicinal, food, construction material, equipment, etc.)
4. Which parts of the plant do you use? (aerial parts, leaf, fruit, flower, root, etc.)
5. How and when do you use the plants? (infusion, decoction, crushed, powder, fresh, drying, boiling, cooking, etc.)