

Medicinal Plants Used for Gastrointestinal Disorders in Some Districts of Izmir Province, Turkey

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ABSTRACT This study was carried out in order to determine which plants and the ways in which these plants are used for the treatment of gastrointestinal disorders among the people of some districts of Izmir province, located in the Western Anatolian part of Turkey. Field study was carried out over a period of approximately three years (2009-2011). During the field trips, the information was collected through interviews, including various data obtained from local healers and traditional medicine men, herbalists, shepherds, patients and elderly persons. In addition, informant consensus factor (F_{ic}) values were calculated for the medicinal plants included in the study. A total of 33 plants belonging to 25 families were documented for their therapeutic use against gastrointestinal disorders. Further analysis on the families of medicinal plants that are used against gastrointestinal disorders has shown that family Lamiaceae is represented by the highest number of species. Also, it was determined that gastrointestinal system ailments for which the folk medicinal plants are mostly used, are as follows: constipation, diarrhea, gastritis and ulcer, intestinal winds, nausea, gastralgia and indigestion. Informant consensus of medicinal plant usage within Izmir resulted in F_{ic} values between 0.56 and 0.84 per gastrointestinal disorder category. This study showed that plants are actively used for the treatment of gastrointestinal disorders in the area of Izmir.

INTRODUCTION

Since ancient times, humanity used various natural materials as a source of medicines and probably plants have always had the most important role to play in medicine and public health (Ghorbani 2005). As a result of centuries of accumulated experience, humans used plants for treatment purposes until the development of modern medicine. But this knowledge and transmission is in danger because transmission between older and younger generation is not always assured (Anyinam 1995).

Documentation of the local knowledge through ethnobotanical studies is important for the conservation and utilization of biological resources (Muthu et al. 2006; Ugulu 2013). For this reason, ethnobotanical studies have become increasingly valuable for the development of healthcare and conservation programs in such regions (Ososki et al. 2002). In this context, many studies have been conducted in Turkey about usages of the medicinal plants and herbal prod-

ucts (Erci 2007; Kultur 2007; Kargioglu et al. 2008; Ugulu et al. 2009; Dogan et al. 2011; Ugulu 2011; Ugulu and Aydin 2011). These studies indicated that herbal therapies (40.6%) are used most frequently (Tan et al. 2004; Isikhan et al. 2005). Another study found that patients were mostly using herbal products (72.5%) in Turkey (Oguz and Pinar 2000).

Traditional ethnobotanical knowledge, complementary and alternative medicine therapies and prevalence of medicinal plants have been investigated in different areas of Turkey (Dogan and Mert 1998; Dogan et al. 2003; Dogan et al. 2004a; Dogan et al. 2005; Nedelcheva et al. 2007; Dogan et al. 2008; Cakilcioglu and Turkoglu 2010; Dogan et al. 2010a; Ugulu and Baslar 2010; Nedelcheva et al. 2011; Dogan 2012; Ugulu 2012; Ugulu et al. 2012a; Dogan et al. 2013). The results of these studies show that applications toward the treatment of gastrointestinal disorders occupy an important place among the usage of plants for medicinal purposes (Simsek et al. 2004; Kultur 2007; Kargioglu et al. 2008; Ugurlu and Secmen 2008; Ugulu et al. 2009). Gastrointestinal disorders include symptoms like abdominal pain, acidity, constipation, dyspepsia, indigestion, flatulence, etc., caused by

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eating indigestible, excessive or irregular foods, imbalanced and spicy diets, and adulteration of food and contamination of drinking water. Diarrhea, dysentery, colic and colitis also occur due to digestive complaints (Dwivedi et al. 2006; Olajuyigbe and Afolayan 2012).

This study was carried out in order to determine the plants and the ways in which these plants are used for the treatment of gastrointestinal disorders among the people of the study area.

MATERIAL AND METHODS

General Characteristics of the Study Area

The study area consisted of towns and counties of Beydag (38° 05' N, 28° 11' E), Kiraz (38° 14' N, 28° 12' E), Odemis (38° 16' N, 27° 59' E) and Tire (38° 05' N, 27° 46' E), all of which lie within the administrative borders of Izmir province. The area was approximately 2600 km² (Fig. 1). The area consisted of the Küçük Menderes delta, one of the important deltas of Western Anatolia (Atalay 2002). To the north of the delta lies Bozdağlar and to the south lies the Aydın Mountains. The Küçük Menderes River, which rises in Bozdağlar and is 175 km long, passes through first Kiraz, then Beydag, Odemis and Tire town borders and finally reaches the Aegean Sea.

Mediterranean climate prevailed in the area. Mediterranean climate is characterized by warm and rainy winters and hot and dry summers and occurs in more than half of Turkey. Yearly rainfall in the area varied between 650-700 mm.

In the study area, maquis was prevalent where *Pinus brutia* Ten. (Turkish red pine) was destroyed. In areas where vegetation cover was destroyed, the prevalent maquis species was *Quercus coccifera* L. (kermes oak). In other areas, *Pistacia terebinthus* L. (terebinth), *Laurus nobilis* L. (bay laurel), *Arbutus andrachne* L. (Grecian strawberry tree), *Arbutus unedo* L. (Strawberry tree), *Myrtus communis* L. (true myrtle) and *Spartium junceum* L. (Spanish broom) were quite common. *Nerium oleander* L. (oleander) and *Vitex agnus-castus* L. (chaste tree) were seen in riverbeds. *P. brutia* could be seen as high as 1000 m on the north slopes of Aydın Mountains. Beyond this altitude, *Pinus nigra* Arnold. subsp. *pallasiana* (Lamb.) Holmboe (Anatolian black pine) dominated. On the north slopes of Aydın Mountain, *Castanea*

sativa Mill. (sweet chestnut) and *Juglans regia* L. (walnut) communities were encountered. It was possible to come across to *Quercus ithaburensis* Decne. subsp. *macrolepis* (Kotschy) Hedge and Yalt. (Valonia oak) on some dry slopes. *Olea europaea* L. (olive) was planted in large areas in the region (Akman and Ketenonlu 1986; Baslar et al. 1999; Atalay 2002; Dogan et al. 2004b; Dogan et al. 2007; Baslar et al. 2009; Dogan et al. 2010b; Ugulu et al. 2012b).

DATA COLLECTION AND METHODOLOGY

Ethnobotanical Survey

The field studies were carried out in collaboration with urban and rural inhabitants of the towns of Beydag, Kiraz, Odemis and Tire, situated in the Western Anatolian part of Turkey (Fig. 1). The study was performed between 2009 and 2011. During this period, contacts were established with women (32 interviews) and men (21 interviews) who are practicing herbal medicine. The information was collected during field trips through semi-structured interviews including various data (local names, ailments and diseases treated, therapeutic effects, part(s) of plants used, methods of administration) obtained from local healers and traditional medicine men, herbalists, shepherds, patients and elderly persons, based on one of the methods for ethnobotanical data collection (Martin 1995). The local people were asked for their consent to share their knowledge only for the purpose of this study. Also, the obtained data were supported by literature concerning the plants used for gastrointestinal disorders.

Throughout interviews and discussions, information about many of the plants used in their medicine was gathered. The data collected were arranged in alphabetical order of the botanical name. The common name for each taxon in local language was given in the table. In addition, the medicinal uses, parts used methods of preparation, and similar use or different uses for the same purpose of the plant were given.

Identification of Plant Specimens

The identification of the plant specimens was authentically and basically carried out using "Flora of Turkey and East Aegean Islands" (Davis 1965-1982). The collected information

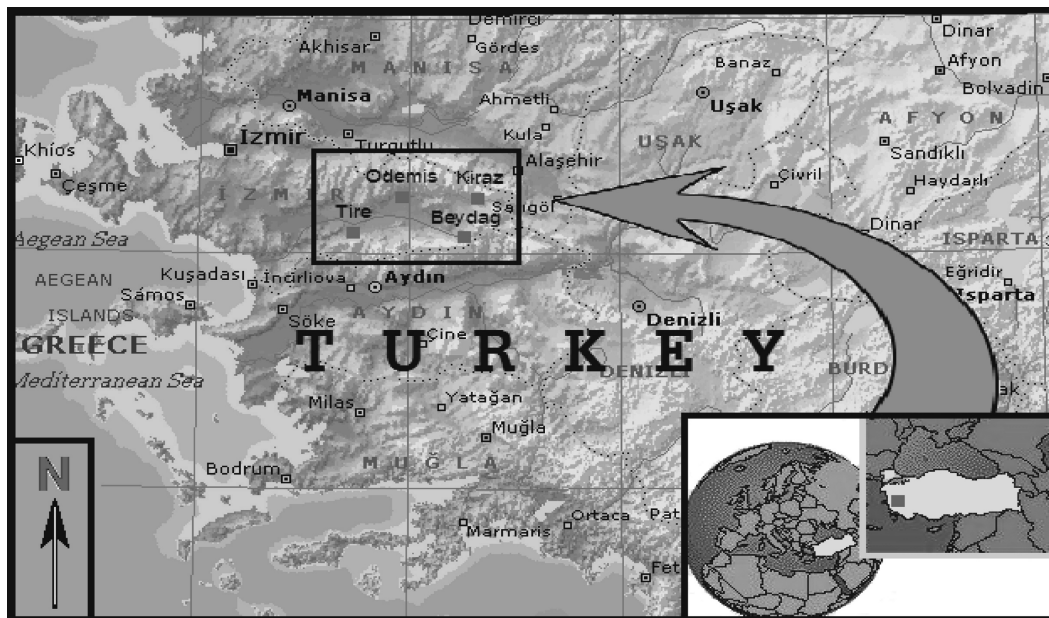


Fig. 1. Map of the study area

was cross-checked with the available literature about medicinal plants and ethnobotany in Turkey and other areas of the world. Herbarium specimens are kept in the personal collection of the first author.

Data Analysis and Quantitative Ethnobotany

The level of homogeneity between information provided by different informants was calculated using the Informants' Consensus Factor, F_{ic} (Trotter and Logan 1986). It is calculated as

$$F_{ic} = \frac{N_{ur} - N_t}{(N_{ur} - 1)}$$

where N_{ur} is the number of use reports from informants for a particular plant-usage category and N_t is the number of taxa or species that are used for a particular plant usage category for all informants. Values range between 0 and 1, where "1" indicates the highest level of informant consent. For instance, if few taxa are used by informants, then a high degree of consensus is reached and medicinal tradition is thus viewed as welldefined (Heinrich 2000).

The Fidelity Level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was calculated for the most frequently reported diseases or ailments as: $FL (\%) = (N_p / N) \times 100$

where N_p is the number of informants that claim a use of a plant species to treat a particular disease, and N is the number of informants that use the plants as a medicine to treat any given disease (Alexiades 1996).

RESULTS AND DISCUSSION

Information about Medicinal Plants

In terms of flora, Turkey's biodiversity provides a great source for herbal therapies. Hence, an ethnobotanical survey was carried out to determine plants used as folk medicines by rural and urban inhabitants of some cities of the Western Anatolia in Turkey, where Mediterranean climate and landscape dominates. The study was carried out by means of 53 interviews with medicinal plant users, extractors and traditional healers.

A total of 33 plants belonging to 25 families have been documented for their therapeutic use against gastrointestinal disorders and as herbal care, as enlisted in Table 1, arranged in alphabetical order of their family and botanical names, with the relevant information. The majority of medicinal plants determined in this study grow in the wild, while others are cultivated (that is, *Momordica charantia* and *Citrus x limon*).

Table 1: List of medicinal plants used for gastrointestinal disorders in some districts of Izmir province

Scientific name	Family	Local name	English name	Plant part(s) used	Medicinal use	Traditional preparation	Recorded literature sources defining similar usages
<i>Amygdalus communis</i> L.	Rosaceae	Badem	Almond	Seed oil	Laxative	Almond oil is diluted with water and drunk.	Baytop 1999
<i>Anethum graveolens</i> L.	Apiaceae	Dereotu	Dill	Seed	Antispasmodic, Carminative	Seeds are boiled and the stock is drunk.	Chevallier 1996; Baytop 1999
<i>Camellia sinensis</i> (L.) Kuntze	Theaceae	Çay	Tea	Leaf	Against diarrhea	A strong tea made from the leaves is drunk.	Maity et al. 1995; Jackson 1996; Baytop 1999; Borrelli and Izzo 2000
<i>Cerasus avium</i> (L.) Moench	Rosaceae	Kiraz	Sweet cherry	Fruit peduncle	Against diarrhea	Fruit stalk is boiled and the stock is drunk.	Baytop 1999; Rivera et al. 2005
<i>Ceretonia siliqua</i> L.	Fabaceae	Keçiboynuzu, harnup	Carob tree	Fruit	Stomachic, Laxative	The fruits are eaten.	Baytop 1999; Merzouki et al. 2000
<i>Chenopodium album</i> L.	Chenopodiaceae	Sirken	Lambsquarters	Leaf	Laxative	Leaves are boiled and the stock is drunk.	Baytop 1999; Saghir et al. 2001; Rivera et al. 2005
<i>Cichorium intybus</i> L.	Asteraceae	Yabani hindiba	Chicory	Leaf	Stomachic, laxative	Boiled and the stock is drunk.	Baytop 1999; Karaman and Kocabas 2001; Bnouham et al. 2002; Pieroni and Quave 2005; Rivera et al. 2005
<i>Citrus x limon</i> (L.) Burm. f	Rutaceae	Limon	Lemon	Fruit	Against diarrhea	Fresh fruit peels are boiled and the stock is drunk.	Di Stasi et al. 2002; Pieroni et al. 2004; Arias and Ramon-Laca 2005; Guarrera et al. 2005b; Pieroni and Quave 2005
<i>Coffea arabica</i> L.	Rubiaceae	Kahve	Coffee	Seed	Against indigestion	Turkish coffee is drunk after the meal.	Gedif and Hahn 2003; Cavender 2006
<i>Convolvulus arvensis</i> L.	Convolvulaceae	Tarla sarmaşýđý,	Field bindweed	Root	Stomachic, laxative	The sap of fresh root is licked.	Baytop 1999; Karaman and Kocabas 2001
<i>Cydonia oblonga</i> Mill.	Rosaceae	Ayva	Quince	Leaf and fruit	Against diarrhea	Leaves are boiled and the stock is drunk. Fruit is directly eaten.	Baytop 1999; Karaman and Kocabas 2001; Sezik et al. 2004; Rivera et al. 2005
<i>Glycyrrhiza glabra</i> L.	Fabaceae	Meyan	Licorice	Root	Stomachic, Against gastralgia, To treat gastritis and ulcer	Licorice candy that is produced from the root is dissolved in water and drunk.	Mert et al. 1993; Baytop 1999; Krausse et al. 2004

Table 1: Contd.....

<i>Scientific name</i>	<i>Family</i>	<i>Local name</i>	<i>English name</i>	<i>Plant part(s) used</i>	<i>Medicinal use</i>	<i>Traditional preparation</i>	<i>Recorded literature sources defining similar usages</i>
<i>Hypericum perforatum</i> L.	Clusiaceae	Kantaron, Sary kantaron	St. John's wort	Aerial part	Stomachic, To treat stomach ulcer	Above ground parts are kept in olive oil for at least 3 months and then consumed on an empty stomach in the mornings. Above ground parts are also boiled and the stock is drunk.	Mert et al. 1993; Tuzlaci and Aymaz 2001; Loi et al. 2004; Guarrera 2005; Pieroni et al. 2013
<i>Laurus nobilis</i> L.	Lauraceae	Defne, tehnel	Bay laurel	Leaf	Against indigestion	Boiled and the stock is drunk either plainly or mixed with honey.	Baytop 1999; Tuzlaci and Erol 1999; Merzouki et al. 2000; Tuzlaci and Tolon 2000; Tuzlaci and Aymaz 2001; Di Stasi et al. 2002; Pieroni et al. 2002; Loi et al. 2004; Guarrera et al. 2005a; Guarrera et al. 2005b; Pieroni and Quave, 2005;
<i>Linum usitatissimum</i> L.	Linaceae	Keten	Linum	Seed	Laxative	A couple of spoonfuls of seeds are eaten on an empty stomach.	Baytop 1999; Mert et al. 1993; Merzouki et al. 2000; Gedif and Hahn 2003; Loi et al. 2004
<i>Malva sylvestris</i> L.	Malvaceae	Ebegümeçi	High mallow	Aerial part	Against gastralgia, Laxative	Especially leaves are boiled and the stock is drunk.	Oztig 1971; Mert et al. 1993; Baytop 1999; Tuzlaci and Erol 1999; Loi et al. 2004; Guarrera 2005; Guarrera et al. 2005b; Pieroni and Quave 2005;
<i>Matricaria chamomilla</i> L.	Asteraceae	Papatya	German chamomile	Flower	Treatment of gastrointestinal disorders,	Dried flowers are boiled and the stock is drunk on an empty stomach in the morning.	Mert et al. 1993; Zeybek 1985; Merzouki et al. 2000; Tuzlaci and Tolon 2000; Tuzlaci and Aymaz, 2001; Guarrera, 2005; Guarrera et al., 2005a; Estomba et al., 2006

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<i>Mentha spicata</i> L.	Lamiaceae	Yarpuz	Spearmint	Leaf	Carminative Against gastralgia	Fresh leaves are boiled and the stock is drunk.	Tuzlaci and Erol 1999; Pieroni and Quave 2005; Pieroni et al. 2005; Estomba et al. 2006; Pieroni et al. 2013
<i>Mentha x piperita</i> L.	Lamiaceae	Nane	Peppermint	Leaf	Stomachic, Against nausea	Fresh and dried leaves are boiled and the stock is drunk.	Mert et al. 1993; Baytop 1999; Natarajan et al. 2000; Di Stasi et al. 2002; Sandhu and Heinrich 2005; Cavender 2006; Estomba et al. 2006
<i>Momordica charantia</i> L.	Cucurbitaceae	Kudret narý	Bitter melon	Fruit	Stomachic, To treat gastritis and ulcer	Thinly sliced fruits are kept in honey or olive oil until completely dissolved and then consumed (1-2 tbsp) on an empty stomach in the mornings.	Mert et al. 1993; Baytop 1999; Gurbuz et al. 2000; Repetto and Llesuy 2002; Murakami et al. 2002; Grover and Yadav 2004; Uzun et al. 2004; Beloin et al. 2005
<i>Morus nigra</i> L.	Moraceae	Karadut	Black mulberry	Fruit	Against diarrhea	Fruits are boiled and the stock is drunk.	Bnouham et al. 2002
<i>Myrtus communis</i> L.	Myrtaceae	Mersin	Myrtle	Leaf and fruit	Against diarrhea	Leaves and/or fruits are boiled and the stock is drunk.	Chopra et al. 1986; Baytop 1999; Tuzlaci and Erol 1999; Merzouki et al. 2000; Bnouham et al. 2002; Said et al. 2002; El-Hilaly et al. 2003; Sandhu and Heinrich 2005
<i>Origanum majorana</i> L.	Lamiaceae	Mercankö"k	Sweet marjoram	Aerial part	Against indigestion and gastralgia	Aerial parts are boiled and the stock is drunk.	Baytop 1999
<i>Origanum onites</i> L.	Lamiaceae	Izmir kekiđi	Pot marjoram	Aerial part	Against gastralgia	Aerial parts are boiled and the stock is drunk.	Mert et al. 1993; Tuzlaci and Erol 1999
<i>Paliurus spina-christi</i> Mill.	Rhamnaceae	Karaçalý	Jerusalem thorn	Fruit	Stomachic, Laxative	Fresh or dried fruits are boiled and the stock is drunk.	Baytop 1999; Karaman and Kocabas 2001
<i>Pistacia lentiscus</i> L.	Anacardiaceae	Sakýz	Mastic tree	Gum mastic	Against gastralgia	Its gum is chewed.	Al-Said et al. 1986; El-Hilaly et al. 2003; Loi et al. 2004;

Table 1: Contd.....

Scientific name	Family	Local name	English name	Plant part(s) used	Medicinal use	Traditional preparation	Recorded literature sources defining similar usages
<i>Pistacia terebinthus</i> L.	Anacardiaceae	Çitlenbik	Terebinth	Leaf	Stomachic, To treat gastritis and ulcer	Leaves are boiled and the stock is drunk.	Nedelcheva 2012 Vidrich et al. 2004 Yesilada et al. 1995; Tuzlaci and Aymaz 2001
<i>Plantago major</i> L.	Plantaginaceae	Sinirotu	Common plantain	Leaf	Against gastralgia	Fresh leaves are boiled and the stock is drunk.	Yesilada et al. 1993; Baytop 1999; Tuzlaci and Tolon 2000; Sezik et al. 2004; Guarrera 2005; Kala 2005
<i>Punica granatum</i> L.	Punicaceae	Nar	Pomegranate	Fruit	Against diarrhea	Fruit is directly eaten or squeezed and juice is drunk.	Baytop 1999; Borrelli and Izzo 2000; Vidal et al. 2003; Palombo 2006; Ricci et al. 2006
<i>Quercus ithaburensis</i> Decne. subsp. <i>macrolepis</i> (Kotschy.) Hedge. & Yalt.	Fagaceae	Palamut me ^o esi	Valonia oak	Fruit	Stomachic, Against diarrhea	Dried, broken or ground fruits are boiled; this stock is mixed with water and drunk.	Baytop 1999; Said et al. 2002
<i>Rumex patientia</i> L.	Polygonaceae	Labada	Dock Patience dock	Leaf	Laxative	Fresh leaves are boiled and the stock is drunk.	Baytop 1999; Silig et al. 2004; Suleyman et al. 2004
<i>Salvia officinalis</i> L.	Lamiaceae	Adaçayý	Sage	Leaf	Against gastralgia	Fresh leaves are boiled and the stock is drunk.	Zeybek 1985; Mert et al. 1993; Baytop 1999; Zafar et al. 2003
<i>Viscum album</i> L.	Loranthaceae	Ökseotu	Mistletoe	Leaf and fruit	Against diarrhea	Leaves and fruits are boiled and the stock is drunk.	Baytop 1999; Pieroni et al, 2005

Further analysis on the families of medicinal plants that are used against gastrointestinal disorders has shown that family Lamiaceae is represented by the highest number of species (five species). Rosaceae are represented by three species. These are followed by Anacardiaceae, Asteraceae and Fabaceae, each represented by two species. The rest are represented by one species each (19 families). When the studies conducted in areas close to our study area were examined, it was seen that the medicinal plants used in and around Izmir province were mostly from Lamiaceae, Asteraceae and Fabaceae families (Ugulu et al. 2009), while the medicinal plants used in Western Anatolia belonged to Asteraceae, Rosaceae and Lamiaceae families (Kargioglu et al. 2008).

All parts of various plants are used in the traditional medication of different gastrointestinal disorders. However, the most frequently used parts are leaves followed by fruits. These parts are followed by all aboveground parts. Figure 2 displays the result of analysis on medicinal plant parts used to treat gastrointestinal disorders. It was concluded from similar studies on plants used for medicinal purposes that most used parts of the plants are leaves with 54% in China and Thailand (Inta et al. 2008), 44% leaves and 29% root in Ethiopia (Wondimu et al. 2007), 22%

leaves in Iran (Ghorbani et al. 2005), 36% leaves in Izmir in Turkey (Ugulu et al. 2009) and 26% leaves in Western Anatolia. These results are in agreement with Giday et al. (2003), where leaves are found to be the most frequently used parts.

Often, different parts of a single plant may be concocted and used for a particular type of ailment. For example the leaves and fruits of *Viscum album*, *Myrtus communis* and *Cydonia oblonga* are concocted to treat diarrhea, while the aerial parts of *Hypericum perforatum* are concocted to treat stomach ulcers.

When other studies concerning nearby areas were evaluated, it was seen that decoction and infusion are the methods mostly used for the preparation of the folk medicine (Tuzlaci and Tolon 2000; Kargioglu et al. 2008; Ugulu et al. 2009). People still continue to follow the traditions of their ancestors. Sometimes, local people also use other ingredients, such as sugar, honey, and oil to prepare the remedies. Some plants are also used as food-vegetable plants (that is, *Malva sylvestris* and *Anethum graveolens*), appetizer (*Amygdalus communis*), fruit (that is, *Cerasus avium* and *Cydonia oblonga*) and beverage (*Coffea arabica*).

It is revealed that some of the plants are collected for commercial purposes by local people: *Amygdalus communis*, *Cerasus avium*, *Citrus x*

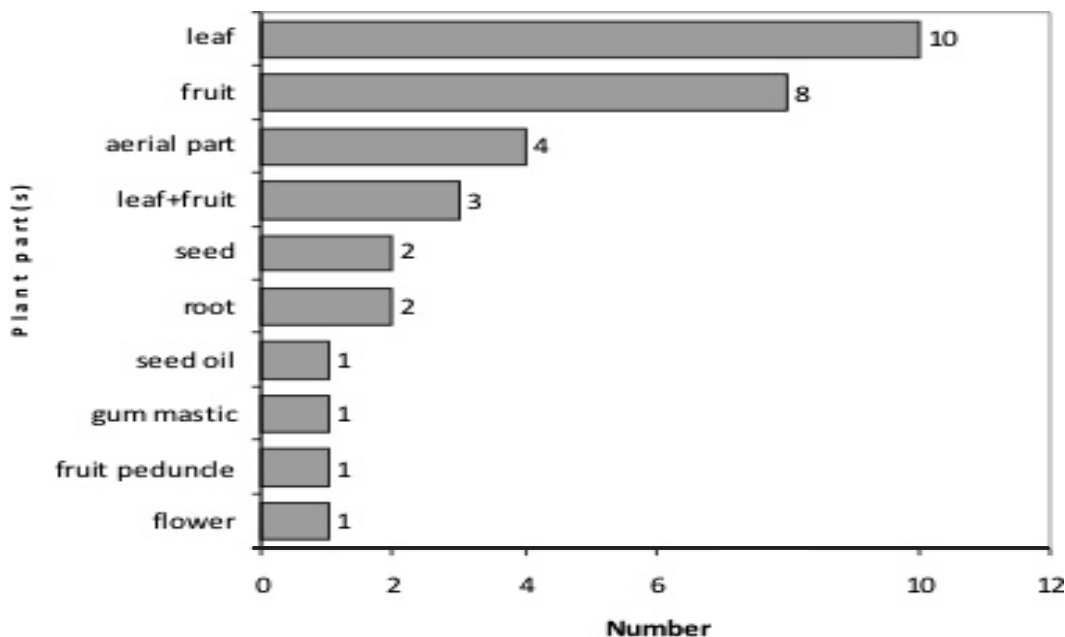


Fig. 2. Parts used of medicinal plants

limon, *Cydonia oblonga*, *Malva sylvestris*, *Mentha x piperita*, *Morus nigra*, *Pistacia lentiscus*, *Punica granatum*, *Salvia officinalis* are largely cultivated for harvesting. These plants have great economic importance in Turkey and, *Malva sylvestris* and *Cerasus avium* are also exported abroad. *Anethum graveolens*, *Ceratonia siliqua*, *Hypericum perforatum* and *Origanum onites* are wild harvested and these plants are sold bazaars and markets.

Ugulu et al. (2009) have investigated plants used by the locals for medicinal purposes in 28 districts of Izmir province. They determined that a total of 108 plants are used for the treatment of various ailments. Only 34 of these plants are reported to be used against gastrointestinal disorders. When we compare this figure with 33 plant species we obtained in our study encompassing 4 districts of Izmir province, it is possible to allude that, in general, there is a consistency and homogeneity in the use of plants against gastrointestinal disorders in the area.

Data Analysis

At the end of the study, it was seen that gastrointestinal system ailments, for which the folk medicinal plants are mostly used, are as follows: constipation, diarrhea, gastritis and ulcer, intestinal winds, nausea, gastralgia and indigestion. Informant consensus of medicinal plant usage with Izmir resulted in informant consensus factor (F_{ic}) values between 0.56 and 0.84 per gas-

Table 2: Informant consensus factor by gastrointestinal ailments

Category	Number of species (N_s)	All species (%)	Number of use-reports (N_{ur})	F_{ic}^*
Gastritis and ulcer	5	15.1	27	0.84
Intestinal winds	2	6.1	6	0.80
Constipation	7	21.2	29	0.78
Diarrhea	9	27.2	33	0.75
Indigestion	13	39.4	38	0.67
Gastralgia	8	24.2	17	0.56

*Informant Consensus Factor, $F_{ic} = N_s - N_{ur} / (N_s - 1)$, providing a value between 0 and 1, where “1” indicates the highest rate of informant consensus.

trointestinal disorders category. The category that had the highest F_{ic} value was gastritis and ulcer (0.84) followed by intestinal winds (0.80). The lowest is gastralgia (0.56) (Table 2). *Origanum majorana* (100%) had the highest fidelity level and *Convolvulus arvensis* (42%) had the lowest (Table 3).

When the articles in which the informant consensus factor is calculated are examined, it is seen that; cold and influenza have the highest F_{ic} value (0.82), followed by cough (0.73) and hemorrhoids, and enteritis have the lowest F_{ic} value (0.30). In the present study, it was found that the average F_{ic} value was 0.58.

Cakilcioglu and Turkoglu (2010) examined the diseases in 10 categories in a study they conducted in another area of Turkey. In these categories, the highest F_{ic} value was reported to be 0.62 while the lowest F_{ic} value was reported to

Table 3: The most commonly used medicinal plants against gastrointestinal disorders and their major uses with their fidelity level

(0= The least, 100= The highest efficiency)

Species	Local name	Uses	Fidelity Level (FL) (%)
<i>Origanum majorana</i>	mercanköşk	Against indigestion and gastralgia	100
<i>Origanum onites</i>	Izmir kekiđi	Against gastralgia	96
<i>Hypericum perforatum</i>	kantaran otu	Stomachic, to treat stomach ulcer	95
<i>Glycyrrhiza glabra</i>	meyan	Stomachic, against gastralgia to treat gastritis and ulcer	92
<i>Mentha x piperita</i>	nane	Stomachic, against nausea	87
<i>Salvia officinalis</i>	adaçayý	Against gastralgia	85
<i>Camellia sinensis</i>	çay	Against diarrhea	82
<i>Laurus nobilis</i>	defne	Against indigestion	78
<i>Morus nigra</i>	karadut	Against diarrhea	74
<i>Matricaria chamomilla</i>	papatya	Treatment of gastrointestinal disorders, carminative	74
<i>Amygdalus communis</i>	badem	Laxative	68
<i>Coffea arabica</i>	kahve	Against indigestion	62
<i>Citrus x limon</i>	limon	Against diarrhea	53
<i>Anethum graveolens</i>	dereotu	Antispasmodic, carminative	48
<i>Convolvulus arvensis</i>	tarla sarmaþýđý	Stomachic, laxative	42

be 0.26. In the present study, it was found that the average F_{ic} value was 0.40.

In the studies by Akerreta et al. (2007) and Black et al. (2008), the F_{ic} values were found to be 0.65 and 0.75, respectively. Although the values reached in these studies are reported to be relatively high, they are lower than the values obtained in the studies conducted in various areas of the Iberian Peninsula: 0.85 and 0.91 for a Portuguese and a Catalan region respectively (Bonet et al. 2003; Camejo-Rodrigues et al. 2003). According to the results of these studies, it is seen that F_{ic} values in these areas are high. It could be concluded that the knowledge of plants with high F_{ic} values will be transferred more as a result of satisfactory use and therefore could be utilized more effectively in treatment of certain illnesses (Teklehaymanot and Giday 2007).

The fidelity level calculated for each medicinal plant agrees with F_{ic} value. Obviously, the remedies for frequently reported ailments have the highest FL value and those with low number of reports have the lowest FL values. The remedies, such as *Convolvulus arvensis* (42%), have low FL value because the majority of the informants do not know the dosage and the methods of preparation of the remedies. The average F_{ic} value for all gastrointestinal disorder categories was 0.73, indicating a fairly high level of informant consensus compared with similar studies (Heinrich 2000).

Review of Local Names of Plants

As a result of the analysis of plant names in the Turkish Language Association (TLA) web page (<http://tdkterim.gov.tr/bts/>), it was seen that although some plant names were adopted from Arabic (harnup, hindiba, kahve, keten, kudret narý, nar, nane), from Persian (badem, dut, mepe, meyan) and from Greek (defne, kantaron, kiraz, labada, limon, mersin, palamut, papatya), most of the plant names were found to be of Turkish origin.

The plants used in Beydag, Kiraz, Odemis and Tire are known by the same or different local names in various parts of Anatolia. For example, the local names of *Hypericum perforatum*, *Amygdalus communis* in Sivrice, *Matricaria chamomilla*, *Hypericum perforatum*, *Malva sylvestris*, *Morus nigra*, *Cichorium intybus*, *Cerentonia siliqua*, *Amygdalus communis*, *Cerasus avium*, *Cydonia oblonga*, in Kýrklareli, *Che-*

nopodium album, *Convolvulus arvensis*, *Malva sylvestris* in Ankara, *Amygdalus communis*, *Cerasus avium*, *Hypericum perforatum*, *Laurus nobilis*, *Malva sylvestris*, *Mentha piperita*, *Morus nigra*, *Viscum album* in Manisa, *Cerentonia siliqua*, *Cydonia oblonga*, *Laurus nobilis*, *Malva sylvestris*, *Pistacia lentiscus* in Bodrum (Cakilcioglu and Turkoglu 2010; Ertug 2000; Kultur 2007; Simsek et al. 2004; Ugurlu and Secmen 2008) are the same with the local names used in Izmir.

The local names used for *Mentha spicata* (nane) and *Pistacia terebinthus* (cedene) in Sivrice, *Pistacia terebinthus* (menengic), *Plantago major* (kesik otu, keskin otu, bobvitsa) in Kýrklareli, *Pistacia terebinthus* (menengic, cýtlýk) in Yanýktepe, *Plantago major* (sigil otu) in Ankara, *Pistacia terebinthus* (menengic), *Origanum onites* (tulu kekik, kara kekik, dag kekigi) in Manisa, *Origanum onites* (salman kekik, incir kekigi) in Bodrum (Abay and Kilic 2001; Cakilcioglu and Turkoglu 2010; Ertug 2000; Kultur 2007; Simsek et al. 2004; Ugurlu and Secmen 2008; Dogan 2012) are different from the local names used in Izmir.

CONCLUSION

In the scope of the present study, 33 plants belonging to 25 families were detected to be used by the local people for curative purposes. The majority of medicinal plants determined in this study grow in the wild, while others are cultivated (i.e. *Momordica charantia* and *Citrus x limon*). By drying, decoctions or infusions of these plants, local people use them during the whole seasons of the year. Most commonly used plants are *Origanum majorana*, *Origanum onites*, *Hypericum perforatum*, *Glycyrrhiza glabra*, *Mentha x piperita*, *Salvia officinalis*, *Camellia sinensis*, *Laurus nobilis*, *Morus nigra*, *Matricaria chamomilla*. Most commonly used parts of the plants were the leaves and fruits. The fidelity level of plant species and informant consensus factor values for plants were calculated. The F_{ic} values were found to be fairly high level (0.73) in our calculations. Therefore, it can be thought that the data obtained are reliable.

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REFERENCES

- Abay G, Kílyc A 2001. Local names and ethnobotanical features of some plants in the district of Purenbeleni and Yanýktepe (Mersin). *Herb J System Bot*, 8: 97-104.
- Akerreta S, Cavero RY, Calvo MI 2007. First comprehensive contribution to medical ethnobotany of Western Pyrenees. *J Ethnobiol Ethnomed*, 3: 26.
- Akman Y, Ketenođlu O 1986. The climate and vegetation of Turkey. *Proc Roy Soc Edinb B Biol*, 89: 123-134.
- Alexiades MN 1996. Collecting ethnobotanical data: An introduction to basic concepts and techniques. In: MN Alexiades (Ed.): *Selected Guidelines for Ethnobotanical Research: A Field Manual*. New York: The New York Botanical Garden, pp. 53-94.
- Alexiades MN 1996. *Selected Guidelines for Ethnobotanical Research: A Field Manual. Advances in Economic Botany*. Volume 10. Bronx: The New York Botanical Garden.
- Al-Said MS, Ageel AM, Parmar NS, Tariq M 1986. Evaluation of mastic, a crude drug obtained from *Pistacia lentiscus* for gastric and duodenal anti-ulcer activity. *J Ethnopharmacol*, 15: 271-278.
- Anyinam C 1995. Ecology and ethnomedicine: Exploring links between current environmental crisis and yndigenous medical practices. *Soc Sci Med*, 4: 321-329.
- Arias BA, Ramon-Laca L 2005. Pharmacological properties of citrus and their ancient and medieval uses in the Mediterranean region. *J Ethnopharmacol*, 97: 89-95.
- Atalay I 2002. *Ecoregions of Turkey*. Orman Bakanligi Yayinlari No: 163, Izmir.
- Baslar S, Dogan Y, Mert HH 1999. Studies on the ecology of *Pistacia terebinthus* L. subsp. palaestina (Boiss.) Engler in West Anatolia. *J Fac Sci Ege Univ*, 22(2): 1-12.
- Baslar S, Dogan Y, Durkan N, Bag H 2009. Biomonitoring of zinc and manganese in bark of Turkish red pine in Western Anatolia. *J Environ Biol*, 30(5S): 831-834.
- Baytop T 1999. *Turkiye' de Bitkilerle Tedavi*. Istanbul: Nobel Týp Kitabevleri.
- Beloin N, Messanvi G, Akpagana K, Hudson J, De Souza K, Koumaglo K, Thor Arnason J 2005. Ethnomedicinal uses of *Momordica charantia* (Cucurbitaceae) in Togo and relation to its phytochemistry and biological activity. *J Ethnopharmacol*, 96: 49-55.
- Black PL, Arnason JT, Cuerrier A 2008. Medicinal plants used by the Inuit of Qikiqtaaluk (Baffin Island, Nunavut). *Botany*, 86: 157-163.
- Bnouham M, Mekhfi H, Legssyer A, Ziyat A 2002. Medicinal plants used in the treatment of diabetes in Morocco. *Int J Diabetes Metabol*, 10: 33-50.
- Bonet MA, Valles J 2003. Pharmaceutical ethnobotany in the Montseny biosphere reserve (Catalonia, Iberian Peninsula). General results and new or rarely reported medicinal plants. *J Pharm Pharmacol*, 55: 259-270.
- Borrelli F, Izzo AA 2000. The plant kingdom as a source of anti-ulcer remedies. *Phytother Res*, 14: 581-591.
- Cakilcioglu U, Turkoglu I 2010. An ethnobotanical survey of medicinal plants in Sivrice (Elazig-Turkey). *J Ethnopharmacol*, 132: 165-175.
- Camejo-Rodrigues J, Ascensao L, Bonet MA, Valles J 2003. An ethnobotanical study of medicinal and aromatic plants in the Natural Park of "Serra de Sao Mamede" (Portugal). *J Ethnopharmacol*, 89: 199-209.
- Cavender A 2006. Folk medical uses of plant foods in southern Appalachia, United States. *J Ethnopharmacol*, 108: 74-84.
- Chevallier A 1996. *The Encyclopedia of Medicinal Plants*. Dorling Kindersley, London.
- Chopra RN, Nayar SL, Chopra IC 1986. *Glossary of Indian Medicinal Plants (Including the Supplement)*. New Delhi: Council of Scientific and Industrial Research.
- Davis PH (Ed.) 1965-1982. *Flora of Turkey and East Aegean Islands*. Volume 1-10. Edinburgh: Edinburgh University Press.
- Di Stasi LC, Oliveira GP, Carvalhoes MA, Queiroz-Junior M, Tien OS, Kakinami SH, Reis MS 2002. Medicinal plants popularly used in the Brazilian Tropical Atlantic Forest. *Fitoterapia*, 73: 69-91.
- Dogan Y 2012. Traditionally used wild edible greens in the Aegean Region of Turkey. *Acta Soc Bot Pol*, 81(4): 245-255.
- Dogan Y, Baslar S, Ay G, Aydin H, Yorek N, Mert HH 2005. Poisonous plants distributed naturally in Turkey. *Pharmacia*, 52: 50-55.
- Dogan Y, Baslar S, Celik A, Mert HH, Ozturk M 2004b. A study of the roadside plants of West Anatolia, Turkey. *Nat Croat*, 13(1): 63-80.
- Dogan Y, Baslar S, Mert HH, Ay G 2004a. The use of wild edible plants in Western and Central Anatolia (Turkey). *Econ Bot*, 58(4): 684-690.
- Dogan Y, Durkan N, Baslar S 2007. Trace element pollution biomonitoring using the bark of *Pinus brutia* (Turkish red pine) in the Western Anatolian part of Turkey. *Trace Elem Electroly*, 24 (3): 146-150.
- Dogan Y, Mert HH 1998. An autecological Study on the *Vitex agnus-castus* L. (Verbenaceae) distributed in West Anatolia. *Turk J Bot*, 22: 327-334.
- Dogan Y, Nedelcheva AM, Baslar S 2010a. Plant patterns of silk based needlework, a traditional handicraft in Turkey. *Indian J Tradit Know*, 9(4): 640-643.
- Dogan Y, Nedelcheva AM, Obratov-Petkovic D, Padure IM 2008. Plants used in traditional handicrafts in several Balkan countries. *Indian J Tradit Know*, 7 (1): 157-161.
- Dogan Y, Ugulu I, Baslar S 2010b. Turkish red pine as a biomonitor: A comparative study of the accumulation of trace elements in needles and barks. *Ekoloji*, 19 (75): 88-96.
- Dogan Y, Ugulu I, Durkan N 2013. Wild edible plants sold in the local markets of Izmir. *Pak J Bot*, 45(S1): 177-184.
- Dogan Y, Ugulu I, Durkan N, Unver MC, Mert HH 2011. Determination of some ecological characteristics and economical importance of *Vitex agnus-castus*. *Eurasia J Biosci*, 5: 10-18.
- Dogan, Y., S. Baslar S, H. H. Mert HH, and G Ay G 2003. Plants used as natural dye sources in Turkey. *Econ Bot*, 57(4): 442-453.
- Dwivedi SN, Dwivedi S, Patel PC 2006. Medicinal plants used by the tribal and rural people of Satna District, Madhya Pradesh for the treatment of gastrointestinal diseases and disorders. *Nat Prod Rad*, 5(1): 60-63.
- El-Hilaly J, Hmammouchi M, Lyoussi B 2003. Ethnobotanical studies and economic evaluation of medicinal plants in Taounate province (Northern Morocco). *J Ethnopharmacol*, 86: 149-158.

- Erci B 2007. Attitudes towards holistic complementary and alternative medicine: A sample of healthy people in Turkey. *J Clin Nurs*, 16: 761-768.
- Ertug F 2000. An ethnobotanical study in Central Anatolia (Turkey). *Econ Bot*, 54(2): 155-182.
- Estomba D, Ladio A, Lozada M 2006. Medicinal wild plant knowledge and gathering patterns in a Mapuche community from North-western Patagonia. *J Ethnopharmacol*, 103: 109-119.
- Gedif T, Hahn HJ 2003. The use of medicinal plants in self-care in rural central Ethiopia. *J Ethnopharmacol*, 87: 155-161.
- Ghorbani A 2005. Studies on pharmaceutical ethnobotany in the region of Turkmen Sahra, north of Iran (Part 1): General results. *J Ethnopharmacol*, 102: 58-68.
- Giday M, Asfaw Z, Elmqvist T, Woldu Z 2003. An ethnobotanical study of medicinal plants used by the Zay People in Ethiopia. *J Ethnopharmacol*, 85: 43-52.
- Grover JK, Yadav SP 2004. Pharmacological actions and potential uses of *Momordica charantia*: a review. *J Ethnopharmacol*, 93: 123-132.
- Guarrera PM, Forti G, Marignoli S 2005a. Ethnobotanical and ethnomedicinal uses of plants in the district of Acquapendente (Latium, Central Italy). *J Ethnopharmacol*, 96: 429-444.
- Guarrera PM, Salerno G, Caneva G 2005b. Folk phytotherapeutic plants from Maratea Area (Basilicata, Italy). *J Ethnopharmacol*, 99: 367-378.
- Guarrera PM 2005. Traditional phytotherapy in Central Italy (Marche, Abruzzo, and Latium). *Fitoterapia*, 76: 1-25.
- Gurbuz I, Akyuz C, Yesilada E, Sener B 2000. Anti-ulcerogenic effect of *Momordica charantia* L. fruits on various ulcer models in rats. *J Ethnopharmacol*, 71: 77-82.
- Heinrich M 2000. Ethnobotany and its role in drug development. *Phytother Res*, 14: 479-488.
- Inta A, Shengji P, Balslev H, Wangpakapattanawong P, Trisonthi C 2008. A comparative study on medicinal plants used in Akha's traditional medicine in China and Thailand, cultural coherence or ecological divergence. *J Ethnopharmacol*, 116(3): 508-17.
- Isikhan V, Komurcu S, Ozet A, Arpacı F, Oztürk B, Balbay O, Guner P 2005. The status of alternative treatment in cancer patients in Turkey. *Canc Nurs*, 28: 355-362.
- Jackson F 1996. The coevolutionary relationship of humans and domesticated plants. Yearbk. *Phys Anthropol*, 39: 161-176.
- Kala CP 2005. Ethnomedicinal botany of the Apatani in the Eastern Himalayan region of India. *J Ethnobiol Ethnomed*, 1: 11-19.
- Karaman S, Kocabas YZ 2001. Traditional Medicinal Plants of K. Maras (Turkey). *J Med Sci*, 1 (3): 125-128.
- Kargioglu M, Cenkcı S, Serteser A, Evliyaoglu N, Konuk M, Kok MS, Bagcı Y 2008. An ethnobotanical survey of Inner-West Anatolia, Turkey. *Hum Ecol*, 36: 763-777.
- Krause R, Bielenberg J, Blaschek W, Ullmann U 2004. In vitro anti-*Helicobacter pylori* activity of extractum liquiritiae, glycyrrhizin and its metabolites. *J Antimicrob Chemother*, 54(1): 243-246.
- Kultur S 2007. Medicinal plants used in Kırklareli Province (Turkey). *J Ethnopharmacol*, 111: 341-364.
- Loi MC, Poli F, Sacchetti G, Seleno MB, Ballero A 2004. Ethnopharmacology of Ogliastra (Villagrande Strisaili, Sardinia, Italy). *Fitoterapia*, 75: 277-295.
- Maity S, Vedasiromoni JR, Ganguly DK 1995. Anti-ulcer effect of the hot water extract of black tea (*Camellia sinensis*). *J Ethnopharmacol*, 46: 167-174.
- Martin GJ 1995. *Ethnobotany: A Methods Manual*. London: Chapman and Hall.
- Mert HH, Baslar S, Dogan Y 1993. Some medicinal plants which are grown around Izmir and usage of them. *Buca Egit Fak Der*, 2 (2): 73-77.
- Merzouki A, Ed-derfoufi F, Molero Mesa J 2000. Contribution to the knowledge of Rifian traditional medicine. II: Folk medicine in Ksar Lakbir district (NW Morocco). *Fitoterapia*, 71: 278-307.
- Murakami T, Emoto A, Matsuda H, Masayuki YM 2001. Medicinal Foodstuffs. XXI.1) Structures of New Cucurbitane-Type Triterpene Glycosides, Goyaglycosides-a, -b, -c, -d, -e, -f, -g, and -h, and New Oleanane-Type Triterpene Saponins, Goyasaponins I, II, and III, from the Fresh Fruit of Japanese *Momordica charantia* L. *Chem Pharmaceut Bull*, 49(1): 54-63.
- Muthu C, Ayyanar M, Raja N, Ignacimuthu S 2006. Medicinal plants used by traditional healers in Kancheepuram district of Tamil Nadu, India. *J Ethnobiol Ethnomed*, 2: 43.
- Natarajan B, Paulsen BS, Korneliusen V 2000. An ethnopharmacological study from Kulu district, Himachal Pradesh, India: traditional knowledge compared with modern biological science. *Pharmaceut Biol*, 38(2): 129-138.
- Nedelcheva A 2012. Medicinal plants from an old Bulgarian medical book. *J Med Plants Res*, 6(12): 2324-2339.
- Nedelcheva AM, Dogan Y, Obratov-Petkovic D, Padure IM 2011. The traditional use of plants as handicrafts in Southern Europe. *Hum Ecol*, 39(6): 813-828.
- Nedelcheva AM, Dogan Y, Guarrera PM 2007. Plants traditionally used to make brooms in several European countries. *J Ethnobiol Ethnomed*, 3: 20.
- Oguz S, Pýnar R 2000. Mostly, Which Kind of Complementary Medical Methods are Preferred? *Paper presented in 1st International & 3rd National Nursing Congress* in Akdeniz University, Antalya, 29 October-2 November, 2000. Oguz S, Pýnar R 2001. Mostly, Which Kind of Complementary Medical Methods are Preferred? *1st International and 8th National Nursing Congress Book*, Marmara University College of Nursing Publishing, Istanbul.
- Olajuyigbe OO, Afolayan AJ 2012. Ethnobotanical survey of medicinal plants used in the treatment of gastrointestinal disorders in the Eastern Cape Province, South Africa. *J Med Plants Res*, 6(18): 3415-3424. DOI: 10.5897/JMPR11.1707.
- Osocki AL, Lohr P, Reiff M, Balick MJ, Kronenberg F, Fugh-Berman A, O'Connor B 2002. Ethnobotanical literature survey of medicinal plants in the Dominican Republic used for women's health conditions. *J Ethnopharmacol*, 79: 285-298.
- Oztig F 1971. *Faydalı bitkiler: Ekonomik deđeri ve morfolojik özellikleri yönünden bitki cinsleri*. Istanbul Üniversitesi Fen Fakültesi, Istanbul.
- Palombo EA 2006. Phytochemicals from traditional medicinal plants used in the treatment of diarrhoea: modes of action and effects on intestinal function. *Phytother Res*, 20(9): 717-724.
- Pieroni A, Quave CL 2005. Traditional pharmacopoeias and medicines among Albanians and Italians in southern Italy: A comparison. *J Ethnopharmacol*, 101: 258-270.

- Pieroni A, Quave CL, Santorod RF 2004. Folk pharmaceutical knowledge in the territory of the Dolomiti Lucane, inland southern Italy. *J Ethnopharmacol*, 95: 373-384.
- Pieroni A, Rexhepi B, Nedelcheva A, Hajdari A, Mustafa B, Kolosova V, Cianfaglione K, Quave CL 2013. One century later: the folk botanical knowledge of the last remaining Albanians of the upper Reka Valley, Mount Korab, Western Macedonia. *J Ethnobiol Ethnomed*, 9: 22.
- Pieroni A, Harald M, Akbulut M, Baser KHC, Durmuskahya C 2005. Traditional phytotherapy and trans-cultural pharmacy among Turkish migrants living in Cologne, Germany. *J Ethnopharmacol*, 102: 69-88.
- Pieroni P, Nebel S, Quave C, Harald M, Heinrich M 2002. Ethnopharmacology of liakra: Traditional weedy vegetables of the Arbereshe of the Vulture area in southern Italy. *J Ethnopharmacol*, 81: 165-185.
- Repetto MG, Llesuy SF 2002. Antioxidant properties of natural compounds used in popular medicine for gastric ulcers. *Braz J Med Biol Res*, 35(5): 523-534.
- Ricci D, Giamperi L, Bucchini A, Fraternali D 2006. Antioxidant activity of *Punica granatum* fruits. *Fitoterapia*, 77: 310-312.
- Rivera D, Obon C, Inocencio C, Heinrich M, Verde A, Fajardo J, Llorach R 2005. The ethnobotanical study of local Mediterranean food plants as medicinal resources in southern Spain. *J Physiol Pharmacol*, 56: 97-114.
- Saghir IA, Awan AA, Majid S, Khan MA, Qureshi SJ, Bano S 2001. Ethnobotanical studies of Chikar and its allied areas of District Muzaffarabad. *Online J Biol Sci*, 1(12): 1165-1170.
- Said O, Khalil K, Fulder S, Azaizah H 2002. Ethnopharmacological survey of medicinal herbs in Israel, the Golan Heights and the West Bank Region. *J Ethnopharmacol*, 83: 251-265.
- Sandhu DS, Heinrich M 2005. The use of health foods, spices and other botanicals in the Sikh Community in London. *Phytother Res*, 19: 633-642.
- Sezik E, Yesilada E, Shadidoyatov H, Kulivey Z, Nigmatullaev AM, Aripov HN, Takaishi Y, Takeda Y, Honda G 2004. Folk medicine in Uzbekistan I. Toshkent, Djizzax, and Samarqand provinces. *J Ethnopharmacol*, 92: 197-207.
- Silig Y, Cetinkaya O, Demirezer LO 2004. Effects of *Rumex patientia* L. extract on some drug-metabolizing enzymes in rat liver. *Indian J Biochem Biophys*, 41: 45-47.
- Simsek I, Aytekin F, Yesilada E, Yıldırymlı S 2004. An ethnobotanical survey of the Beypazarı, Ayas, and Gudul District Towns of Ankara Province (Turkey). *Econ Bot*, 58: 705-720.
- Suleyman H, Demirezer LO, Kuruuzum-Uz A. 2004. Effects of *Rumex patientia* root extract on indomethacine and ethanol induced gastric damage in rats. *Pharmazie*, 59(2): 147-149.
- Tan M, Uzun O, Akcay F 2004. Trends in complementary and alternative medicine in Eastern Turkey. *J Alternative Compl Med*, 10: 861-865.
- Teklehaymanot T, Giday M 2007. Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, northwestern Ethiopia. *J Ethnobiol Ethnomed*, 3: 12.
- Trotter R, Logan M 1986. Informant consensus: A new approach for identifying potentially effective medicinal plants. In: NL Etkin (Ed.): *Plants in Indigenous Medicine and Diet: Biobehavioural Approaches*. Bedford Hills, New York: Redgrave Publishers, pp. 91-112.
- Tuzlaci E, Tolon E 2000. Turkish folk medicinal plants. Part III: "ile (Istanbul). *Fitoterapia*, 71(6): 673-685.
- Tuzlaci E, Erol MK 1999. Turkish folk medicinal plants. Part II: Eđirdir (Isparta). *Fitoterapia*, 70: 593-610.
- Tuzlaci E, Aymaz PE 2001. Turkish folk medicinal plants. Part IV: Gonen (Balıkesir). *Fitoterapia*, 72(4): 323-343.
- Ugulu I 2011. Traditional ethnobotanical knowledge about medicinal plants used for external therapies in Alasehir, Turkey. *Int J Med Arom Plants*, 1(2): 101-106.
- Ugulu I 2012. Fidelity level and knowledge of medicinal plants used to make Therapeutic Turkish Baths. *Stud Ethno-med*, 6(1): 1-9.
- Ugulu I 2013. Development and validation of an instrument to measure university students' attitudes toward traditional knowledge. *J Hum Ecol*, 43(2): 151-158.
- Ugulu I, Aydin H 2011. Research on students' traditional knowledge about medicinal plants: Case study of high schools in Izmir, Turkey. *J Appl Pharmaceut Sci*, 1(9): 43-46.
- Ugulu I, Baslar S 2010. The determination and fidelity level of medicinal plants used to make traditional Turkish salves. *J Alternative Compl Med*, 16(3): 313-322.
- 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 Plants Res*, 3(5): 345-367.
- Ugulu I, Dogan Y, Baslar S, Varol O 2012. Biomonitoring of trace element accumulation in plants growing at Murat Mountain. *Int J Environ Sci Tech*, 9: 527-534.
- Ugulu I, Dogan Y, Kesercioglu T 2012. The vascular plants of Buca Faculty of Education Campus (Izmir): Contribution to educational practices. *Eurasia J Biosci*, 6: 11-23.
- Ugurlu E, Secmen O 2008. Medicinal plants popularly used in the villages of Yunt Mountain (Manisa-Turkey). *Fitoterapia*, 79:126-131.
- Uzun E, Sariyar G, Adersen A, Karakoc B, Otuk G, Oktayoglu E, Pirildar S 2004. Traditional medicine in Sakarya province (Turkey) and antimicrobial activities of selected species. *J Ethnopharmacol*, 95: 287-296.
- Wondimu T, Asfaw Z, Kelbessa E 2007. Ethnobotanical study of medicinal plants around 'Dheeraa' town, Arsi Zone, Ethiopia. *J Ethnopharmacol*, 112: 152-161.
- Vidal A, Fallarero A, Peña BR, Medina ME, Gra B, Rivera F, Gutierrez Y, Vuorela PM 2003. Studies on the toxicity of *Punica granatum* L. (Punicaceae) whole fruit extracts. *J Ethnopharmacol*, 89: 295-300.
- Vidrich V, Fusi P, Graziano A, Silvestrini E, Michelozzi M, Marco F 2004. Chemical composition of the essential oil of *Pistacia lentiscus* L. *J Essent Oil Res*, 16(3): 223-226.
- Yesilada E, Sezik E, Fujita T, Tanaka S, Tabata M 1993. Screening of some Turkish medicinal plants for their antiulcerogenic activities. *Phytother Res*, 7(3): 263-265.
- Yesilada E, Honda G, Sezik E 1995. Traditional medicine in Turkey V. Folk medicine in the inner Taurus Mountains. *J Ethnopharmacol*, 46: 133-155.
- Zafar M, Bokharie SYA, Tariq MA, Shaikat K, Arkam A 2003. Taxonomical description and ethnobotanical survey for indigenous use of some medicinal plants of Rawalpindi District. *Asian J Plant Sci*, 2(6): 475-479.
- Zeybek N 1985. *Farmasotik botanik, kapali tohumlu bitkiler sistematiđi ve önemli maddeleri*. Ege Universitesi Eczacilik Fakultesi Yayinlari, No. 1, Izmir.