

Traditional Uses of Some Wild Plants in Kale and Acipayam Provinces in Denizli

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Abstract

Aim of study: With this study, it was aimed to determine some wild plants in the traditional uses in daily lives by local people for healing, treatment, food, spices, equipment, etc. purposes.

Area of study: The study area was Kale and Acipayam provinces in Denizli between April and October 2016.

Material and Methods: Plant materials were provided from villagers and county of Kale and Acipayam districts. In the identification of plants, "Flora of Turkey and the East Aegean Islands" and "List of Turkish Plants" were used. To determine this, totally 60 people were interviewed face to face. The Informants' Consensus Factor (FIC) and Use Value (UV) formulas were used to analyze the data.

Main results: As a result of the surveys conducted with 60 people, 48 plant taxa belonging to 29 families have been identified. It has been determined that the plants with traditional use in the region are mostly used for the treatment of stomach disorders, respiratory diseases and pain relief. The most used parts of the plants have been leaves. The highest UV is *Olea europaea* L. var. *sylvestris* L. (0.65), and the lowest UV is *Pulicaria dysenterica* (L.) Bernh. (0.05). The highest FIC value (0.86) is cold and flu.

Research highlights: Although *Viscum album* subsp. *austriacum* (Wiesb.) Vollman has been found to be used for different diseases in the literature, its use as a vasodilator drug was first determined by this study.

Keywords: Ethnobotany, traditional uses, herb, Denizli

Kale ve Acipayam Yöresinde (Denizli) Bazı Doğal Bitkilerin Geleneksel Kullanımları

Öz

Çalışmanın Amacı: Bu çalışma, yerel halkın sağlık, tedavi, gıda, baharat, araç-gereç gibi amaçlarla hangi bitkileri, nasıl kullandıklarını saptamak amacıyla yapılmıştır.

Çalışma Alanı: Çalışma 2016 yılı nisan ve ekim ayları arasında Denizli iline bağlı Kale ve Acipayam ilçelerinde gerçekleştirilmiştir.

Materyal ve Yöntem: Çalışma materyalini Kale ve Acipayam ilçelerinde yaşayan 60 yerel kişinin gösterdiği, toplanıp teşhis edildiği bitkiler oluşturmaktadır. Bitkilerin teşhisinde "Flora of Turkey and the East Aegean Islands" and "List of Turkish Plants (Vascular Plants) adlı eserlerden yararlanılmıştır. Verilerin analizinde Denek Konsensüs Faktörü (FIC) ve Kullanım Değeri (UV) formülleri kullanılmıştır.

Temel Sonuçlar: 60 kişi ile yapılan anketler sonucunda 29 familyaya ait 48 bitki taksonu teşhis edilmiştir. Yörede geleneksel kullanımı olan bitkilerin daha çok mide rahatsızlıklarının, solunum yolu rahatsızlıklarının tedavisinde ve ağrı kesici olarak kullanıldığı tespit edilmiştir. Bitkilerin en çok kullanılan kısımları ise yaprakları olmuştur. En yüksek UV değeri 0.65 ile *Olea europaea* L. var. *sylvestris* L.'e, en düşük UV değeri ise 0.05 ile *Pulicaria dysenterica* (L.) Bernh.'ya aittir. En yüksek FIC değeri de 0.86 ile nezle ve grip için çıkmıştır.

Araştırma vurguları: Literatürde farklı kullanımları hakkında benzer çalışmalar kayıt edilmiştir. Ancak, bu çalışma ile *Viscum album* subsp. *austriacum* (Wiesb.) Vollman'un damar açıcı ilaç olarak kullanımı ilk kez saptanmıştır.

Anahtar Kelimeler: Etnobotanik, geleneksel kullanım, şifalı bitki, Denizli



Introduction

Ethnology, composed of ethnos and logos, is a discipline dealing with the distribution, association and activities of different groups of people. The field of activity of the botany is the plants. Botany is a branch of biology and can be defined as the science of plant life. Botany, as well as called plant science, plant biology or phytology. Botany is one of the oldest disciplines in the world. In prehistoric times, people have defined, used and cultivated edible plants for medical purposes. Until the medieval period, herbalists have set up health gardens in many places, especially in the monasteries, in order to raise the plants thought to have healing powers. (Anonymous-1, 2018; Anonymous-2, 2018). Ethnobotanic is one of the most frequently used methods to reveal changes in the cultural values of societies in the modernization process using the plant-human relationship (Heinrich, Bernes, Gibbons & Williamson, 2004; Kendir and Güvenç, 2010). Ethnobotany is perceived as a term that expresses human-medicinal plant relationships because people often use plants as medicines (Tütenocaklı, 2002).

Utilization of plants and treatment with plants dates back to 3000 BC. It is known that many famous Turkish scientists such as Abu Reyhan, Biruni, Ibn-i Sina and Ibn-i Baytar are dealing with herbal drugs (Eşen, 2008).

Because Turkey has a very rich flora and cultural structure, it is an important center in

terms of ethnobotany. In recent years there has been a significant increase in such studies (Uysal, Onar, Karabacak & Çelik, 2010; Polat & Satıl, 2012; Akaydın, Şimşek, Arituluk & Yeşilada, 2013; Gürdal & Kültür, 2013; Hayta, Polat & Selvi, 2014; Mükemre, Behçet & Cakilcioglu, 2015; Akbulut & Özkan, 2016).

This study aimed to determine some of wild plants used for local requirements and traditional treatments in the district of Denizli.

Materials and Methods

Study area

The Denizli Province geographically is a gateway between the Aegean, Central Anatolia and Mediterranean Regions, east of the Aegean Region, south-west of the Anatolian peninsula. Denizli city is surrounded by Burdur and Afyon from the east, Muğla from the south, Aydın and Manisa from the west and Uşak from the north. The study area is located between latitudes 37° 12'-38° 12' N and longitude 28° 30'-29° 30' E (Figure 1) (Anonymous-3, 2017). It falls within the southern part of B2 and the northern part of C2 grid square according to grid system of Turkey (Davis, 1965). 58% of Denizli forests are productive and 42% are non-productive forests. The forests in the region are generally composed of calabrian pine, black pine, oak, juniper, cedar and other species (Anonymous, 2017).

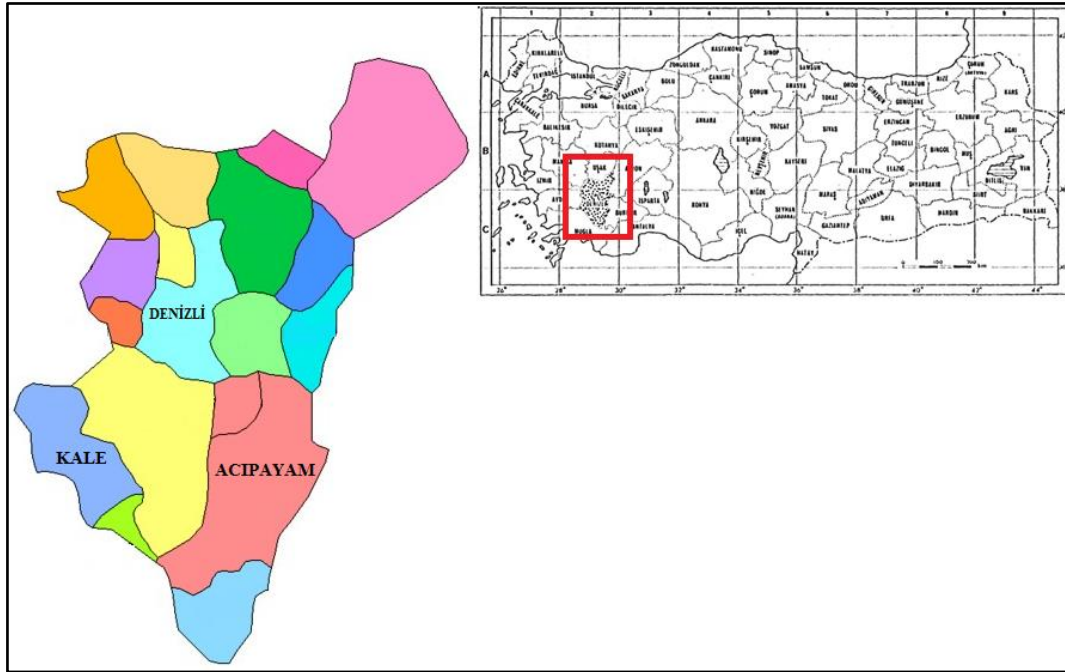


Figure 1. Location of Denizli in grid system of Turkey (Davis, 1965)

Plant Materials and Informants

This study was conducted to determine some wild plant species which are used for local requirements and traditional treatments of diseases by local people in Kale and Acıpayam provinces of Denizli. Plant materials were obtained from Acıpayam and Kale districts and villages. These plants were identified using the flora list of Turkey (Vascular Plants) (Davis 1965-1985; Davis, Mill & Tan, 1988; Güner, Özhatay, Ekim & Baser, 2000; Güner, Aslan, Ekim, Vural & Babaç, 2012). In the study, a two-part questionnaire was applied to total of 60 informants (Appendix A). The questionnaires were applied face to face. The first part of the questionnaire aimed to determine the demographic characteristics such as age, gender, educational level, occupation. In the second part of the questionnaire, vernacular names, part used and preparation technics, and unwritten uses of the plants were noted.

Data Analysis

The Informants Consensus Factor (FIC), the first of the equations used in the analysis of the data, is used to determine the homogeneity of the information obtained by the surveys. FIC was developed by Trotter and Logan (1986). FIC value ranges from 0

to 1, where ‘1’ indicates the highest level of informant consent

$$FIC = \frac{Nur - Nt}{Nur - 1}$$

Nur, the number of references in each group. Nt is the number of plants utilized (Trotter and Logan, 1986).

Another parameter used for data analysis is “Use Value (UV)”. It is used to determine the value of UV (Use Value) that quantitatively expresses the importance of local use of plants:

$$UV = U / N$$

U is the number of references per species and N is the number of people who say the species is used (Trotter and Logan, 1986; Albuquerque, Lucena, Montero, Florentino & Almeida, 2006; Abe and Ohtani, 2013).

Results and Discussions

A total 60 informants (27 male, 33 female) were interviewed. The average age of the informants is 57. Some demographic characteristics of the informants are given in Table 1.

A total of 48 taxa belonging to 29 families were identified in the study. *Lamiaceae* (9), *Rosaceae* (6), and *Poaceae* (4) are the most used families. The most preferred methods of preparation are infusion (21), fresh (14), and decoction (10). The most commonly used parts of plants were leaves. The leaves are

followed by flowers and fruit respectively. The results obtained from the study are given in Table 2.

Table 1. Demographic features of the informants

Features	Number of informants	Percentage (%)
Gender		
Male	27	45
Female	33	55
Educational level		
Illiterate	3	5.0
Primary school	17	28.3
Middle school	16	26.7
High school	20	33.3
University	4	6.7
Age Groups		
30-49	17	28.3
50-69	33	55.0
>69	10	16.7
Occupation		
Worker	8	13.3
Farmer	23	38.3
Artisan	6	10.0
Officer	5	8.3
Retired	10	16.7
Housewife	8	13.3

According to the results of the study, plants are mostly used to treatment of cold and flu, respiratory tract diseases, stomach disorders, digestive system disorders, laxative, diuretic, painkiller, skin disorders, vascular disorder. The species used mostly for the treatment of stomach disorders were *Arum dioscoridis* Sm., *Liquidambar orientalis* Mill., *Matricaria chamomilla* L. var. *recutita* (L.) Grierson, *Berberis crataegina* DC., *Hypericum perforatum* L., *Lavandula angustifolia* Mill., *Mentha pulegium* L., *Sideritis libanotica* Labill., *Thymus longicaulis* C.Pres, *Rubus canescens* DC. (Table 2). Similar results were found in the studies in the ethnobotanical field in Turkey (Everest and Oztürk, 2005; Ezer and Mumcu Arısan, 2006; Koçyiğit and Özhatay, 2006; Kültür, 2007; Uysal et al., 2010; Polat and Satıl, 2012; Tahri, El Basti, Zidane,

Rochdi & Douira, 2012; Akbulut and Bayramoğlu, 2013; Gürdal and Kültür, 2013; Akyol and Altan, 2013; Mükemre et al., 2015).

The results of the study showed that some plants used for food in Denizli were used in different regions in a similar way (*Arum dioscoridis* Sm., *Sinapis arvensis* L., *Malva sylvestris* L., *Rumex tuberosus* L. subsp. *L. tuberosus*, *Crataegus azarolus* L. var. *azarolus*, *Rosa canina* L., *Rubus canescens* DC., *Rubus idaeus* L.) (Uysal et al., 2010; Öztürk, 2006; Dogan, Baslar, Ay & Mert, 2004; Sağıroğlu, Dalgıç & Toksoy, 2013; Akaydin et al., 2013; Özçelik and Balabanlı, 2005; Akyol and Altan, 2013; Sargın, Selvi & Lopez, 2015; Ertuğ, Tümen, Çelik & Dirmenci, 2004; Akbulut and Özkan, 2016).

Although *Arum dioscoridis* Sm. is poisonous, it is one of the species used for cooking in the region. The plant is thoroughly cooked in water before it is eaten. In the Eastern Black Sea region, the roots of this plant are consumed in a similar way (Akbulut and Özkan, 2016).

In the present study, *Viscum album* subsp. *austriacum* (Wiesb.) Vollman was used to treat vasodilator. According to the literature analysis, the use of *Viscum album* subsp. *austriacum* as a vasolidator was recorded for the first time in this study (Bulut, Bozkurt & Tuzlacı, 2017; Akbulut and Özkan, 2016; Polat and Satıl, 2012; Kumar, Paul & Anand, 2009).

It was determined in the study that *Arundo donax* L. was used for making stick and arbour. *Tamarix smyrnensis* Bunge was used for making saddle by the local people.

Echinophora tenuifolia subsp. *sibthorpiana* (Guss.) Tutin is a plant that is often used in making “tarhana”, a soup that is unique to the region.

Salvia officinalis L., *Alcea rosea* L., and *Morus nigra* L. are exotic taxa that are not a part of the flora of Turkey. However, *Salvia officinalis* L. and *Morus nigra* L. are cultured and traded.

Table 2. Traditional uses of plants in Denizli

Family	Botanical name	Vernacular name	Part used	Preparations	Traditional uses	UV
<i>Araceae</i>	<i>Arum dioscoridis</i> Sm.	Yılan bıçağı	Leaves	Infusion, juice	Pass a kidney stone, stomachache, heartburn, food, eczema (externally juice)	0.20
<i>Altingiaceae</i>	<i>Liquidambar orientalis</i> Mill.	Günlük, Buhur ağacı	Styrax oil	Internally oil with honey and butter	Stomach diseases	0.08
<i>Apiaceae</i>	<i>Echinophora tenuifolia</i> subsp. <i>sibthorpiana</i> (Guss.) Tutin	Çörtlük, Tarhana otu	Flowering and leafy shoots	Dried	Tarhana preparing, aromatizer, pickle making, prevents fermenting in pickles	0.32
<i>Apocynaceae</i>	<i>Nerium oleander</i> L.	Zakkum	Flowers, leaves	Decoction (mixed with olive oil or tobacco sap)	Sarcopticide (externally), muscicide (for tobacco field)	0.15
<i>Asteraceae</i>	<i>Matricaria chamomilla</i> L. var. <i>recutita</i> (L.) Grierson	Babatça	Flowers, leaves	Infusion	Stomach disorders	0.23
<i>Asteraceae</i>	<i>Pulicaria dysenterica</i> (L.) Bernh.	Pireotu	Flowers	Decoction	Decoction is mixed with olive oil and henna. Hair dye is obtained. Fresh fruits regulate blood circulation, decrease blood pressure. Leaf tea strengthens the stomach. Leaves are used in making salads.	0.05
<i>Berberidaceae</i>	<i>Berberis crataegina</i> DC.	Kadımtuzluğu	Fruit, leaves	Fresh, infusion	Body resistance	0.23
<i>Brassicaceae</i>	<i>Armoracia rusticana</i> (Lam.) P.Gaertn., B.Mey. & Schreb.	Bayır turpu	Root	Juice (with honey)	Body resistance	0.07
<i>Brassicaceae</i>	<i>Sinapis arvensis</i> L.	Hardal	Leaves	Fresh, cooking	Foodstuff	0.30
<i>Cupressaceae</i>	<i>Juniperus oxycedrus</i> L.	Katran ardıcı	Wood, cone	Extrakt (mixed water)	Blood purifier	0.38
<i>Cyperaceae</i>	<i>Carex</i> L.	Kındıra	Root	Decoction	Diuretic	0.12
<i>Euphorbiaceae</i>	<i>Euphorbia</i> L.	Sütleşen	Latex	Externally	Wart	0.22
<i>Fabaceae</i>	<i>Glycyrrhiza glabra</i> L.	Bıyan	Root	Decoction	Bronchitis, antitussive	0.33
<i>Fagaceae</i>	<i>Quercus coccifera</i> L.	Meşe Peliti	Flowers	Fresh, dried	Milk yield for livestock	0.43
<i>Hypericaceae</i>	<i>Hypericum perforatum</i> L.	Sarı Kantaron	Flowers, dried shoots	Infusion, oil	Stomach disorders, cancer, painkiller	0.48

Table 2. (continued)

Lamiaceae	<i>Lavandula angustifolia</i> Mill.	Lavanta	Flowers	Infusion	Tranquillizer, stomachache	0.18
Lamiaceae	<i>Mentha pulegium</i> L.	Nane	Leaves	Decoction	Stomach diseases, qualm	0.63
Lamiaceae	<i>Origanum onites</i> L.	Deli kekik	Flowers, leaves	Infusion	Cold and flu, against rise of the blood sugar level	0.22
Lamiaceae	<i>Rosmarinus officinalis</i> L.	Biberiye	Leaves	Infusion	Cold, headache, migraine	0.15
Lamiaceae	<i>Salvia officinalis</i> L.* ^e	Adaçayı	Leaves	Infusion	Throat ache, tonsillitis, pyorrhoea, carminative, anti-nausea, diuretic, sweat off	0.48
Lamiaceae	<i>Sideritis arguta</i> Boiss. & Heldr.	Dağ çayı	Leaves, flowers	Infusion	Digestive disorders, rheumatism pains, antitussive, sore throat, cold and flu	0.32
Lamiaceae	<i>Sideritis libanotica</i> Labill.	Dağ Çayı	Leaves, flowers	Infusion	Cold and flu, stomachache	0.32
Lamiaceae	<i>Teucrium chamaedrys</i> L.	Dalakotu	Flowering shoots	Infusion	Relieve the abdominal pain, haemorrhoids	0.17
Lamiaceae	<i>Thymus longicaulis</i> C.Pres	Kekik	Leaves, flowers	Decoction	Stomach discomfort, prostate, painkiller, constipation	0.40
Malvaceae	<i>Alcea rosea</i> L. ^e	Devegülü	Seeds, leaves	Infusion	Expectorant, antitussive, cold, bronchitis, against throat, mouth and teeth inflammations	0.07
Malvaceae	<i>Malva sylvestris</i> L.	Ebegümeçi	Leaves, flowers	Decoction, fry	Anti-inflammatory, food	0.48
Moraceae	<i>Morus nigra</i> L.*	Karadut	Leaves, root bark, fruit	Infusion	Chlorothiazide, gingiva diseases, chapped lips	0.46
Myrtaceae	<i>Myrtus communis</i> L.	Mersin	Flowers, Leaves	Fresh, decoction	Skin disorders, diarrhea, spices	0.28
Nitrariaceae	<i>Peganum harmala</i> L.	Nazarotu	Seeds	Amulet	For religious beliefs	0.08
Oleaceae	<i>Olea europaea</i> L. var. <i>sylvestris</i> L.*	Zeytin	Leaves	Decoction	Diabetes, chlorothiazide	0.65
Papaveraceae	<i>Papaver rhoeas</i> L.	Gelincik	Flowers, leaves	Cooking	Galactagogue, gynaecological diseases	0.13
Poaceae	<i>Arundo donax</i> L.	Kargı	Stem	Fresh, dried	Used for making stick and arbour	0.40
Poaceae	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	Darıcan	Parts of plant	Fresh, dried	Animal feed	0.17

Table 2. (continued)

Poaceae	<i>Elymus flaccidifolius</i> (Boiss. & Heldr.) Melderis	Ayrıkotu	Root	Infusion	Prostate, blood purifier	0.10
Poaceae	<i>Sorghum halepense</i> (L.) Pers. var. <i>halepense</i> (L.) Pers.	Kaynaş	Parts of plant	Dried	Animal feed	0.10
Polygonaceae	<i>Rumex tuberosus</i> L. subsp. <i>tuberosus</i>	Kuzukulak	Leaves, flowers	Decoction, cooking	Digestive system disease, food	0.20
Portulacaceae	<i>Portulaca oleracea</i> L.	Semizotu	Leaves	Fresh	Lose weight, laxative	0.37
Rhamnaceae	<i>Ziziphus jujuba</i> Mill.	Hünnap	Fruits	Fresh, infusion	Diabetes, chest pain, diuretic, diarrhea and laxative	0.45
Rosaceae	<i>Amygdalus webbii</i> Spach	Badem, payam	Fruits, seeds	Fresh	Blood glucose value and cholesterol level regulator, antitussive	0.30
Rosaceae	<i>Crataegus azarolus</i> L. var. <i>azarolus</i>	Ahç	Fruits, leaves	Infusion, fresh, syrup	Headache, digestive system diseases, food	0.18
Rosaceae	<i>Pyrus elaeagnifolia</i> Pall.	Çöğür armudu	Fruits	Fresh	Blood glucose regulator, cardio protective, laxative, pass a kidney stone, diuretic, digestive	0.27
Rosaceae	<i>Rosa canina</i> L.	Kuşburnu	Fruits	Infusion, marmalade	Cold, food	0.42
Rosaceae	<i>Rubus canescens</i> DC.	Böğürtlen	Root, fruits	Infusion	Diuretic, anti-inflammatory, stomach discomfort, food	0.18
Rosaceae	<i>Rubus idaeus</i> L.	Ahududu	Fruits, leaves	Fresh, infusion	Food, gingiva diseases	0.20
Santalaceae	<i>Viscum album</i> subsp. <i>austriacum</i> (Wiesb.) Vollman	Burç, hurç	Leaves	Infusion, fresh	Vasodilator, fodder	0.12
Tamaricaceae	<i>Tamarix smyrnensis</i> Bunge	İlgın	Branches	Fresh	Saddle	0.42
Ulmaceae	<i>Celtis tournefortii</i> Lam.	Çıtlık	Thin branches	Bracelet	Used against nazara	0.13
Verbenaceae	<i>Vitex agnus-castus</i> L.	Ayt, Hayıt	Branches, leaves, fruit	External, infusion	Making basket, antifebrile, fruit ripening, diuretic, carminative, sedative, intestinal regulator	0.12

*: Cultivated plant in Turkey, e: Egzotic plant

According to the calculations, *Olea europaea* L. var. *sylvestris* L. (0.65), *Mentha pulegium* L. (0.63), *Malva sylvestris* L. (0.48), *Salvia officinalis* L. (0.48), *Hypericum perforatum* L. (0.48), and *Morus nigra* L. (0.46) were reported to be of the highest use value (UV). *Peganum harmala* L. (0.08), *Liquidambar orientalis* Mill. (0.08), *Alcea rosea* L. (0.07), *Armoracia rusticana* (Lam.) P.Gaertn., B.Mey. & Schreb. (0.07), and *Pulicaria dysenterica* (L.) Bernh. (0.05) were found to be of the lowest UV value (Table 3). The high UV value of *Olea europaea* L. var. *sylvestris* originates from the fact that it is an

important commercial product as well as its medicinal properties in the region.

Information on medicinal use of plants with low UV values such as *Peganum harmala*, *Liquidambar orientalis*, *Alcea rosea*, *Armoracia rusticana*, *Pulicaria dysenterica* was obtained from people over middle age. The plants with higher UV values (*Olea europaea*, *Mentha pulegium*, *Morus nigra*) are more popular in the middle age group due to their popularity and widespread use in recent years. In addition, the commercial use of these plants is very high.

Table 3. Comparison of UV values

Species	Use value (UV)						
	Present study	Mükemre et al. 2015	Polat et al. 2013	Polat et al. 2015	Cakılcıoğlu et al. 2011	Polat & Satıl 2012	Tetik et al. 2013
<i>Rosa canina</i> L.	0.42	0.23	0.50	0.46	0.55	0.52	0.40
<i>Mentha pulegium</i> L.	0.63	0.21	0.30	-	0.30	0.34	-
<i>Hypericum perforatum</i> L.	0.48	-	0.27	0.40	0.32	-	-
<i>Morus nigra</i> L.	0.46	-	0.31	0.23	-	-	-

Comparisons of the plants with the highest UV values compared to the previous studies are given in Table 3.

According to the information obtained from the participants, recorded discomfort issues were collected under 9 headings (Table 4). The FIC values in the study range from 0.53 to 0.86. "Cold and flu" had the highest FIC rate (0.86) (37 use-reports for 6 plant species). *Origanum onites* L., *Rosmarinus officinalis* L., *Sideritis arguta* Boiss. & Heldr., *Sideritis libanotica* Labill., *Alcea rosea* L., *Rosa canina* L. were reported to be among the plant remedies indicated for this use.

The high FIC value for cold and flu suggests that the disease is very common in this region because of the very cold and hard winter months. The low FIC value of vascular disorders can be explained by vegetarian diet and overuse of olive oil (Table 4).

Table 4. Informant consensus factor (FIC) for each ailment

Ailment categories	Number of use report (Nur)	Number of taxa (Nt)	FIC
Cold and flu	37	6	0.86
Respiratory tract diseases	21	6	0.75
Stomach disorders	40	11	0.74
Digestive system disorders	25	8	0.71
Laxative	9	4	0.63
Diuretic	13	6	0.58
Painkiller	8	4	0.57
Skin disorders	12	6	0.54
Vascular disorder	18	9	0.53

Conclusions

In this study, 48 herbal and aromatic plants belonging to 29 families were determined in the study site. *Salvia officinalis*, *Alcea rosea*, and *Morus nigra* cultivated plants. *Olea europaea*, another cultivated plant, is also produced in a very large area. These plants provide significant commercial returns on both domestic and international markets. Ethnobotanical

information is also being considered by fewer people because of commercial concerns. However, Tarhana (*Echinophora tenuifolia* subsp. *sibthorpiana*) is a plant which is mostly sold in local markets for food purposes and is considered as a traditional flavor in tourism.

The continuity of ethnobotanical studies is crucial to reveal the new uses of different plants. The results of these studies contribute to many fields such as medicine, pharmaceutical, paint industry and food industry.

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Appendix A.

- 1- Age and sex of the informant.
- 2- Marital status of the informant.
- 3- Educational level of the informant.
- 4- Occupation of the informant.
- 5- Place of residence of the informant.
- 6- What are the medical plants you know?
- 7- For what purposes do you use medical plants?
- 8- Which parts of plants are you using?
- 9- How do you prepare the preparation?
- 10- What is the vernacular name of the plant used?
- 11- What are the poisonous plants you know? How do you use them?
- 12- What are the food plants you know? How do you use them?
- 13- Do you use auxiliary substances when preparing the preparation?

References

Abe, R. & Ohtani, K. (2013). An ethnobotanical study of medicinal plants and traditional therapies on Batan Island, the Philippines. *Journal of Ethnopharmacology*, 145, 554–565.

Akbulut, S. & Bayramoglu, M.M. (2013). The trade and use of some medical and aromatic herbs in Turkey. *Studies on Ethno-Medicine*, 7(2), 67-77.

Akbulut, S. & Özkan, Z.C. (2016). Herbalist-Customer Profile in Medicinal and Aromatic Herbs Trade: A Case Study of

Kahramanmaraş, Turkey. *Kastamonu University Journal of Forestry Faculty*, 16(1), 246-252.

Akaydın, G., Şimşek, I., Arıtuluk, Z.C. & Yeşilada, E. (2013). An ethnobotanical survey in selected towns of the Mediterranean subregion (Turkey). *Turkish Journal of Biology*, 37, 230-247.

Akyol, Y. & Altan, Y. (2013). Ethnobotanical studies in the Maldan Village (Province Manisa, Turkey). *Marmara Pharmaceutical Journal*, 17, 21-25.

Albuquerque, U.P., Lucena, R.F.P., Montero, J.M., Florentino, A.T.N. & Almeida, C.F. (2013). Evaluating two quantitative ethnobotanical techniques. *Ethnobotany Research and Applications*, 4, 51–60.

Anonymous-1 (2018). Botany. Available<<https://en.wikipedia.org/wiki/Botany>> [Accessed: 03.12.2018]

Anonymous-2 (2018). Botany. Available<<https://www.maximumyield.com/definition/265/botany>> [Accessed: 03.12.2018]

Anonymous-3 (2017). Denizli province environmental situation report for 2015. Available<http://webdosya.csb.gov.tr/db/ced/editor/dosya/Denizli_icdr2016.pdf> [Accessed: 21.07.2017]

Bulut, G., Bozkurt, M.Z. & Tuzlacı, E. (2017). The preliminary ethnobotanical study of medicinal plants in Uşak (Turkey). *Marmara Pharmaceutical Journal*, 21(2), 305-310.

Cakilcioglu, U., Khatunb, S., Turkoglu, I. & Hayta, Ş. (2011). Ethnopharmacological survey of medicinal plants in Maden (Elazığ-Turkey). *Journal of Ethnopharmacology*, 137, 469–486.

Davis, P.H. (1965). *Flora of Turkey and the east Aegean Islands, Vol. I*. Edinburgh: In University Press.

Davis, P.H. (1965-1985). *Flora of Turkey and the east Aegean Islands. Vol. I-IX*. Edinburgh: In University Press.

Davis P.H., Mill R.R. & Tan K. (1988). *Flora of Turkey and the east Aegean Islands. Vol. X*. Edinburgh: In University Press.

Dogan, Y., Baslar, S., Ay, G. & Mert, H.H. (2004). The use of wild edible plants in Western and Central Anatolia (Turkey). *Economic Botany*, 58(4), 684-690.

Ertuğ, F., Tümen, G., Çelik, A. & Dirmenci, T. (2004). *Ethnobotanic Inventory Study of Buldan (Denizli)*. Tübitak Projesi.

Eşen, B. (2008). Ethnobotanical features of Aydınlar village and its surroundings (Erdemli/Mersin). Master Thesis, Selcuk University, Institute of Science and Technology, Konya.

- Everest, A. & Ozturk, E. (2005). Focusing on the ethnobotanical uses of plants in Mersin and Adana provinces (Turkey). *Journal of Ethnobiology and Ethnomedicine*, 1(6), 1-6.
- Ezer, N. & Mumcu-Arisan, Ö. (2006). Folk medicines in Merzifon (Amasya, Turkey). *Turkish Journal of Botany*, 30, 223-230.
- Güner, A., Ozhatay, N., Ekim, T. & Baser, K.H.C. (2000). *Flora of Turkey and the east Aegean islands. Vol. XI, Supplement-II*. Edinburgh: In University Press.
- Güner, A. Aslan, S., Ekim, T., Vural, M. & Babaç, M.T. (2012). *Türkiye Bitkileri Listesi (Damarlı Bitkiler)*. Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul.
- Gürdal, B. & Kültür, Ş. (2013). An ethnobotanical study of medicinal plants in Marmaris (Muğla, Turkey). *Journal of Ethnopharmacology*, 146, 113–126.
- Hayta, S., Polat, R. & Selvi, S. (2014). Traditional uses of medicinal plants in Elazığ (Turkey). *Journal of Ethnopharmacology*, 154, 613-623.
- Heinrich, M., Barnes, J., Gibbons, S. & Williamson, E.M. (2004). *Fundamentals of pharmacognosy and phytotherapy*. Churchill Livingstone, Edinburgh.
- Kendir G. & Güvenç A. (2010). Ethnobotany and a general view of ethnobotanical studies in Turkey. *Hacettepe University Journal of the Faculty of Pharmacy*, 30(1), 49-80.
- Koçyiğit, M. & Özhatay, N. (2006). Wild plants used as medicinal purpose in Yalova (Northwest Turkey). *Turkish Journal of Pharmaceutical Sciences*, 3(2), 91-103.
- Kumar, M., Paul, Y. & Anand, V.K. (2009). An Ethnobotanical Study of Medicinal Plants used by the Locals in Kishtwar, Jammu and Kashmir, India. *Ethnobotanical Leaflets*, 13, 1240-1256.
- Kültür, Ş. (2007). Medicinal plants used in Kırklareli Province (Turkey). *Journal of Ethnopharmacology*, 111, 341–364.
- Mükemre, M., Behçet, L. & Cakilcioglu, U. (2015). Ethnobotanical study on medicinal plants in villages of Çatak (Van-Turkey). *Journal of Ethnopharmacology*, 166, 361-374.
- Özçelik, H. & Balabanlı, C. (2005). Medical and aromatic plants of Burdur. I. Burdur Symposium, 1127-1136.
- Öztürk, M. (2006). The Flora and Etnobotany of Nizip Region (Aksaray). Master Thesis, Selcuk University, Institute of Science and Technology, Konya.
- Polat, R., Cakilcioglu, U., Kaltalioglu, K., Uluhan, M.D. & Türkmen Z. (2015). An ethnobotanical study on medicinal plants in Espiye and its surrounding (Giresun-Turkey). *Journal of Ethnopharmacology*, 163, 1–11.
- Polat, R., Cakilcioglu, U. & Satil, F. (2013). Traditional uses of medicinal plants in Solhan (Bingöl—Turkey). *Journal of Ethnopharmacology*, 148, 951–963.
- Polat, R. & Satil, F. (2012). An ethnobotanical survey of medicinal plants in Edremit Gulf (Balıkesir - Turkey). *Journal of Ethnopharmacology*, 139, 626 – 641.
- Sağiroğlu, M., Dalgıç, S. & Toksoy, S. (2013). Medicinal plants used in Dalaman (Muğla), Turkey. *Academic Journals*, 7(28), 2053-2066.
- Sargin, S.A., Selvi, S. & Lopez, V. (2015). Ethnomedicinal plants of Sarigöl district (Manisa), Turkey. *Journal of Ethnopharmacology*, 171, 64–84.
- Tahri, N., El Basti, A., Zidane, L., Rochdi, A. & Douira, A. (2012). Ethnobotanical Study of Medicinal Plants in the Province of Settat (Morocco). *Kastamonu University Journal of Forestry Faculty*, 12(2), 192-208.
- Tetik, F., Civelek, S. & Cakilcioglu, U. (2013). Traditional uses of some medicinal plants in Malatya (Turkey). *Journal of Ethnopharmacology*, 146, 331–346.
- Trotter, R.T. & Logan, M.H. (1986). *Informant census: A new approach for identifying potentially effective medicinal plants*. In *Plants in indigenous medicine and diet* (Edited by L. N. Etkin), Routledge, Bedford Hill, NY.
- Tütenocaklı, T. (2002). *Ethnobotany of Ayvacık and its surroundings (B1, Çanakkale)*. Master Thesis, ÇOMÜ, Çanakkale.
- Uysal İ., Onar S., Karabacak E. & Çelik S. (2010). Ethnobotanical aspects of Kapıdağ Peninsula (Turkey). *Biological Diversity and Conservation*, 3(3), 15-22.