



An Ethnobotanical Study of Medicinal Plants in Mersin (Turkey)

Gizem Emre^{1*}, Ahmet Dogan¹, Mehmet Zeki Haznedaroglu², Ismail Senkardes¹, Mahmut Ulger³, Aysen Satiroglu⁴, Berivan Can Emmez⁵ and Osman Tugay⁶

¹Department of Pharmaceutical Botany, Faculty of Pharmacy, Marmara University, Basibuyuk-Istanbul, Turkey, ²Department of Pharmaceutical Botany, Faculty of Pharmacy, Izmir Katip Celebi University, Cigli-Izmir, Turkey, ³Department of Pharmaceutical Microbiology, Faculty of Pharmacy, Mersin University, Yenisehir-Mersin, Turkey, ⁴Department of Sociology, Faculty of Letters, Istanbul University, Fatih-Istanbul, Turkey, ⁵Department of Turkish Language and Literature, Faculty of Humanities and Social Sciences, Adana Alparslan Turkes University, Adana, Turkey, ⁶Department of Pharmaceutical Botany, Faculty of Pharmacy, Selcuk University, Selcuklu-Konya, Turkey

This comprehensive ethnobotanical study carried out in Mersin province, which is located in the southern part of Anatolia, east of the Mediterranean Sea, compiles details on plants used in folk medicine and ethnopharmacological information obtained through face-to-face interviews. The aim was to collect and identify plants used for therapeutic purposes by local people and to record information on traditional herbal medicine. Plant specimens were collected in numerous excursions. Additionally, informant consensus factor and use value (UV) were calculated for information gathered. This study identifies 93 plant taxa belonging to 43 families and records their usage in folk medicine; 83 taxa are wild and the remaining 10 are cultivated. The most commonly used plants belong to Lamiaceae, representing 15.0% of the total, while the Rosaceae, Malvaceae, Hypericaceae, Asteraceae and Cupressaceae families each represented another 5.4%. As a result of this investigation, we determine 189 medicinal usages of 93 taxa. The UV values indicate that the most important medicine plants are *Hypericum perforatum* (0.80), *Cedrus libani* (0.78), *Quercus coccifera* (0.77), *Arum dioscoridis* (0.76) and *Juniperus drupaceae* (0.74). We observed that most of the drugs are prepared using the infusion method (27.6%). As a conclusion, the study finds that traditional folk medicine usage is still common, especially among the rural population of Mersin.

Keywords: Ethnobotany, folk medicinal plants, traditional knowledge, Mersin, Turkey

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Manuel Pardo de Santayana,
Autonomous University of Madrid,
Spain

*Correspondence:

Gizem Emre
gizem.bulut@marmara.edu.tr

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INTRODUCTION

The Mediterranean area, which possesses a unique ecology with various natural features, has been inhabited for millennia and is strongly influenced by human–nature relationships (Scherrer et al., 2005). The tradition of using wild plants for medicinal reasons continues in today's small rural communities, especially among societies that maintain the cultural bridge between past and present. While the recently developed fast communication technologies connect people in seconds and spread data across vast distances, traditional knowledge still holds importance in daily life. Over the past few decades, efforts to preserve traditional knowledge have escalated around the world, especially in Europe and Mediterranean countries (Varga et al., 2019).

Besides being home to many plants in floristic terms, Turkey is rich in traditional herbal medicine, in addition to its cultural, historical and geographical heritage (Bulut et al., 2013). Ethnobotanical studies show that traditional knowledge of medicinal plants still exists in the Mediterranean Region,



especially among elderly (Agelet, et al., 2003). Many scientists have focused on such studies and governmental foundations have increased financial support of this kind of research. The Turkish Ministry of Agriculture and Forestry has organized studies across the country in the scope of the “Recording of Traditional Knowledge Based on Biological Diversity Project.”

The Taurus Mountains are one of the highlights of the Mediterranean Region with a rich plant diversity (Everest et al., 2005). Mersin has previously been the subject of this kind of scientific research, such as a study on herbal drugs on herbal markets in Mersin, which was conducted throughout the entire province (Everest et al., 2005). Thorough documentation of the traditional use of medicinal plants across the entirety of Mersin province is not presently available. Three districts (Sargın 2015; Sargın et al., 2015; Sargın and Büyükcengiz, 2019) and some specific areas of the province have been investigated from an ethnobotanical perspective. Another study investigates a small section of the region (Akaydın et al., 2013); however, as one of the largest cities in Turkey, Mersin needs further investigation from an ethnobotanical perspective.

We aim to record the traditional usage of medicinal plants by conducting an ethnobiological study in Mersin that covers various different altitudes and areas representing all ten of its districts.

To this end, we compare the gathered ethnomedicinal data with previous findings from the Balkan and Mediterranean regions. We highlight new plants and usages from the region for future phytochemical and phytopharmacological studies. With further cultivation studies, these findings may

demonstrate the potential for economic development for the benefit of local communities.

Hypothesis of this study tests;

- a Traditional knowledge is still being used in villages far from the city and main settlement centers,
- b Plants are still being used in the more isolated villages.

MATERIALS AND METHODS

Mersin is a province in southwestern Anatolia, located at a latitude of $36^{\circ} 37'$ north and a longitude of $33^{\circ} 35'$ east; covering a $15,853 \text{ km}^2$ area with a population of 1,814,468 (<http://www.tuik.gov.tr>) (Figure 1). The majority of the acreage is mountainous (87%) and forestland is 54%. There are ten districts: Anamur, Aydıncık, Bozyazı, Camliayla, Erdemli, Gülnar, Merkez, Silifke, Mut, and Tarsus. This ethnobotanical survey includes 91 villages located in all ten districts of Mersin (Figure 2).

The territory of the province consists primarily of the high, rugged, rocky Western and Central Taurus Mountains. The highest point in Mersin is Mount Medetsiz (3,585 m) in the Bolkar Mountains. The altitude decreases from northwest toward the south. Kumpet Mountain (2,473 m), Elma Mountain (2,160 m), Alamusa Mountain (2,013 m), Big Egrı Mountain (2,025 m), Kızıl Mountain (2,260 m), Naldoken Mountain (1,754 m), and Kabaklı Mountain (1,675 m) are the topographic heights from the Bolkar Mountains in the west.

Karaziyaret Mountain, Tol Mountain, Sunturas Mountain, Balkalesi, Ayyagedigi Mountain, Makam Mountain and

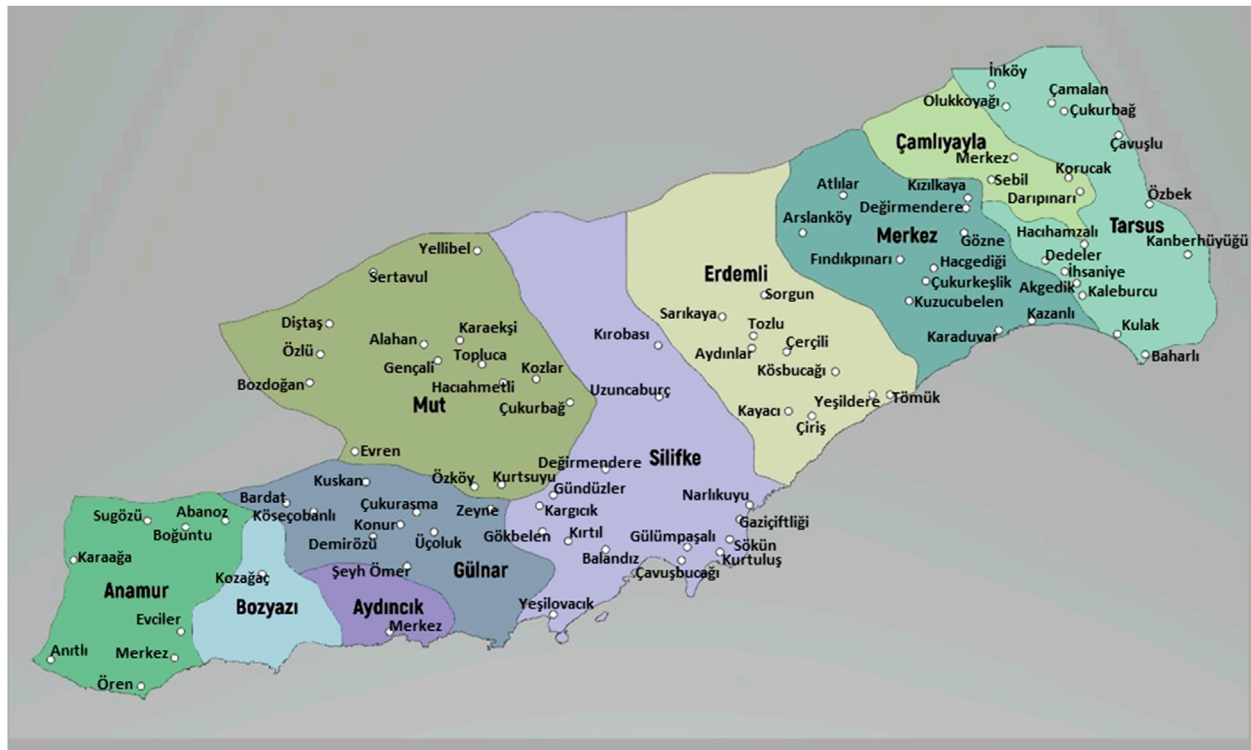


FIGURE 2 | Map of visited villages of study area.

Kaskaya Mountain are other important elevations heading toward the south. Mersin is connected to Central Anatolia through Gulek Pass (1,050 m) from the northeast and Sertavul Pass (1,610 m) from northwest.

Rivers, streams, atmospheric conditions and the tectonic faults in the region give rise to various plains in the upper reaches of the Taurus Mountains, with altitudes ranging from 700 to 1,500 m. Major plateau areas of Mersin include the highlands of Aslankoy, Gozne, Fındıkpinari, Sogucak, Bekiralani, Mihrican, Ayvagediği and Guzelyayla, Camliyayla, Gulek and Sebil, Sorgun, Kucuk Sorgun, Toros, Kucukfındıklı and Guzeloluk, Balandiz, Uzuncaburc, Gokbelen and Kirobasi, Abanoz, Kas and Besoluk, Bozyazi, Elmagozu and Kozagac, Bardat, Tersakan and Bolyaran, Kozlar, Civi, Dagpazari, Sogutozu and Sertavul (Figure 3). The province is not rich in terms of rivers. The most important rivers are the Goksu and Berdan streams.

The climate is Mediterranean with an annual mean temperature of 22°C and a mean rainfall of 1,096 mm per year (Meteoroloji Genel Müdürlüğü, 2020).

The primary sources of income in Mersin are industry (40%), agriculture (30%), and trade/business sector (10%).

The main crops of Mersin are wheat, barley and cotton. Mersin plays an important role in greenhouse cultivation of various agricultural products, of which banana production in Anamur is one of the most famous. *Citrus* trees, tropical fruits and vegetables are also commonly cultivated.

The vegetation of Mersin district presented here is based on the authors' own observations and field records. Mersin, which is generally covered with maquis or forest vegetation, contains



FIGURE 3 | View of Camliyayla highland.

Mediterranean elements. In areas with maquis, plants such as *Ceratonia siliqua* L., *Cistus creticus* L., *Laurus nobilis* L., *Myrtus communis* L., *Nerium oleander* L., *Paliurus spina-christi* P. Mill., *Phillyrea latifolia* L., and *Quercus coccifera* L. are widespread. Tree species such as *Pinus nigra* J.F. Arnold subsp. *pallasiana* (Lamb.) Holmboe, *Cedrus libani* A. Rich. var. *libani*, *Abies cilicica* (Antoine and Kotschy) Carriere subsp. *cilicica*, *Juniperus excelsa* M. Bieb. subsp. *excelsa*, *J. foetidissima* Willd., *J. oxycedrus* L.

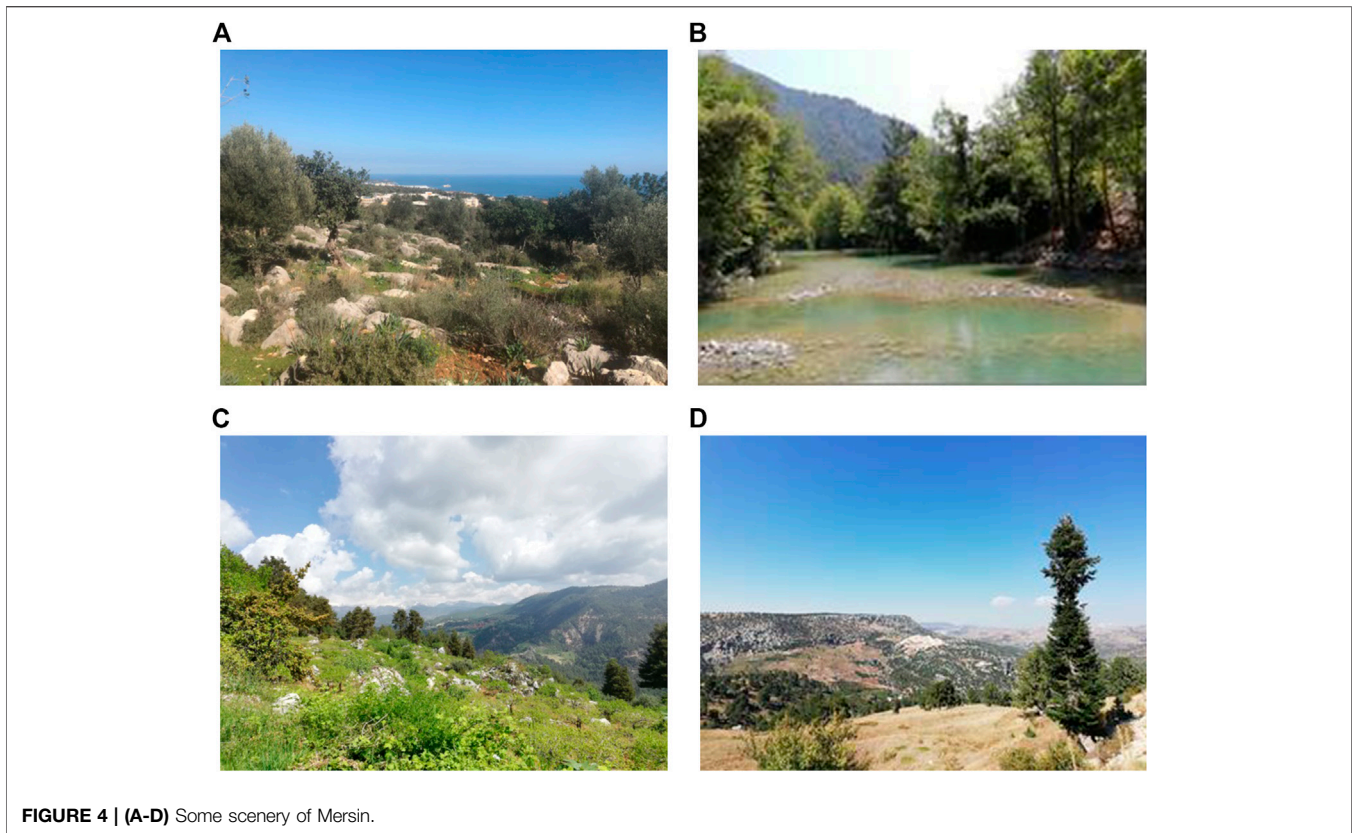


FIGURE 4 | (A-D) Some scenery of Mersin.

subsp. *oxycedrus*, are observed in high altitudes (above 900 m). Lowland forest areas usually consist of *Pinus brutia* Ten. (Davis, 1965; Davis et al., 1988; Güner et al., 2000).

Mersin province also has significant dune and halophyte vegetation, including taxa such as *Cyperus capitatus* Vand., *Eryngium maritimum* L., *Euphorbia paralias* L., *Pancratium maritimum* L., *Halimione portulacoides* (L.) Aellen, *Juncus acutus* L. subsp. *acutus*, *J. maritimus* Lam., *Limonium virgatum* (Willd.) Fourr. and *Tamarix smyrnensis* Bunge (Davis, 1965; Davis et al., 1988; Güner et al., 2000) (Figures 4A–D).

Some plants of Mersin are endemic to Turkey; such as *Alkanna hispida* Hub.-Mor., *Anthemis rosea* Sm. subsp. *carnea* (Boiss.) Grierson (Figure 5), *Astragalus schottianus* Boiss., *Centaurea pinetorum* Hub.-Mor. (Figure 6), *Colchicum balansae* Planch., *Crocus boissieri* Maw, *Delphinium dasystachyon* Boiss. and Balansa, *Eryngium polycephalum* Hausskn. ex H. Wolff, *Ferulago pauciradiata* Boiss. and Heldr., *Lamium eriocephalum* Benth., *Ophrys cilicica* Schltr., *Origanum boissieri* Ietsw., *Papaver pilosum* Sibth. and Sm. subsp. *glabrisepalum* Kadereit, *Pimpinella isaurica* V.A.Matthews subsp. *isaurica*, *Salvia heldreichiana* Boiss. ex Benth., and *Sideritis cilicica* Boiss. and Balansa (Davis, 1965; Davis et al., 1988; Güner et al., 2000).

Demographic Characteristics of Respondents

As mentioned above, Mersin is one of the most populous provinces of Turkey with a population density of 114.45/km². Due to the migration mobility in the region, 55,779 people moved

into and 61,917 people left the city center between 2017–2018. Regarding the population growth rate, there was a notable population increase in districts close to the city center. The number of men and women living in the province is almost equal, more than half of the population are under the age of 35, 38% are 35–64 and 9% of the population are over 65. The literacy rate is 97.72 (TUIK, 2020).

The villages of Mersin province have different characteristics depending on local geographical features, such as whether they

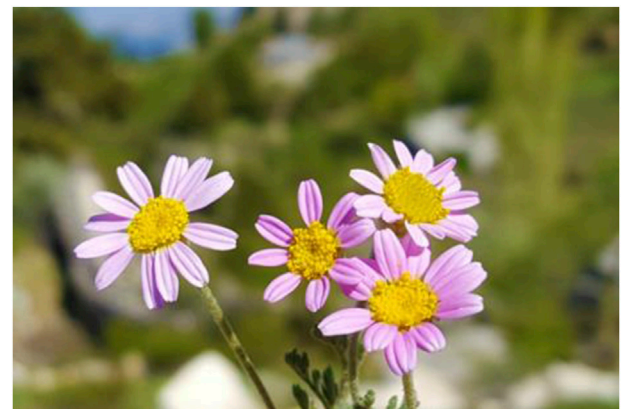


FIGURE 5 | Habit view of endemic *Anthemis rosea* subsp. *carnea*.



FIGURE 6 | Habit view of endemic *Centaurea pinetorum*.

are located at high or low (near the coast) altitudes, or are near to or far from the city. There are also migrant villages and a few semi-nomadic families living in the highlands. Most of the villages in Mersin are Yoruk, alongside villages consisting of Tahtacı, Cretan and Circassian peoples. As all of the participants spoke Turkish (some elderly participants could speak Cretan and Circassian languages in addition to Turkish), we did not experience language or communication problems. Most of the remaining population of these villages is elderly. Although many of them were literate, most were at the level of primary school education.

Data Collection

This study was conducted following the guidelines for best practices in ethnopharmacological research (Heinrich et al., 2018). Ethnobotanical data were collected in face-to-face interviews (**Appendix 1**) conducted in Turkish with inhabitants of Mersin on several trips to the province between 2018 and 2019. Field work was carried out over a total of 71 days. Plant vouchers were collected in collaboration with the informants. We adhered to The International Society of Ethnobiology Code of Ethics in interviews (International

Society of Ethnobiology Code of Ethics with 2008 additions <http://ethnobiology.net/code-of-ethics/>).

A total of 338 interviews were performed. Of the participants, 247 were male and 91 were female.

The informants' occupations were farmers, housewives, shepherds, mukhtar (village headmen), labourers (forestry workers) and cafe owners. Interviews were performed in various settings, such as coffee houses, gardens, houses and fields. Experienced adults, patients and local healers were the main source of information about local names, part(s) of plants used, ailments treated, therapeutic effects, methods of preparation and methods of administration. Interviews also covered adverse effects of folk medicines. Although the primary focus of our study was to collect information on the folkloric use of medicinal plants, animal-based remedies were also discussed and recorded.

Collected plants were identified according to "The Flora of Turkey and East Aegean Islands" (Davis, 1965; Davis et al., 1988; Guner et al., 2000) and "Illustrated Flora of Turkey Vol 2" (Güner et al., 2018). Voucher specimens were deposited at the Herbarium of the Faculty of Pharmacy at Marmara University (MARE) and Herbarium of Konya at Selçuk University (KNYA).

Data Analyses

Informant consensus factor (Trotter and Logan, 1986; Heinrich et al., 1988) was calculated according to the following formula: $FIC = \frac{Nur - Nt}{Nur - 1}$, where *Nur* refers to the number of citations used in each category and *Nt* to the number of species used. This method demonstrates the homogeneity of the information: if plants are chosen randomly or if informants do not contribute information about their use, FIC values will be close to zero. If there is a well-defined selection criterion in the community and/or if information is given between the informants' values, the value will be close to one (Afifi and Abu-Irmaileh, 2000; Abu-Irmaileh and Afifi, 2003). Medicinal plants with higher FIC values are considered to be more likely to be effective in treating a certain disease (Teklehaymanot and Giday, 2007).

A quantitative method called "use value" (UV_s), calculated according to the formula UV_s (medicinal use value) parameter using the Phillips and Gentry, 1993 formula as modified and used by Thomas et al., 2009:

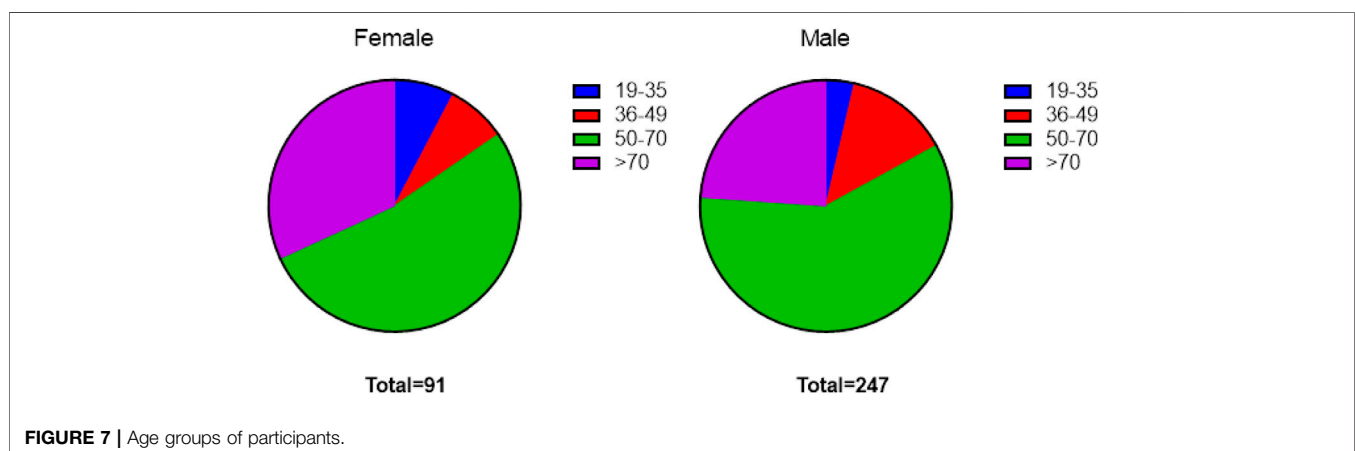


FIGURE 7 | Age groups of participants.

$$UV_s = \sum_{ni=1} U_{is} / ns$$

in which UV_s is the use value of a given species s , U_{is} is the number of uses of species s listed by the informant i , and ns is the total number of informants.

We used the most common method of dendrogram clustering to demonstrate the relationship of the taxa and traditional usages in ten different districts of Mersin. The Unweighted Pair Group Method with Arithmetic Mean (UPGMA) was used for statistical analysis with v2. (Sokal and Michener, 1958; Bailey, 1994).

The proportion and pairwise-proportion (with Holm adjustment) tests were used to compare the true (population) proportions. These tests were performed in R and the significance level was fixed at 0.05.

RESULTS

Demographic Features of the Informants

Details on the demographic characteristics of the participants were asked in face-to-face interviews. Among 338 participants, 16 were 19–35 years of age, 40 were 36–49, 194 were 50–70 and 88 were over the age of 70. The majority of the respondents were male (247) and 91 were female.

The age of the informants ranged between 19 and 91 years old with a mean age of 68 years.

Among all the participants; 25 were illiterate (7%), 37 were literate (11%), 190 had graduated from elementary school (57%), 43 from middle school (12%), 30 from high school (9%) and 13 from university (4%) (Figures 7A,B, 8A,B).

The occupational groups of the participants consist of farming, animal husbandry, beekeeping, shepherding, retired, tradesmen and housewives. We gained access to four local healers, who can be regarded as practitioners of traditional medicine, for this study.

It should be noted that the reason women informants constituted only one third of the total number is that the study started mostly in the coffeehouses, which were generally in the center of the villages and in Turkey are frequented only by men.

Medicinal Plants and Related Knowledge

The plants used for medicinal treatment of human beings in Mersin are listed in Table 1, while Table 2 shows the plants that

see veterinary use. Both are arranged alphabetically by botanical name and include relevant information. Taxonomic changes according to The Plant List (The Plant List, 2013) are shown in parentheses with scientific names in Table 1. In total, 324 plant specimens were collected in the research area during the study period. Among these, 93 medicinal plants belonging to 43 families were identified; of these 83 taxa were wild and 10 were cultivated. The most commonly used medicinal plants were in the Lamiaceae (14 taxa), Rosaceae (5 taxa), Malvaceae (5 taxa), Hypericaceae (5 taxa), Asteraceae (5 taxa) and Cupressaceae (5 taxa) families.

The UV data is summarized in the statistical data analysis section. Amongst the most commonly used plants were *Hypericum* species. During our interviews, participants shared that they learned about using the oleate of *Hypericum* species for external wound treatment from their ancestors, emphasizing that it was even used for sword wounds in ancient times. We even observed that many of the participants' kept this oleate in their homes.

The fruit of *Arum dioscoridis* Sm, is the leading herb used in the treatment of haemorrhoids in the region. The leaves are boiled and consumed as food while fruits are used as toys.

We recorded that the latex of *Euphorbia helioscopia* L., *E. kotschyana* Fenzl, *E. rigida* M. Bieb., *Glaucium flavum* Crantz and *Ficus carica* L. are used for the treatment of warts in the region. *F. carica* latex is also used for toothaches.

Molasses “pekmez” prepared from the fruits of *C. siliqua* and *J. drupaceae*, which are very common in the flora of the region, was traditional product used in children and adults, especially in upper respiratory tract diseases, and was also sold in the local markets.

Female participants over 60 years of age, who contributed to our research in the region, mentioned that the roots of *Malva* species were previously used to terminate pregnancies when birth control methods were not common, and that their mothers frequently applied this method.

Helichrysum compactum Boiss., *S. cilicica* and *S. congesta* P. H. Davis et Hub.-Mor. are endemic species of the region with therapeutic usages (presented in Table 1). *S. cilicica* and *S. congesta* were the most consumed herbal teas in the region and are cultivated in the gardens of some participants.

Gundelia tournefortii L. var. *tournefortii* and *Pistacia terebinthus* L. subsp. *palaestina* (Boiss.) Engler were used to

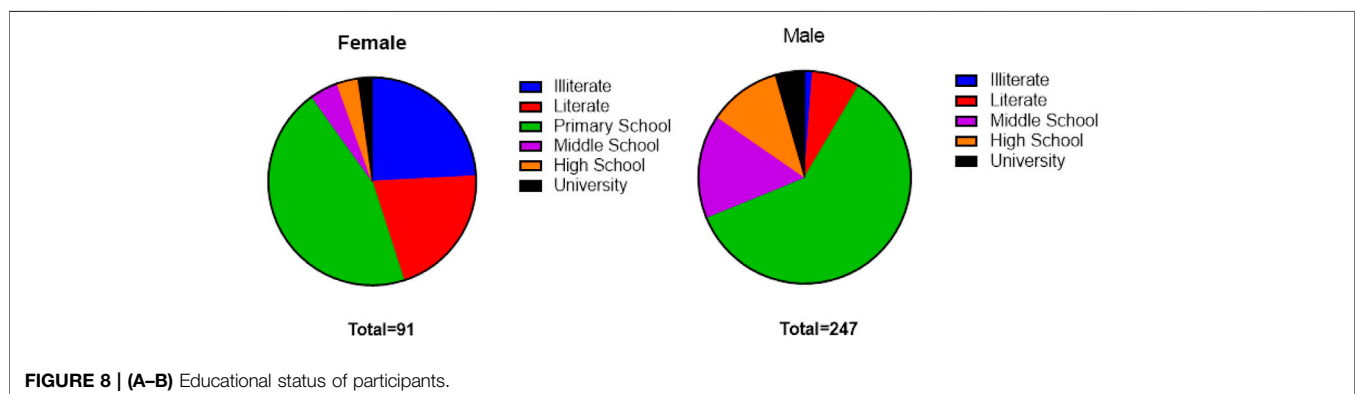


FIGURE 8 | (A–B) Educational status of participants.

TABLE 1 | Folk medicinal plants of Mersin (Turkey).

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/ Therapeutic effect	Preparation	Administration	UV	Ethnobotanical records from Turkey	Ethnobotanical records from Mediterranean region
<i>Abies cilicica</i> (Ant. et Kotschy) Carr. Pinaceae, MARE 21101	İladin	Resin	Wounds	Crushed with olive oil	Ext	0.44	(6, 9, 10, 11) ^b	—
<i>Achillea</i> sp. Asteraceae, MARE 21004	Kirkbas	Capitulum	Abdominal pain	Infusion	Int	0.34	—	—
<i>Alcea pallida</i> (Willd.) Waldst. et Kit. Malvaceae, MARE 20130, 21063	Ayşefalma, Aygulu, Eşefalma ocağı, Hasbi ocağı	Flowers	Expectorant, cough	Decoction	Int	0.41	Cough (3) (3) ^b	—
<i>Alcea rosea</i> L. ^a Malvaceae, MARE 20173	Ayşefalma, Gulhami	Flowers	Cough	Decoction	Int	0.15	—	(31, 54) ^b
<i>Arbutus x andrachnoides</i> Link Ericaceae, MARE 20175, 21068, 21157	Sandlal	Fruits	Abdominal pain	—	Int	0.24	—	—
<i>Arum discoloris</i> Sm. Araceae, MARE 20056, 20057	Agi otu, Agu, Elkabartan, Tirsin, Yılabıcağı, Yılabıkmegi	Fruits leaves	Bee bite Abdominal pain Hemorrhoids	Crushed	Ext	0.76	Hemorrhoids (6, 8, 9) (9) ^b	—
<i>Asparagus acutifolius</i> L. Asparagaceae, MARE 20150, 21162, 21637	Kuskonmaz	Aerial parts	Urinary system diseases	Infusion	Int	0.13	(5, 6, 7, 8, 11) ^b	(15, 17, 22, 35, 41, 44, 49, 51, 54) ^b
<i>Asphodeline lutea</i> (L.) Robb. Xanthorrhoeaceae, MARE 21645	Kescinli	Leaves	Burns	—	—	0.11	—	—
<i>Asphodelus aestivus</i> Brot. Xanthorrhoeaceae, MARE 21527, 21680	Oris	Tuber	Wounds	Crushed then added flour	—	0.20	Wounds (7) (5, 7, 8) ^b	Wounds (15) (15) ^b
<i>Asphodelus fistulosus</i> L. Xanthorrhoeaceae, MARE 20061	Oris	Tuber	Wounds	Crushed then mixed with olive oil	—	0.17	—	—
<i>Astragalus</i> sp. Fabaceae, MARE 21046, 21054	Geven, Keven	Resin	Herniated disc	—	—	0.24	—	—
<i>Berberis crataegina</i> . DC. Berberidaceae, MARE 21007, 21831	Karamik	Leaves Stem bark Fruits	Diabetes, diarrhea Diabetes Stye	Decoction	Int	0.17	Diabetes (4) (2, 3, 4, 5) ^b	—
<i>Cedrus libani</i> A. Rich. Pinaceae, MARE 20084, 20192, 21104, 21504	Katran, Sedir	Resin	Stomachache Eczema, Warts, wounds Cough, Anemia	—	Int	0.78	Wounds (3, 10) (2, 3, 6, 9, 10) ^b	—
<i>Ceratania silvica</i> L. Fabaceae, MARE 20170, 21066	Hunnap, Kara armut	Fruits	Appetite Abscess	Boiled (called pekmez) Boiled	Int Ext	0.61	Anemia (7, 8, 9, 10) Appetizer (8) Cough (1) (1, 2, 5, 6, 7, 8, 9, 10) ^b	(17, 22, 28, 35, 36) ^b
<i>Ceterach officinarum</i> DC. Asplenaceae, MARE 21529 [Ceterach officinarum Willd.]	Alın otu, Yosun yayı	Aerial parts	Stomachache	Infusion	Int	0.10	Stomachache (7) (3, 7, 8, 11) ^b	(12, 17, 22, 26, 27, 28, 35, 39, 44, 45, 48, 51) ^b
<i>Cichorium intybus</i> L. Asteraceae, MARE 21049, 21060	—	Aerial parts	Stomachache	Infusion	Int	0.09	Stomachache (8), (4, 8) ^b	(13, 17, 25, 29, 31, 35, 36, 37, 38, 41, 44, 45, 49, 51, 55) ^b (15) ^b
<i>Cistus creticus</i> L. Cistaceae, MARE 21119	Karahan	Aerial parts	Antifungal	Decoction	Ext	0.08	(3, 6, 7, 8) ^b	—
<i>Cistus salvifolius</i> L. Cistaceae, MARE 21013	Karahan	Aerial parts	Antifungal	Decoction	Ext	0.08	(7, 8) ^b	Cardiovascular system diseases (15, 17, 19, 24, 31), Stomachache (33) (12, 13, 16, 17, 19, 24, 25, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 39, 43, 47, 51, 53, 54, 55) ^b
<i>Crataegus monogyna</i> Jacq. subsp. <i>monogyna</i> Rosaceae, MARE 21001, 21914, 21916 (Crataegus monogyna Jacq.)	Alic	Aerial parts	Stomachache, cardiovascular system diseases	Infusion	Int	0.31	Cardiovascular system diseases (9), (3, 4, 6, 8, 9) ^b	—
<i>Cupressus sempervirens</i> L. ^(c) Cupressaceae, MARE 21059, 21303	Sevi	Cones	Cough	Decoction	Int	0.08	(2, 5) ^b	(15, 17, 29, 42, 50) ^b
<i>Cydonia oblonga</i> Mill. Rosaceae, MARE 21084, 21678	Aya	Leaves	Diarrhea, Stomachache Sore throat	Infusion boiled in water	Int.	0.64	Diarrhea (1, 3, 6, 9, 10), (1, 3, 4, 5, 6, 9, 10) ^b	Diarrhea (20, 24, 28, 31, 38, 44, 53, 54), Stomachache (31), (12, 17, 21, 28, 31, 37, 39, 40, 42, 46, 52) ^b
<i>Ecballium elaterium</i> (L.) A. Rich. Cucurbitaceae, MARE 21114, 21663	Çiritan, cakalkavunu	Fruits juice (fresh), fruits	Hemorrhoids sinusitis rheumatism	—	Ext.	0.39	Hemorrhoids (3, 8), rheumatism (9), sinusitis (1, 3, 6, 8, 9, 10, 11), (1, 6, 8, 9, 10, 11) ^b	Shingles (52) (21, 40, 45, 51, 53) ^b
<i>Equisetum telmateia</i> Ehrh. Equisetaceae, MARE 21087	Kırkikilit	Aerial parts	Diuretic	Heated in the olive oil Infusion	Int	0.13	Edema (3)	Diuretic (17, 25, 28, 53) (17, 23, 24, 25, 28, 40, 50, 53) ^b
<i>Eriobotrya japonica</i> (Thunb.) Lindl. ^(c) Rosaceae, MARE 21309	Yendunya, Malta enigi	Flowers	Sore throat, cough	Infusion	Int	0.32	Cough (1), (1, 9, 10) ^b	(17, 22, 40, 52) ^b

(Continued on following page)

TABLE 1 | (Continued) Folk medicinal plants of Mersin (Turkey).

Botanical name, family and specimen number	Local name	Plant part used	Aliments treated/ Therapeutic effect	Preparation	Administration	UV	Ethnobotanical records from Turkey	Ethnobotanical records from Mediterranean region
<i>Eucalyptus camaldulensis</i> Dehnh. Myrtaceae, MARE 21105, 21174, 21891	Kalıplıs, Okalıptus, Sıma agacı	Leaves	Cough	Infusion	Int	0.08	(1, 6, 8, 9, 10) ^b	Cough (21, 25), (15, 17, 25) ^b
<i>Euphorbia helioscopia</i> L. Euphorbiaceae, MARE 21300	Sulleğen	Latex	Warts	—	Ext	0.63	—	Warts (33), (27, 51) ^b
<i>Euphorbia kotschyana</i> Fenzl Euphorbiaceae, MARE 21092	Sulleğen	Latex	Warts	—	Ext	0.63	(2) ^b	—
<i>Euphorbia rigida</i> M. Bieb. Euphorbiaceae, MARE 21318	Sulleğen	Latex	Warts	—	Ext	0.63	Warts (3,9), (3, 6, 8, 9, 10) ^b	—
<i>Ficus carica</i> L. subsp. <i>carica</i> ^a . Moraceae, MARE 20180, 21151 [Ficus carica L.]	Inçir	Latex	Toothache, warts	—	Ext	0.71	Toothache (6), warts (3,9), (1, 2, 3, 4, 6, 7, 9, 10) ^b	Toothache (41), warts (13, 17, 20, 22, 24, 25, 27, 28, 29, 31, 34, 35, 36, 39, 41, 44, 50, 52), (13, 15, 17, 22, 25, 26, 27, 31, 32, 33, 35, 36, 41, 45, 48, 50, 53, 55) ^b
<i>Foeniculum vulgare</i> Mill. Apiaceae, MARE 21021	Arapıacı, Meletura, Rezene	Aerial parts	Abdominal pain	Infusion	Int	0.41	Abdominal pain (3) (1,4,8) ^b	Abdominal pain (32, 33, 34) (13, 15, 17, 20, 21, 22, 24, 25, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 48, 49, 50, 51, 53, 54, 55) ^b
<i>Glaucium flavum</i> Crantz Papaveraceae, MARE 21870	Gogundurme	Latex Aerial parts	Warts warts	Infusion	Ext. Int	0.07	—	—
<i>Gundelia tournefortii</i> L. var. <i>tournefortii</i> (Asteraceae, MARE 21917) [<i>Gundelia tournefortii</i> L.]	Kengel	Seeds	Stomachache	Roasted, boiled with water (made coffee)	Int	0.23	(8) ^b	—
<i>Hedera helix</i> L. Araliaceae, MARE 21058	—	Leaves	Abscess	Heated	Ext	0.11	(5) ^b	(12, 13, 17, 22, 26, 27, 28, 29, 35, 43, 48, 51, 55) ^b
<i>Helichysum compactum</i> Boiss. Asteraceae, MARE 20091	Alınbas, Koyungozu	Aerial parts	Abdominal pain	Infusion	Int	0.31	—	—
<i>Hypericum atomarium</i> Boiss. Hypericaceae, MARE 20117	Kantaron	Aerial parts	Wounds	Oleate	Ext	0.44	—	—
<i>Hypericum lydlum</i> Boiss. Hypericaceae, MARE 21097	Kantaron	Aerial parts	Wounds	Oleate	Ext	0.32	—	—
<i>Hypericum montbretii</i> Spach Hypericaceae, MARE 20067	Kantaron	Aerial parts	Wounds	Oleate	Ext	0.32	Wounds (7), (7) ^b	—
<i>Hypericum perforatum</i> L. Hypericaceae, MARE 20080, 20987, 21091, 21549	Kantaron, Koromaz	Aerial parts	Stomach ailments warts	Oleate	Int	0.80	Stomach ailments (3) Hemorrhoids (1)	Hemorrhoids (37, 41, 53, 54) Rheumatism (25)
<i>Hypericum triquetrifolium</i> Turra Hypericaceae, MARE 21009, 21039, 21109, 21129, 21158, 21178	Gavursakalı, Kızlık	Aerial parts	Wounds	Oleate	Ext	0.32	Wounds (7), (7) ^b	Stomach disorders (39, 53)
<i>Juglans regia</i> L. ^a , Juglandaceae, MARE 20163, 21012	Ceviz	Immature fruits, young shoots	Haemorrhoids Smoking cessation	— Infusion	Before breakfast, int. Int	0.18	— Hemorrhoids (4, 10) (3, 4, 6, 7, 8, 9, 10, 11) ^b	Wounds (13, 15, 25, 28, 33, 41, 46, 51, 54, 55) (13, 15, 16, 17, 22, 23, 25, 26, 27, 28, 32, 35, 37, 38, 39, 41, 46, 47, 48, 50, 51, 53, 54, 55) ^b
<i>Juniperus drupacea</i> Labill. Cupressaceae, MARE 20070, 20165, 21023, 21548	Andız	Cones	Expectorant, cough, Shortness of breath	Waxed in a water then boiled (called pekmez)	Before breakfast, int	0.74	Cough (2)	Hemorrhoids (17, 37) (13, 16, 17, 22, 24, 27, 28, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 44, 45, 50, 53, 54) ^b
<i>Juniperus excelsa</i> M. Bieb. Cupressaceae, MARE 20183, 21003, 21059	Ardıc	Resin	Stomachache	—	Int	0.51	(1, 3, 6, 9, 10) ^b	Stomachache (50)
<i>Juniperus foetidissima</i> Willd. Cupressaceae, MARE 21061, 21506, 21924	Ardıc, Yayıl ardıc	Resin	Stomachache	—	Int	0.32	(3, 6, 9, 10) ^b	—
<i>Juniperus oxycedrus</i> L. subsp. <i>oxycedrus</i> Cupressaceae, MARE 20160, 21103, 21505 (Juniperus oxycedrus L.)	Ardıc, Gıllık	Immature cones Cones Resin	Expectorant Rheumatism Stomachache	Crushed with honey Decoction Crushed then mixed with olive oil	Before breakfast, int Ext	0.71	Stomach ache (3, 10) (3,6,8,9,10,11) ^b	Rheumatism (25, 27), (15, 17, 27, 54) ^b
<i>Laurus nobilis</i> L. Lauraceae, MARE 20169, 21070	Defne, Teynel	Immature cones	Stomachache	Decoction	Int	0.56	Diabetes (1)	(Continued on following page)

TABLE 1 | (Continued) Folk medicinal plants of Mersin (Turkey).

Botanical name, family and specimen number	Local name	Plant part used	Aliments treated/ Therapeutic effect	Preparation	Administration	UV	Ethnobotanical records from Turkey	Ethnobotanical records from Mediterranean region
<i>Makia parviflora</i> L., Malvaceae, MARE 20088, 21034	Ebegumeci, Gomec	Leaves	Diabetes Varicose Vein Rheumatism Rheumatism	Decoction Bath Crushed Boiled	Ext Ext Wrapped in a cloth, ext	0.38	Rheumatism (1, 4, 6, 7, 9, 10), (1,4,5,6,7,9,10,11) ^b	Rheumatism (43, 51) (15, 16, 20, 22, 25, 27, 28, 29, 32, 33, 35, 36, 43, 44, 45, 51, 54, 55) ^b
<i>Makia sylvestris</i> L., Malvaceae, MARE 21951	Ebegumeci, Gomec	Roots	Abortive	—	Ext	0.38	—	—
<i>Mentha longifolia</i> (L.) Hudson subsp. <i>typhoides</i> (Briq.) Harley var. <i>typhoides</i> Lamiaceae, MARE 21016, 21125 <i>Mentha longifolia</i> subsp. <i>typhoides</i> (Briq.) Harley <i>Mentha x piperita</i> L. ^a Lamiaceae, MARE 21016	Yarpiz	Roots Aerial parts Leaves	Abortive Abdominal pain	Massage in water added flour	Ext Wrapped in a cloth, ext	0.38	Abdominal pain (5) (1, 4, 5, 6, 7, 8, 9, 10) ^b	Abdominal pain (32, 33, 44, 45) Abortive (12), (12, 13, 15, 16, 17, 20, 21, 22, 24, 25, 26, 27, 28, 29, 31, 33, 34, 35, 36, 38, 40, 41, 43, 44, 45, 48, 50, 51, 53) ^b (50) ^b
<i>Micromeria myrtifolia</i> Boiss. et Hohen. Lamiaceae, MARE 21553	Topuklu cay	Aerial parts	Rheumatism, Abscess	Infusion	Int, Wrapped in a cloth, ext	0.34	Rheumatism (3)	(3) ^b
<i>Myrtus communis</i> L. subsp. <i>communis</i> Myrtaceae, MARE 20149, 20181, 21075, 21132 [<i>Myrtus communis</i> L.]	Hambelmez, Mersin, Merta, Murt	Fruits Leaves	Nausea, Abdominal pain	Crushed Infusion	Int	0.68	Abdominal pain (1) Nausea (1, 9) (1, 9, 10) ^b	Abdominal pain (31) Nausea (43), (17, 21, 28, 31, 39, 40, 43, 53, 55) ^b
<i>Nerium oleander</i> L., Apocynaceae, MARE 20166, 21088, 21130	Agı, Sındılla, Zakkum	Flowers	Abdominal pain	Infusion	Int	0.34	(9, 10, 11) ^b	—
<i>Olea europaea</i> L. var. <i>europaea</i> ^a , Oleaceae, MARE 21052, 21336 [Olea europaea L.]	Elya, Zeytin	Fruits	Diabetes Constipation	— Infusion	Eaten Int	0.38	Diabetes (1, 3, 6, 7, 9, 10) Purgative (4), (1, 2, 3, 4, 6, 7, 9, 10) ^b	(15, 25, 32, 33, 35, 55) ^b
<i>Origanum majorana</i> L. ^a Lamiaceae, MARE 21551	Mercankosk	Aerial parts	Abdominal pain	Chewed Infusion	Ext Int	0.69	(3, 4, 9, 10, 11) ^b	Abdominal pain (34) (22, 28, 34, 43, 48, 54, 55) ^b
<i>Origanum syriacum</i> L. var. <i>beyvanli</i> (Holmes) leisvaart Lamiaceae, MARE 20078, 20082, 20103, 21166, 21330 [Origanum syriacum subsp. <i>beyvanli</i> (Holmes) Greuter et Burdet]	Kekik	Aerial parts	Abdominal pain	Decoction	Int., half glass of water	0.71	Stomachache (9, 10)	—
<i>Origanum vulgare</i> L., Lamiaceae, MARE 21020	Avigani, Kekik, Mercus	Aerial parts	Stomachache, Cough	Infusion	Int	(9,10) ^b	—	—
<i>Paliurus spina-christi</i> Mill. Rhamnaceae, MARE 20075, 20159, 21010	Calti, Calti dikeni	Fruits	Cough, kidney stones	Decoction	Int	0.66	(11) ^b	Abdominal pain (31, 33) Cough (25, 33, 37, 38, 43, 46)
<i>Papaver macrostomum</i> Boiss. et A. Huet Papaveraceae, MARE 21930	Gelincik, Lale	Petals	Cough	Waited in water 10 days	Int	0.31	(1) ^b	Stomachache (24, 43), (13, 15, 16, 20, 24, 25, 26, 28, 31, 35, 37, 38, 39, 42, 43, 44, 46, 48, 50, 54, 55) ^b (31, 42) ^b
<i>Papaver rhoeas</i> L., Papaveraceae, MARE 21725	Gelincik, Lale	Petals	Cough	Waited in water 10 days	Int	0.52	(6, 7) ^b	—
<i>Phillyrea latifolia</i> L. Oleaceae, MARE 21067, 21134, 21295, 21507	Akkalesme, Kesme	Leaves	Kidney stones	Infusion	Int	0.19	—	Cough (26, 27, 31) (22, 25, 26, 27, 28, 29, 34, 35, 36, 39, 44, 45, 48, 51) ^b
<i>Pinus brutia</i> Ten.Pinaceae, MARE 20155, 21556	Cam	Young shoots Resin Immature cones	Cough Stomach ulcer Shortness of breath Cough Diaper rash (babies)	Crushed with sugar Decoction — Boiled with milk	Eaten before breakfast, int Before breakfast for 40 days, int Eaten 1 teaspoon, int Ext Ext	0.63	Cough (1, 7) Shortness of breath (3, 9) Ulcer (9, 10) (1, 2, 3, 5, 6, 7, 9, 10, 11, 15) ^b	—

(Continued on following page)

TABLE 1 | (Continued) Folk medicinal plants of Mersin (Turkey).

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/ Therapeutic effect	Preparation	Administration	UV	Ethnobotanical records from Turkey	Ethnobotanical records from Mediterranean region
<i>Pistacia terebinthus</i> L. subsp. <i>palestina</i> (Boiss.) Engler Anacardiaceae, MARE 21005, 20101, 21057, 21159, 21176	Menegic	Immature cones Terbinthine Fruits	Shortness of breath Fracture Cough	Heated then mixed with olive oil Decoction — Roasted the boiled with water (made coffee)	Int Ext Int Ext	— — 0.27 —	— — (3, 5, 6) ^b —	—
<i>Plantago lanceolata</i> L. Plantaginaceae, MARE 21877	Krikshir otu, Piskuyugu	Leaves	Rheumatism, wounds, abscess	Crushed	Wrapped in a cloth, wait for 10 min, ext	0.71	Wounds (3, 6, 8) (3, 5, 8) ^b —	Abscess (25, 27) Rheumatism (50) Wounds (24, 25, 26, 44, 53), (13, 16, 17, 22, 24, 25, 26, 27, 28, 29, 32, 33, 34, 35, 36, 39, 41, 44, 48, 50, 54) ^b
<i>Plantago major</i> L. subsp. <i>intermedia</i> (Gilib.) Lange Plantaginaceae, MARE 20184	Krikshir otu	Leaves	Rheumatism, wounds	Crushed	Wrapped in a cloth, wait for 10 min, ext	0.71	Wounds (3, 9)	—
<i>Polygonum cognatum</i> Meien. Polygonaceae, MARE 21923, 21939	Madimak	Aerial parts	Kidney stones	Infusion	Int	0.10	(3, 9, 10) ^b	—
<i>Primula vulgaris</i> Huds. subsp. <i>vulgaris</i> Primulaceae, MARE 21697 (<i>Primula vulgaris</i> Huds.) <i>Punica granatum</i> L. ^a Lythraceae, MARE 21659	Ezrali meneksesi, Sari menekse Nar	Flowers Seeds Exocarp Fruits, roots	Cold Diarrhea Diarrhea Enuresis (in child) Wounds Burns Menstrual pain	Boiled for 2-3 h Infusion Decoction Decoction (added olive oil) Decoction — Bath Infusion Infusion Decoction Decoction Decoction	Int Int Int Int Ext Int Ext Ext Ext Ext Int	0.09 0.52 0.77	(16, 31, 50) ^b Diarrhea (22, 54) (17, 22, 28, 35, 48) ^b (12, 41, 52) ^b	—
<i>Quercus coccolifera</i> L. Fagaceae, MARE 21008, 21074	Kotopirni, Pynar	Fruits, roots	Menstrual pain	Decoction	Ext	—	(3, 4, 6) ^b	—
<i>Rhus coriaria</i> L. Anacardiaceae, MARE 20171, 21041, 21055, 21100, 21128	Sumak	Fruits Leaves and fruits Leaves	Foot odor Threa peeds Gingivitis Placide	— Bath Infusion Infusion Decoction Decoction Decoction	Put in socks, ext Ext Ext Ext Ext Ext Ext	0.72	(15, 51) ^b	Diabetes (15) (12, 13, 15, 16, 17, 22, 23, 27, 28, 31, 34, 35, 37, 38, 39, 41, 44, 46, 51, 52, 53, 54) ^b Stomach diseases (54)
<i>Rosa canina</i> L. Rosaceae, MARE 21911	İburnu, Kusburnu	Fruits	Diabetes	Decoction	Int	0.16	Diabetes (6) (6, 8, 9, 10) ^b	—
<i>Rosmarinus officinalis</i> L. ^a Lamiaceae, MARE 20083, 20148, 21069, 21131, 21338	Arizmarı, Bibeñye	Leaves	Stomach diseases	Infusion	Int	0.38	(1, 4, 7, 9, 10, 11) ^b	—
<i>Rubus sanctus</i> Schreb. Rosaceae, MARE 21555	Boguritan	Roots, leaves	Kidney ailments Diabetes, Emenagog Sore throat	Decoction Infusion Crushed	Int Gargle Ext	0.44	Diabetes (1, 8) Kidney ailments (9) Menstrual pains (9) (1, 3, 6, 7, 8, 9, 11) ^b	—
<i>Rumex</i> sp. Polygonaceae, MARE 21668 ^a <i>Ruscus aculeatus</i> L. var. <i>aculeatus</i> Asparagaceae, MARE 20100 (<i>Ruscus aculeatus</i> L.) <i>Salvia fruticosa</i> Mill. Lamiaceae, MARE 20092 <i>Salvia viridis</i> L. Lamiaceae, MARE 21668, 21710, 21712 <i>Sambucus nigra</i> L. Adoxaceae, MARE 21002	Kainik cayı, Çekez cayı Kandak Adaçayı, Faskomila Esek cayı Kokarot, Bandıfik	Aerial parts Fruits Roots Aerial parts Aerial parts Fruits	Cardiovascular system diseases Kidney stones Cold Stomachache Haemorrhoids	Boiled in milk Infusion Decoction Infusion Infusion —	Int Int Int Int Int Int	0.24 0.39 0.53 0.37 0.13	— Kidney stones (6) Cold (7) (4, 5, 7) ^b Stomachache (6) (8, 9, 10) ^b	—
<i>Sideritis cificica</i> Boiss. et Balansa Lamiaceae, MARE 21552 <i>Sideritis congesta</i> Lamiaceae, MARE 20101a, 21520	Dag cayı Dag cayı	Aerial parts Aerial parts	Cold Cold, Abdominal pain	Infusion Infusion	Int Int	0.61 0.61	(4, 11) ^b	Haemorrhoids (17, 25, 27, 29) (13, 15, 16, 17, 20, 21, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 53, 54, 55) ^b

(Continued on following page)

TABLE 1 | (Continued) Folk medicinal plants of Mersin (Turkey).

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/ Therapeutic effect	Preparation	Administration	UV	Ethnobotanical records from Turkey	Ethnobotanical records from Mediterranean region
<i>Solanum nigrum</i> L. subsp. <i>schultesii</i> (Opiz) Wessely Solanaceae, MARE 20186 [<i>Solanum decipiens</i> opiz]	Boncuklu gogundurme	Leaves	Wounds	Boiled in water added flour	Ext	0.29	(8) ^b	(36) ^b
<i>Stachys lavandulifolia</i> vahl var. <i>lavandulifolia</i> Lamiaceae, MARE 21933 [<i>Stachys lavandulifolia</i> vahl]	Tuylu cay	Aerial parts	Cold	Infusion	Int	0.17	Cold (9,10) (5,9,10,11) ^b	—
<i>Tamarix smyrnensis</i> Bunge Tamaricaceae, MARE 21146	Ilgın	Stem bark	Antipyretic	Decoction	Int	0.31	(3) ^b	—
<i>Teucrium polium</i> L. Lamiaceae, MARE 20090, 20196, 21011, 21018	Aci yavsan	Aerial parts	Abdominal pain Stomachache	Infusion Crushed with olive oil added flour, wrapped in a cloth, infusion	Int Ext., Int	0.65	Abdominal pain (3) Stomachache (1, 5, 10, 11), (1, 3, 4, 5, 6, 9, 10, 11) ^b	Stomachache (38) (38, 50) ^b
<i>Tilia rubra</i> DC. subsp. <i>caucasica</i> (Rupr.) V. Engl Malvaceae, MARE 20098	Ihlamur	Flowers	Cold Cough	Decoction Infusion	Int Int	0.31	Common cold (1)	—
<i>Tribulus terrestris</i> L. Zygophyllaceae, MARE 20059, 21024, 21136	Devecokerten, demirpitirak, Ucdis	Aerial parts	Cardiovascular system diseases, kidney ailments	Decoction	Int	0.44	(3, 4, 6, 8, 9, 11) ^b	(15) ^b
<i>Urginea maritima</i> (L.) Baker Asparagaceae, MARE 21089 [<i>Drimis maritima</i> (L.) Stearn]	Zıpcık soganı, zıbgın	Bulbus	Rheumatism	Infusion Sliced	Int Wrapped in a cloth, ext	0.37	Rheumatism (4,9,10) (9, 10) ^b	(17, 22, 27, 40, 51) ^b
<i>Urtica urens</i> L. Urticaceae, MARE 21297, 21510	Isırgan	Leaves Aerial parts	Rheumatism Diuretic	Crushed Infusion	Wrapped in a cloth, ext Int	0.61	Rheumatism (4) (1, 4, 9) ^b	Diuretic (17) Rheumatism (17, 22, 36, 44) (12, 14, 17, 19, 22, 27, 28, 35, 36, 44, 48, 51) ^b
<i>Verbascum</i> sp. Scrophulariaceae, MARE 21026	Paskulak, Sigirkulagi, Salkaba	Flowers	Stomachache Constipation	Infusion Decoction	Int Int	0.62	(1, 9, 10) ^b	(38, 50) ^b
<i>Viscum album</i> L. subsp. <i>abietis</i> (Wiesb.) Abromeit Santalaceae, MARE 21006, 21081	Govelek	Whole plants	Cardiovascular system diseases	Decoction	Int	0.36	(6, 9, 10) ^b	—
<i>Viscum album</i> L. subsp. <i>album</i> Santalaceae, MARE 21027, 21147 [<i>Viscum album</i> L.]	Govelek	Whole plants	Cardiovascular system diseases	Infusion	Int	0.36	(3, 4, 5) ^b	Heart problems (19) (12, 13, 19, 24, 43, 48, 50, 54) ^b
<i>Vitex agnus-castus</i> L. Lamiaceae, MARE 21073, 21124, 21179	Hayıt	Fruits	Cardiovascular system diseases Fertility (in women)	Infusion	Int	0.17	(1, 5, 7, 9, 10) ^b	(42) ^b
<i>Xanthium strumarium</i> L. subsp. <i>cavanillesii</i> (Schouw) D. Löve et P. Dansereau Asteraceae, MARE 21083 [<i>Xanthium orientale</i> subsp. <i>italicum</i> (Moretti) Greuter]	Pitirak	Leaves Aerial parts Leaves	Wounds Abscess	Infusion Crushed	Int Wrapped in a cloth, ext. Wrapped in a cloth, ext	0.40	—	—

Int.; Internal use. Ext.; External use. Adm.: Administration.

^aCultivated plant.

^bDifferent usage, the new plant uses were marked as bold.

(1) Akaydin et al., 2013, (2) Ari et al., 2018, (3) Bulut et al., 2017, (4) Everest and Ozturk, 2005, (5) Fakir et al., 2016, (6) Gunes et al., 2017, (7) Gurdal and Kultur, 2013, (8) Guzel et al., 2015, (9) Sargin, 2015, (10) Sargin and Buyukcengiz, 2019, (11) Yesilada et al., 1993, (12) Agelet and Vallès, 2003, (13) Akerreta et al., 2007a, (14) Akerreta et al., 2007b, (15) Axiotis et al., 2018, (16) Bellia and Pieroni, 20,015, (17) Benitez et al., 2010, (18) Benitez et al., 2012, (19) Calvo and Cavero, 2014, (20) Calvo et al., 2011, (21) Camejo-Rodrigues et al., 2003, (22) Camió and Vallès, 2012, (23) Cavero et al., 2011a, (24) Cavero et al., 2011b, (25) Comara et al., 2009, (26) De Natale and Pollio, 2007, (27) González et al., 2010, (28) Gras et al., 2019, (29) Guarrera et al., 2005, (30) Luczaj et al., 2019, (31) Matejic et al., 2020, (32) Mattalia et al., 2020a, (33) Mattalia et al., 2020b, (34) Mattalia et al., 2020c, (35) Mautone et al., 2019, (36) Menale and Muoio, 2014, (37) Mustafa et al., 2012, (38) Mustafa et al., 2015, (39) Mustafa et al., 2020, (40) Novais et al., 2004, (41) Papageorgiou et al., 2020, (42) Parada et al., 2009, (43) Petrakou et al., 2020, (44) Pieroni, 2000, (45) Pieroni et al., 2002, (46) Pieroni, 2017, (47) Rigat et al., 2007, (48) Rigat et al., 2013, (49) Sansanelli et al., 2017, (50) Sarić-Kundalić et al., 2010, (51) Tuttolomondo et al., 2014, (52) Viegi, et al., 2003, (53) Vinagre et al., 2019, (54) Vitasović Kosić et al., 2017, (55) Zivkovic et al., 2020.

prepare a special traditional coffee. In addition, fruits of *P. terebinthus* were used as a snack and sold in local bazaars.

M. communis is used in treatments for diabetes and constipation, and its fruits are also consumed as a snack. Another application we recorded in almost every village in our study was its usage during cemetery visits.

Euphorbia helioscopia L., *Glaucium flavum* Crantz, *J. foetidissima*, *H. perforatum*, *N. oleander*, *Mentha longifolia* (L.) Hudson subsp. *typhoides* (Briq.) Harley var. *typhoides*, *Punica granatum* L. and *Rhus coriaria* L. are used in the treatment of both humans and animals. Among the medicinal plants used for veterinary purposes, we found that only *Salix alba* L. is used exclusively for the treatment of animals (Table 2).

Plant Parts Used and Methods of Preparation

The parts of plants used for medicinal purposes were aerial parts (26.8%), leaves (18.4%), fruits (15.1%) and flowers (7%). The main preparation methods using these parts were infusion (27.6%), direct application (22.2% without any preparation procedure), decoction (18.9%), application after crushing (11.4%), and other less common methods (19.9%).

A total of 189 drugs were recorded in this study. Most were used internally (55.7%) (Table 1, Table 2). Olive oil, flour, honey and sugar were used as additional ingredients in the preparation of these remedies.

The medicinal plants used in multiherbal recipes containing two or more species are presented in Table 3. A decoction prepared from *R. coriaria* and *Q. coccifera* is used in the treatment of warts and a mixture prepared from *P. brutia* and *H. perforatum* is used in stomach disorders.

Plant Names

Local names of medicinal plants are also recorded in this study. The names of the all plants in Turkish, as well as some Cretan plant names, were recorded during the study. Some of these plants have vernacular names that are also used for different plant species, potentially leading to complications. These are presented in Table 4, where we see that in some cases different species of the same genus have the same common names.

Statistical Data Analysis

Analysis of the diversity and similarity among districts, based on the ten districts, using species abundance and amount of information on treatment usage, was carried out by hierarchical clustering (Figure 9). The analysis resulted in five main clusters at the truncation point of 20. Erdemli, Mut, Gulnar and Silifke, which are close to one another, showed greater similarity among themselves. Similarly, Aydıncık and Bozyazı, which are proximate to one another, also displayed very similar characteristics. Interestingly, there was a close similarity between Anamur and Camliyayla, despite them being far apart. Merkez and Tarsus were both different from the other districts, but Tarsus was the most distinct among the districts.

The proportion test was used to compare the true (population) proportion of the population who recognize and use these species in the various districts. The proportions are given below: 1-Camliyayla (0.72), 2-Tarsus (0.82), 3-Merkez (0.88), 4-Mut

(0.66), 5-Anamur (0.60), 6-Silifke (0.91), 7-Gülнар (0.92) and 8-Erdemli (0.86). Bozyazı and Aydıncık districts wasn't included.

The *p*-value was 0.0005773 < 0.05. We conclude that there is a significant difference between the districts in terms of awareness of the species. The pairwise comparison with Holm adjustment was conducted to detect the differences between the districts. The difference between 5–3 (*p* value = 0.044) and 5–6 (*p* value = 0.042) are significant. This result indicates that the major source of difference was the district (Anamur). We can interpret this to mean that Anamur uses fewer species in the traditional treatments than the other districts.

The proportion test was also used to compare the true (population) UV index for the species. As a result of our analysis, the plants with the highest UV values are *H. perforatum* (0.80), *C. libani* (0.78), *Q. coccifera* (0.77), *Arum dioscoridis* (0.76) and *J. drupaceae* (0.74), which are presented in Table 1.

After analysis, the *p*-value is obtained as 0.4423 > 0.05. It is concluded that there is no significant difference between the five most commonly used species in terms of UV.

According to the FIC results, gastrointestinal system diseases (mainly stomach ailments) had the highest value at 0.77, followed by skin and subcutaneous tissues (mainly wound healing) at 0.72, circulatory system (mainly haemorrhoids) at 0.60, respiratory system (mainly cold) at 0.57, urinary/genital system (0.41), musculo-skeletal (mainly rheumatism, 0.44) and finally metabolism (mainly diabetes, 0.35) disorders (Table 5).

Folk Remedies and Related Knowledge Originating From Animals

This research determines that some animals, which constitute an important part of biological diversity, are used for medical purposes in addition to plants used as traditional folk medicine in Mersin. Because animal-based folk remedies are a part of traditional therapy, we present them in this study alongside plants. The folk remedies derived from animals (*n* = 110) recorded during fieldwork *via* interviews with informants are presented in Table 6.

We observed that local people dealing with animal husbandry and hunting as a hobby in the area reaching from villages near the coast to the slopes of the Taurus Mountains were more knowledgeable in this regard.

We found that the use of hedgehog meat for haemorrhoid treatment is very common in the region. The participants added that it is very tasty alongside its therapeutic properties. In addition to the use of animals or animal products for human health, it is very common to use tortoise shell against the evil eye, especially among Yoruks. Furthermore, women and young girls of the village were said to knit with hair from the tails of horses when they could not find thread in Camliyayla, where needle lace is a common traditional handicraft. For this reason, the owners of white horses have to keep their horses tied up in their barns.

We were also informed that the calabash (*Lagenaria* sp.), known as “Kaplankabak” in the Gülнар area, is used as an instrument to make sound that keeps predators away to protect people living in tents. A piece of tanned goat skin is stretched across the calabash and a rope is inserted into a hole in

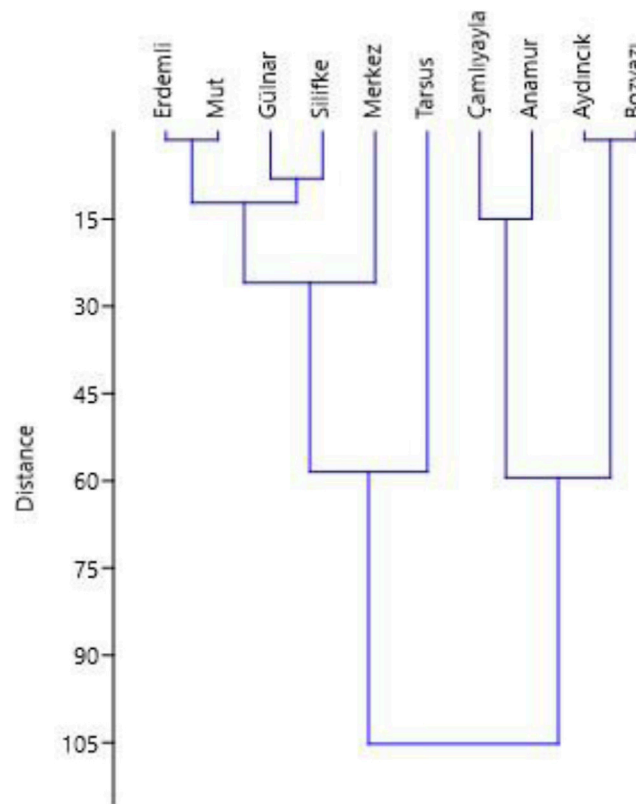


FIGURE 9 | Dendrogram showing UPGMA clustering (with Euclidean distance) of districts (those where over 10 interviews were carried out).

TABLE 2 | The plants used in veterinary medicine in Mersin (Turkey).

Botanical name, family and specimen number	Local name	Plant part used	Ailments treated/ Therapeutic effect	Preparation	Administration	UV	Similar usage in literature
<i>Euphorbia helioscopia</i> L. Euphorbiaceae, MARE 21300	Sutlegen	Latex	Warts, wounds Snakebite (for goat)	— —	Ext Int	0.41	Wounds (52)
<i>Glaucium flavum</i> Crantz Papaveraceae, MARE 21870	Okuzbogurdan	Aerial parts	Emetic	—	Int	0.07	—
<i>Juniperus foetidissima</i> Willd. Cupressaceae, MARE 21061, 21506, 21924	Ardic, Yayli ardic	Aerial parts	Antiseptic (after birth)	—	Ext	0.13	—
<i>Hypericum perforatum</i> L. Hypericaceae, MARE 20080, 20997, 21091, 21549	Kantaron	Aerial parts	Wounds	Oleat	Ext	0.47	Wounds (29.52)
<i>Mentha longifolia</i> (L.) Hudson subsp. typhoides (Briq.) Harley var. typhoides Lamiaceae, MARE 21016, 21125 [<i>Mentha longifolia</i> subsp. <i>typhoides</i> (Briq.) Harley]	Yarpiz	Aerial parts	Anthelmintic	Infusion	Int	0.24	—
<i>Nerium oleander</i> L. Apocynaceae, MARE 20166, 21088, 21130	Agu, Sindilag, Zakkum	Flowers	Scabies	Decoction	Ext	0.31	(52) ^b
<i>Punica granatum</i> L. ^a Lythraceae, MARE 21659	Nar	Exocarp	Diarrhea	Infusion	Int	0.31	—
<i>Rhus coriaria</i> L. Anacardiaceae, MARE 20171, 21041, 21055, 21100, 21128	Sumak	Young shoots	Diarrhea	—	Int	0.50	—
<i>Salix alba</i> L. Salicaceae, MARE 20137	Sogut	Young shoots	Diarrhea	—	Int	0.09	(52) ^b

Int.; Internal use. Ext.; External use.

^aCultivated plant.

^bDifferent usage; the new plant uses were marked as bold.

TABLE 3 | Multiherbal recipes used as folk medicine in Mersin.

Recipe	Plant	Plant part used	Ailments treated, therapeutic effect	Preparation	Administration
1	<i>Rhus coriaria</i> <i>Quercus coccifera</i> <i>Pinus brutia</i> <i>Hypericum perforatum</i>	Leaves Roots Resin Aerial parts	Warts Decoction Ext.	Stomach ailments crushed and mixed with oleat	Before breakfast 1 × 1, int.

TABLE 4 | The same vernacular name was used for more than one plant species.

Local name	Botanical names, family and specimen numbers			
Aysefatma	<i>Alcea pallida</i> (Willd.) Waldst. et Kit. Malvaceae, MARE 20130, 21063	<i>Alcea rosea</i> L. Malvaceae, MARE 20173	—	—
Sutlegen	<i>Euphorbia helioscopia</i> L. Euphorbiaceae, MARE 21300	<i>Euphorbia kotschyana</i> Fenzl Euphorbiaceae, MARE 21092	<i>Euphorbia rigida</i> M. Bieb Euphorbiaceae, MARE 21318	—
Kantaron	<i>Hypericum atomarium</i> Boiss Hypericaceae, MARE 20117	<i>Hypericum lydium</i> Boiss. Hypericaceae, MARE 21097	<i>Hypericum montbretii</i> Spach Hypericaceae, MARE 20067	<i>Hypericum perforatum</i> L. Hypericaceae, MARE 20080, 20997, 21091, 21549
Ardic	<i>Juniperus foetidissima</i> Willd. Cupressaceae, MARE 21061, 21506, 21924	<i>Juniperus oxycedrus</i> L. subsp. <i>oxycedrus</i> Cupressaceae, MARE 20160, 21103, 21505 (<i>Juniperus oxycedrus</i> L.)	<i>Juniperus excelsa</i> M. Bieb. Cupressaceae, MARE 20193, 21003, 21059	—
Ebegumeci	<i>Malva parviflora</i> L. Malvaceae, MARE 20088, 21034	<i>Malva sylvestris</i> L. Malvaceae, MARE 21951	—	—
Gomec	<i>Malva parviflora</i> L. Malvaceae, MARE 20088, 21034	<i>Malva sylvestris</i> L. Malvaceae, MARE 21951	—	—
Kekik	<i>Origanum syriacum</i> L. var. <i>bevanii</i> (Holmes) Letswaart Lamiaceae, MARE 20078, 20082, 20103, 21166, 21330 [<i>Origanum syriacum</i> subsp. <i>bevanii</i> (Holmes) Greuter et Burdet]	<i>Origanum vulgare</i> L. Lamiaceae, MARE 21020	—	—
Kirksinir otu	<i>Plantago lanceolata</i> L. Plantaginaceae, MARE 21877	<i>Plantago major</i> L. subsp. <i>intermedia</i> (Gilib.) Lange Plantaginaceae, MARE 20184	—	—
Dag çayı	<i>Sideritis cilicica</i> Boiss. et Balansa Lamiaceae, MARE 21552	<i>Sideritis congesta</i> P. H. Davis et Hub.-Mor. Lamiaceae, MARE 20101a, 21,520	—	—
Govelek	<i>Viscum album</i> L. subsp. <i>abietis</i> (Wiesb.) Abromeit Loranthaceae, MARE 21006, 21081	<i>Viscum album</i> L. subsp. <i>album</i> Santalaceae, MARE 21027, 21147 (<i>Viscum album</i> L.)	—	—

the skin. An intense noise is produced when the rope is pulled (Supplementary Video S1).

DISCUSSION

Comparison With Previous Studies

Comprehensive ethnobotanical studies previously carried out in neighboring areas (Yeşilada et al., 1993; Everest and Öztürk, 2005; Akaydın et al., 2013; Arı et al., 2018; Gürdal and Kültür, 2013; Güzel et al., 2015; Sargin, 2015; Fakir et al., 2016; Bulut et al., 2017; Güneş et al., 2017; Sargin and Büyükcengiz, 2019) found that *P. brutia* was the most commonly used herbal

medicinal plant at ten localities in Mersin and its environs. Our findings compared with previous studies can be seen in Table 1, Table 2.

In previous studies, widely distributed species *A. cilicica*, *C. libani*, *C. siliqua*, *H. perforatum*, *J. drupaceae*, *J. oxycedrus*, *L. nobilis*, *M. communis* and *O. syriacum* subsp. *bevanii* were found to be the major plants used in traditional folk medicines. The most commonly used method for preparation in Mersin is infusion (Akaydın et al., 2013; Sargin, 2015; Sargin et al., 2015; Sargin and Büyükcengiz, 2019).

Sargin et al., 2015; Sargin, 2015; Sargin and Büyükcengiz, 2019 noted that the fruits of *C. siliqua* and *J. drupaceae* in particular were used for “molasses” in the region. In addition, *L. nobilis*,

TABLE 5 | FIC values of category of ailments.

Ailment categories	Informant consensus factor (FIC)
Gastrointestinal system	0.77
Skin and subcutaneous tissues	0.72
Circulatory system	0.64
Respiratory system	0.57
Bones, joints, etc.	0.44
Genito-urinary system	0.41
Metabolism	0.35
Infectious diseases	0.29
Sensory organs	0.14
Veterinary uses	0.51

locally known as “teynel,” is commonly used for medicinal purposes. Its leaves are used as a spice and during summer in the process of drying fruits to be eaten in winter. The plant is also commonly used in herbal soaps and sold in local markets. Our results agree with these previous findings.

Sargin et al., 2015; Sargin, 2015, Sargin and Büyükcengiz, 2019 collected species belonging to the genera *Dactylorhiza*, *Ophrys*, *Orchis* and *Serapias* and noted that they were used in salep and ice cream production. Unfortunately, we were not able to collect these plants, although we also received information on their usage. We are able to contribute information not recorded previously on the widely cultivated plant *Citrus lemon* L. (Osbeck), which is used to make ice cream in Kaleburcu village under the leadership of the mukhtar.

Besides corroborating previous data in our study, we record new 36 plant taxa with medicinal usages in Mersin (Table 1). Furthermore, nine plants used for applications in animal health were also recorded in this study for the first time in this region.

Plants that have been recorded in previous ethnobotanical studies in Turkey and other Balkan and Mediterranean countries are also presented in Table 1, Table 2 (Agelet and

Vallès, 2003; Akerreta et al., 2007a; Akerreta et al., 2007b; Axiotis et al., 2018; Bellia and Pieroni, 2015; Benítez et al., 2010; Benítez et al., 2012; Calvo and Cavero, 2014; Calvo et al., 2011; Camejo-Rodrigues et al., 2003; Carrió and Vallès, 2012; Cavero et al., 2011a; Cavero et al., 2011b; Cornara et al., 2009; De Natale and Pollio, 2007; González et al., 2010; Gras et al., 2019; Guarrera et al., 2005; Łuczaj et al., 2019; Matejic et al., 2020; Mattalia et al., 2020a; Mattalia et al., 2020b; Mattalia et al., 2020c; Mautone et al., 2019; Menale and Muoio, 2014; Mustafa et al., 2012; Mustafa et al., 2015; Mustafa et al., 2020; Novais et al., 2004, Papageorgiou et al., 2020; Parada et al., 2009; Petrakou et al., 2020; Pieroni, 2000; Pieroni et al., 2002; Pieroni, 2017; Rigat et al., 2007; Rigat et al., 2013; Sansanelli et al., 2017; Sari´c-Kundali´c et al., 2010; Tuttolomondo et al., 2014; Vinagre et al., 2019; Vitasović Kosić et al., 2017; Zivkovic et al., 2020) The medicinal uses of the species in Mersin were compatible with previous findings; such as *Asphodelus aestivus* Brot. (wounds), *Cydonia oblonga* Mill. (diarrhea and stomach-ache), *Ecballium elaterium* (L.) A. Rich. (sinusitis), *Equisetum telmateia* Ehrh. (diuretic), *Ficus carica* L. (wart), *Foeniculum vulgare* Mill. (abdominal pain), *H. perforatum* (wound and haemorrhoids), *Juglans regia* L. (haemorrhoids), *L. nobilis* (rheumatism), *M. sylvestris* L. (abdominal pain), *Mentha x piperita* L. (abdominal pain), *P. lanceolata* L. (wounds), *Punica granatum* (diarrhea), *Rosa canina* L. (diabetes) and *Urtica urens* L. (rheumatism). Further studies on some of the listed species support the folkloric uses of these plants with new evidence: the wound-healing properties of *P. brutia* have been shown (Cetin et al., 2013); *H. perforatum* has been predominantly used for treating depression, wounds and ulcers (EMA 2006 <https://www.ema.europa>); *Rosa canina* has been studied for antidiabetic properties (Rahimi et al., 2020); and the antihypertensive, anti-inflammatory and anti-ulcerogenic properties of *Cydonia oblonga* have been investigated (Zhouet al., 2014).

To the best of our knowledge; usages of *Arbutus x andrachnoides* Link, *Asphodeline lutea* (L.) Rchb., *Asphodelus*

TABLE 6 | Animal-based folk remedies used in Mersin for treating human diseases.

Remedy	Preparation and administration	Ailments treated/Therapeutic effect	Similar usage in literature
Bee's wax	Ext	Bruises	(1) ^a
Camel milk	Boiled, per oral, int	Cough	—
Catfish	Externally applied	Fracture	—
Chicken tail	Ext	Abortive	—
Donkey's milk	Per oral, int	Cough (in children)	1
Donkey urine	Ext	Scorpion sting	(1) ^a
Jay	Consumed, int	Speech delay	—
Porcupine	Consumed, int	Haemorrhoids	—
Pork	Consumed, int	Cracked heels	—
Rabbit lard	Dropped into the ear, ext	Earache	—
Snail shell	Ext	Wounds	—
Snake skin	Applied on scalp, ext	Headache	—
	Applied on skin, ext	Acne	—
Talpa	Consumed, int	Goiter	—

1 Pieroni et al., 2011.

^aDifferent usage.

fistulosus L., *Cistus salvifolius* L., *G. flavum*, *H. compactum*, *H. atomarium* Boiss., *H. lydium* Boiss., *Phillyrea latifolia*, *Polygonum cognatum* Meisn. and *S. cilicica* have been recorded for the first time in the region, these new applications are indicated in bold in **Table 1**; however, of the folk medicinal plants with veterinary uses (**Table 2**), *Euphorbia helioscopia*, *H. perforatum*, *N. oleander* and *S. alba* have also been listed in other studies in the field (Guarrera et al., 2005; Viegi et al., 2003).

Harmful Effects of Medicinal Plants

The harmful effects of the medicinal plants were also discussed during the interviews. The informants stated that *E. elaterium* and *Drimys maritima* (L.) Stearn should be used carefully due to side effects and contra-indications.

In addition, we recorded that the fruits of *Atropa belladonna* L., a medicinal plant that is not used medicinally in the region, were eaten by T. G. (age 23), who had seen his father eat this plant to quench his thirst in Inkyo. T.G. said that he ate many fruits of this plant while he was traveling with his cousin, but his cousin only tasted it. He noted that he experienced poisoning (hallucinations, dry mouth, poor vision) in the hours after consuming the fruit and that he had to go to a hospital far from the village.

Review of Local Plant Names

In our research, we also found some local plant names not recorded in other studies (Akaydin et al., 2013; Sargin, 2015; Sargin and Büyükcengiz, 2019). These are: Akcakesme, Altinbas, Aysefatma, Ayigulu, Boncuklu Gogundurme, Esefatma cicegi, Ezrail meneksesi, Gomec, Hasbi cicegi, Ilgin Kandak, Karahan, Kecirisi, Kesme, Kuskonmaz, Madimak, Pisikuyruğu, Sari menekse, Selvi, and Yosun cayi. Some vernacular names of the medicinal plants recorded for the first time in Turkey in this study include Boncuklu gogundurme, Esefatma cicegi, Ezrail meneksesi and Yosun cayi (Tuzlaci, 2011).

Although Turkish is spoken in all settlements in the region, some villages were established after migration events. For example, a village of Circassian immigrants has preserved their language and the elders speak Circassian among themselves. There is also a village formed by Cretan immigrants after the population exchange with Greece. The villagers speak Cretan among themselves, which allowed us to record the Cretan names of some plants during our research. Greek plant names are recorded and transcribed in the Latin alphabet. Some of these names were included in a study conducted on the island of Lemnos (Papageorgiou et al., 2020).

Review of Traditional Healing With Animals

Comparing our limited data on zotherapy in the Balkans and the Mediterranean region with the study of Pieroni et al., 2011; we find that the use of donkey milk against cough is common, unlike the use of donkey urine and beeswax. Though limited, we believe these data will contribute to future studies to be conducted by the experts in this field.

Quantitative Findings

Comparing our UV values with those of other studies conducted in Mersin, we see that while *C. libani* was 0.64 in our study, Sargin et al., 2015 recorded a value of 0.36 for this plant. Our value for *Q. coccifera* was 0.77 UV, but 0.50 in the study of Akaydin et al., 2013. Another high UV value in our study was 0.87 for *T. polium* (0.71), which was determined to be 0.57 and 0.35, respectively, in previous studies (Akaydin et al., 2013; Sargin and Büyükcengiz, 2019). *H. perforatum*, which has the highest value in our study, was calculated as 0.53 in Sargin, 2015 and 0.42 in Akaydin et al., 2013.

FIC (ICF) values have also been investigated for Mersin in previous studies and were found to be highest for analgesics (0.78), cardiovascular diseases (0.76) and kidney problems (0.70) (Sargin et al., 2015); while another study had the highest value (0.74) for haemorrhoids, followed by gastrointestinal diseases, nutrition disorders, obesity (0.53) and cardiovascular diseases (0.51) (Sargin 2015). In a recent study the highest FIC value calculated was for the treatment category of livestock diseases (0.78), followed by analgesics (0.67) and kidney problems (0.62) (Sargin and Büyükcengiz, 2019). In another study carried out in Mersin (Akaydin et al., 2013), the FIC ratios recorded were: respiratory system (0.88), gastrointestinal diseases (0.79), dermatological disorders (0.76) and urinary disorders (0.69).

The most common usages of the plants we found were for stomach disorders, wound, haemorrhoids and colds, although the previous studies found different rates of usage (Akaydin et al., 2013; Sargin et al., 2015; Sargin 2015; Sargin and Büyükcengiz, 2019).

CONCLUSION

In this comprehensive ethnobotanical study which for the first time evaluates the entire province, we find that 93 folk medicinal plants belonging to 43 families are still being used in Mersin. Among these, the medicinal usages of 36 taxa are new records in Mersin. The usage of nine taxa in veterinary medicine are also recorded. People living in rural areas who could also benefit from modern facilities and technology, maintain a connection, which we regard as a cultural bridge in this study, to traditional knowledge in their daily lives. We also note that the younger generation living in villages more freely shared their knowledge while participating in the study. Although we can say that the transfer of traditional knowledge continues despite visual and electronic culture and the increased use of technology reaching even the most remote villages, we must also note that if this research had been carried out a few decades ago, it would have obtained more comprehensive results in terms of the use of traditional knowledge based on botanical diversity. A connection between the old and young generations that is key to the preservation of important knowledge was established during the interviews. Performing ethnobotanical studies could revitalize this bridge of knowledge between old and new generations and help form solid foundation for its preservation. As a conclusion, study also demonstrates that a historically and culturally important

province with a rich flora such as Mersin has great potential as a source of traditional ethnobotanical knowledge.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation, to any qualified researcher.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

GE conceived and designed the research. GE, AD, MZH, IS, OT, MU, AS, and BC performed data collection, curation, and methodology. GE, IS, and OT identified the plants in 2019. GE, AD, MZH, IS, OT, AS, and BC analyzed the data and wrote the manuscript.

REFERENCES

- Abu-Irmaileh, B. E., and Afifi, F. U. (2003). Herbal Medicine in Jordan with Special Emphasis on Commonly Used Herbs. *J. Ethnopharmacology* 89, 193–197. doi:10.1016/s0378-8741(03)00283-6
- Afifi, F. U., and Abu-Irmaileh, B. (2000). Herbal Medicine in Jordan with Special Emphasis on Less Commonly Used Medicinal Herbs. *J. Ethnopharmacology* 72, 101–110. doi:10.1016/s0378-8741(00)00215-4
- Agelet, A., and Vallès, J. (2003). Studies on Pharmaceutical Ethnobotany in the Region of Pallars (Pyrenees, Catalonia, Iberian Peninsula). Part II. New or Very Rare Uses of Previously Known Medicinal Plants. *J. Ethnopharmacology* 84, 211–227. doi:10.1016/S0378-8741(02)00319-7
- Ahmet Sargin, S. (2015). Ethnobotanical Survey of Medicinal Plants in Bozyazi District of Mersin, Turkey. *J. Ethnopharmacology* 173, 105–126. doi:10.1016/j.jep.2015.07.009
- Akaydin, G., Şimşek, I., Arituluk, Z. C., and Yeşilada, E. (2013). An Ethnobotanical Survey in Selected Towns of the Mediterranean Subregion (Turkey). *Turkish J. Biol.* 37, 230–247. doi:10.3906/biy-1010-139
- Akerreta, S., Cavero, R. Y., and Calvo, M. I. (2007a). First Comprehensive Contribution to Medical Ethnobotany of Western Pyrenees. *J. Ethnobiol. Ethnomedicine* 3. doi:10.1186/1746-4269-3-26
- Akerreta, S., Cavero, R. Y., López, V., and Calvo, M. I. (2007b). Analyzing Factors that Influence the Folk Use and Phytonomy of 18 Medicinal Plants in Navarra. *J. Ethnobiol. Ethnomedicine* 3, 1–18. doi:10.1186/1746-4269-3-16
- Axiotis, E., Halabalaki, M., and Skaltsounis, L. A. (2018). An Ethnobotanical Study of Medicinal Plants in the Greek Islands of North Aegean Region. *Front. Pharmacol.* 9, 1–6. doi:10.3389/fphar.2018.00409
- Bailey, K. (1994). *Typologies and Taxonomies: An Introduction to Classification Techniques*. London-New Delhi: Sage Publications. doi:10.4135/9781412986397
- Bellia, G., and Pieroni, A. (2015). Isolated, but Transnational: The Glocal Nature of Waldensian Ethnobotany, Western Alps, NW Italy. *J. Ethnobiol. Ethnomedicine* 11. doi:10.1186/s13002-015-0027-1
- Benítez, G., González-Tejero, M. R., and Molero-Mesa, J. (2010). Pharmaceutical Ethnobotany in the Western Part of Granada Province (Southern Spain): Ethnopharmacological Synthesis. *J. Ethnopharmacology* 129, 87–105. doi:10.1016/j.jep.2010.02.016

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fphar.2021.664500/full#supplementary-material>

- Benítez, G., González-Tejero, M. R., and Molero-Mesa, J. (2012). Knowledge of Ethnoveterinary Medicine in the Province of Granada, Andalusia, Spain. *J. Ethnopharmacology* 139, 429–439. doi:10.1016/j.jep.2011.11.029
- Bulut, G., and Tuzlacı, E. (2013). An Ethnobotanical Study of Medicinal Plants in Turgutlu (Manisa-Turkey). *J. Ethnopharmacology* 149, 633–647. doi:10.1016/j.jep.2013.07.016
- Bulut, G., Haznedaroğlu, M. Z., Doğan, A., Koyu, H., and Tuzlacı, E. (2017). An Ethnobotanical Study of Medicinal Plants in Acipayam (Denizli-Turkey). *J. Herbal Med.* 10, 64–81. doi:10.1016/j.hermed.2017.08.001
- Calvo, M. I., and Cavero, R. Y. (2014). Medicinal Plants Used for Cardiovascular Diseases in Navarra and Their Validation from Official Sources. *J. Ethnopharmacology* 157, 268–273. doi:10.1016/j.jep.2014.09.047
- Calvo, M. I., Akerreta, S., and Cavero, R. Y. (2011). Pharmaceutical Ethnobotany in the Riverside of Navarra (Iberian Peninsula). *J. Ethnopharmacology* 135, 22–33. doi:10.1016/j.jep.2011.02.016
- Camejo-Rodrigues, J., Ascensão, L., Bonet, M. À., and Vallès, J. (2003). An ethnobotanical study of medicinal and aromatic plants in the Natural Park of "Serra de São Mamede" (Portugal). *J. Ethnopharmacology* 89, 199–209. doi:10.1016/S0378-8741(03)00270-8
- Carrió, E., and Vallès, J. (2012). Ethnobotany of Medicinal Plants Used in Eastern Mallorca (Balearic Islands, Mediterranean Sea). *J. Ethnopharmacology* 141, 1021–1040. doi:10.1016/j.jep.2012.03.049
- Cavero, R. Y., Akerreta, S., and Calvo, M. I. (2011a). Pharmaceutical Ethnobotany in Northern Navarra (Iberian Peninsula). *J. Ethnopharmacology* 133, 138–146. doi:10.1016/j.jep.2010.09.019
- Cavero, R. Y., Akerreta, S., and Calvo, M. I. (2011b). Pharmaceutical Ethnobotany in the Middle Navarra (Iberian Peninsula). *J. Ethnopharmacology* 137, 844–855. doi:10.1016/j.jep.2011.07.001
- Cornara, L., La Rocca, A., Marsili, S., and Mariotti, M. G. (2009). Traditional Uses of Plants in the Eastern Riviera (Liguria, Italy). *J. Ethnopharmacology* 125, 16–30. doi:10.1016/j.jep.2009.06.021
- P. H. Davis, R. R. Mill, and K. Tan (1988). *Flora of Turkey and the East Aegean Islands*. (Edinburgh: Edinburgh University Press), 10.
- P. H. Davis (Eds) (1965). *Flora of Turkey and the East Aegean Islands*. (Edinburgh: Edinburgh University Press), 1–9.
- De Natale, A., and Pollio, A. (2007). Plants Species in the Folk Medicine of Montecorvino Rovella (Inland Campania, Italy). *J. Ethnopharmacology* 109, 295–303. doi:10.1016/j.jep.2006.07.038

- EMA (2020). European Medicines Agency (EMA). Available at: (<https://www.ema.europa.eu>) (Accessed December 25, 2020).
- Everest, A., and Ozturk, E. (2005). Focusing on the Ethnobotanical Uses of Plants in Mersin and Adana Provinces (Turkey). *J. Ethnobiol. Ethnomedicine* 1, 6. doi:10.1186/1746-4269-1-6
- Fakir, H., Korkmaz, M., and Icel, B. (2016). Medicinal Plants Traditionally Used for Pain Alleviation in Antalya Province, Turkey. *Stud. Ethno-Medicine* 10, 314–324. doi:10.1080/09735070.2016.11905503
- Meteoroloji Genel Müdürlüğü (2020). WMO 2020 Küresel İklim Durumu Nihai Raporu. Available at: (<http://www.mgm.gov.tr>) Accessed October 29, 2020).
- González, J. A., García-Barriuso, M., and Amich, F. (2010). Ethnobotanical study of medicinal plants traditionally used in the Arribes del Duero, western Spain. *J. Ethnopharmacology* 131, 343–355. doi:10.1016/j.jep.2010.07.022
- Gras, A., Serrasolses, G., Vallès, J., and Garnatje, T. (2019). Traditional Knowledge in Semi-rural Close to Industrial Areas: Ethnobotanical Studies in Western Gironès (Catalonia, Iberian Peninsula). *J. Ethnobiol. Ethnomedicine* 15, 1–37. doi:10.1186/s13002-019-0295-2
- Guarrera, P. M., Forti, G., and Marignoli, S. (2005). Ethnobotanical and Ethnomedicinal Uses of Plants in the District of Acquapendente (Latium, Central Italy). *J. Ethnopharmacology* 96, 429–444. doi:10.1016/j.jep.2004.09.014
- Guner, A., Ozhatay, N., Ekim, T., and Baser, K. H. C. (2000). *The Flora of Turkey and the East Aegean Islands*, 11. Edinburgh: Edinburgh University Press.
- Guner, A., Kandemir, A., Menemen, Y., Yıldırım, H., Aslan, S., Ekşi, G., et al. (2018). *Illustrated Flora of Turkey*, 2. İstanbul: ANG Vakfı Nezahat Gökyiğit Botanik Bahçesi Yayınları (in Turkish).
- Güneş, S., Savran, A., Paksoy, M. Y., Koşar, M., and Çakılcıoğlu, U. (2017). Ethnopharmacological Survey of Medicinal Plants in Karaisalı and its Surrounding (Adana-Turkey). *J. Herbal Med.* 8, 68–75. doi:10.1016/j.hermed.2017.04.002
- Gürdal, B., and Kültür, Ş. (2013). An Ethnobotanical Study of Medicinal Plants in Marmaris (Muğla, Turkey). *J. Ethnopharmacology* 146, 113–126. doi:10.1016/j.jep.2012.12.012
- Güzel, Y., Güzelşemme, M., and Miski, M. (2015). Ethnobotany of Medicinal Plants Used in Antakya: A Multicultural District in Hatay Province of Turkey. *J. Ethnopharmacology* 174, 118–152. doi:10.1016/j.jep.2015.07.042
- Heinrich, M., Ankli, A., Frei, B., Weimann, C., and Sticher, O. (1998). Medicinal Plants in Mexico: Healers' Consensus and Cultural Importance. *Soc. Sci. Med.* 47, 1859–1871. doi:10.1016/S0277-9536(98)00181-6
- Heinrich, M., Lardos, A., Leonti, M., Weckerle, C., Willcox, M., Applequist, W., et al. (2018). Best Practice in Research: Consensus Statement on Ethnopharmacological Field Studies - ConSEFS. *J. Ethnopharmacology* 211, 329–339. doi:10.1016/j.jep.2017.08.015
- International Society of Ethnobiology (ISE) (2008). International Society of Ethnobiology Code of Ethics. Available at: (<https://www.ethnobiology.net/what-wedo/core-programs/ise-ethics-program/code-of-ethics>) Accessed October 25, 2020).
- Łuczaj, Ł., Jug-Dujaković, M., Dolina, K., Jeričević, M., and Vitasović-Kosić, I. (2019). The Ethnobotany and Biogeography of Wild Vegetables in the Adriatic Islands. *J. Ethnobiol. Ethnomedicine* 15, 1–17. doi:10.1186/s13002-019-0297-0
- Matejić, J. S., Stefanović, N., Ivković, M., Živanović, N., Marin, P. D., and Džamić, A. M. (2020). Traditional Uses of Autochthonous Medicinal and Ritual Plants and Other Remedies for Health in Eastern and South-Eastern Serbia. *J. Ethnopharmacol.* 261, 113186. doi:10.1016/j.jep.2020.113186
- Mattalia, G., Sökand, R., and Corvo, P. (2020a). The Virtues of Being Peripheral, Recreational, and Transnational, Transnational: Local Wild Food and Medicinal Plant Knowledge in Selected Remote Municipalities of Calabria, Southern Italy. *Ethnobot. Res. Appl.* 19, 1–20. doi:10.32859/era.19.38.1-20
- Mattalia, G., Sökand, R., Corvo, P., and Pieroni, A. (2020b). Blended Divergences: Local Food and Medicinal Plant Uses Among Arbëreshë, Occitans, and Autochthonous Calabrians Living in Calabria, Southern Italy. *Plant Biosyst.* 154, 615–626. doi:10.1080/11263504.2019.1651786
- Mattalia, G., Sökand, R., Corvo, P., and Pieroni, A. (2020c). Dissymmetry at the Border: Wild Food and Medicinal Ethnobotany of Slovenes and Friulians in NE Italy. *Econ. Bot.* 74, 1–14. doi:10.1007/s12231020-09488-y
- Mautone, M., De Martino, L., and De Feo, V. (2019). Ethnobotanical research in Cava de' Tirreni area, Southern Italy. *J. Ethnobiol. Ethnomedicine* 15, 1–21. doi:10.1186/s13002-019-0330-3
- Menale, B., and Muoio, R. (2014). Use of Medicinal Plants in the South-Eastern Area of the Partenio Regional Park (Campania, Southern Italy). *J. Ethnopharmacol.* 153, 297–307. doi:10.1016/j.jep.2014.02.039
- Mustafa, B., Hajdari, A., Krasniqi, F., Hoxha, E., Ademi, H., Quave, C. L., et al. (2012). Medical Ethnobotany of the Albanian Alps in Kosovo. *J. Ethnobiol. Ethnomed.* 8, 1–14. doi:10.1186/1746-4269-8-6
- Mustafa, B., Hajdari, A., Pieroni, A., Pulaj, B., Koro, X., and Quave, C. L. (2015). A Cross-Cultural Comparison of Folk Plant Uses Among Albanians, Bosniaks, Gorani and Turks Living in South Kosovo. *J. Ethnobiol. Ethnomed.* 11, 1–26. doi:10.1186/s13002-015-0023-5
- Mustafa, B., Hajdari, A., Pulaj, B., Quave, C. L., and Pieroni, A. (2020). Medical and Food Ethnobotany Among Albanians and Serbs Living in the Shtërpçë/Štrpce Area, South Kosovo. *J. Herb. Med.* 22, 100344. doi:10.1016/j.hermed.2020.100344
- Novais, M. H., Santos, I., Mendes, S., and Pinto-Gomes, C. (2004). Studies on Pharmaceutical Ethnobotany in Arrabida Natural Park (Portugal). *J. Ethnopharmacol.* 93, 183–195. doi:10.1016/j.jep.2004.02.015
- Papageorgiou, D., Bebeli, P. J., Panitsa, M., and Schunco, C. (2020). Local Knowledge about Sustainable Harvesting and Availability of Wild Medicinal Plant Species in Lemnos Island, Greece. *J. Ethnobiol. Ethnomed* 16, 1–23. doi:10.1186/s13002-020-00390-4
- Parada, M., Carrió, E., Bonet, M. À., and Vallès, J. (2009). Ethnobotany of the Alt Empordà Region (Catalonia, Iberian Peninsula). Plants Used in Human Traditional Medicine. *J. Ethnopharmacol.* 124, 609618. doi:10.1016/j.jep.2009.04.050
- Petrakou, K., Iatrou, G., and Lamari, F. N. (2020). Ethnopharmacological Survey of Medicinal Plants Traded in Herbal Markets in the Peloponnisos, Greece. *J. Herb. Med.* 19, 100305. doi:10.1016/j.hermed.2019.100305
- Phillips, O., and Gentry, A. H. (1993). The Useful Plants of Tambopata, Peru: II. Additional Hypothesis Testing in Quantitative Ethnobotany. *Econ. Bot.* 47, 33–43. doi:10.1007/BF02862204
- Pieroni, A., Quave, C., Nebel, S., and Heinrich, M. (2002). Ethnopharmacy of the Ethnic Albanians (Arbëreshë) of Northern Basilicata, Italy. *Fitoterapia* 73, 217–241. doi:10.1016/S0367-326X(02)00063-1
- Pieroni, A., Giusti, M. E., and Quave, C. L. (2011). Cross-Cultural Ethnobiology in the Western Balkans: Medical Ethnobotany and Ethnozoology Among Albanians and Serbs in the Pešter Plateau, Sandžak, South-Western Serbia. *Hum. Ecol.* 39, 333–349. doi:10.1007/s10745-011-9401-3
- Pieroni, A. (2000). Medicinal Plants and Food Medicines in the Folk Traditions of the Upper Lucca Province, Italy. *J. Ethnopharmacology* 70, 235–273. doi:10.1016/S0378-8741(99)00207-X
- Pieroni, A. (2017). Traditional Uses of Wild Food Plants, Medicinal Plants, and Domestic Remedies in Albanian, Aromanian and Macedonian Villages in South-Eastern Albania. *J. Herbal Med.* 9, 81–90. doi:10.1016/j.hermed.2017.05.001
- Rahimi, M., Sajadimajd, S., Mahdian, Z., Hemmati, M., Malekhtabi, P., Bahrami, G., et al. (2017). Characterization and Anti-diabetic Effects of the Oligosaccharide Fraction Isolated from *Rosa Canina* in STZ-Induced Diabetic Rats. *Carbohydr. Res.* 489, 107927. doi:10.1016/j.carres.2020.107927
- Rigat, M., Bonet, M. À., Garcia, S., Garnatje, T., and Vallès, J. (2007). Studies on Pharmaceutical Ethnobotany in the High River Ter valley (Pyrenees, Catalonia, Iberian Peninsula). *J. Ethnopharmacology* 113, 267–277. doi:10.1016/j.jep.2007.06.004
- Rigat, M., Vallès, J., Iglésias, J., and Garnatje, T. (2013). Traditional and Alternative Natural Therapeutic Products Used in the Treatment of Respiratory Tract Infectious Diseases in the Eastern Catalan Pyrenees (Iberian Peninsula). *J. Ethnopharmacology* 148, 411–422. doi:10.1016/j.jep.2013.04.022
- Sansaneli, S., Ferri, M., Salinitro, M., and Tassoni, A. (2017). Ethnobotanical Survey of Wild Food Plants Traditionally Collected and Consumed in the Middle Agri Valley (Basilicata Region, Southern Italy). *J. Ethnobiol. Ethnomedicine* 13, 50. doi:10.1186/s13002-017-0177-4
- Sargin, S. A., and Büyükcengiz, M. (2019). Plants Used in Ethnomedicinal Practices in Gülnar District of Mersin, Turkey. *J. Herbal Med.* 15, 100224. doi:10.1016/j.hermed.2018.06.003
- Sargin, S. A., Selvi, S., and Büyükcengiz, M. (2015). Ethnomedicinal Plants of Aydıncık District of Mersin, Turkey. *J. Ethnopharmacology* 174, 200–216. doi:10.1016/j.jep.2015.08.008

- Sargin, S. A. (2015). Ethnobotanical Survey of Medicinal Plants in Bozyazı District of Mersin, Turkey. *J. Ethnopharmacol.* 173, 105–126. doi:10.1016/j.jep.2015.07.009
- Šarić-Kundalić, B., Dobeš, C., Klatte-Asselmeyer, V., and Saukel, J. (2010). Ethnobotanical Study on Medicinal Use of Wild and Cultivated Plants in Middle, South and West Bosnia and Herzegovina. *J. Ethnopharmacol.* 131, 33–55. doi:10.1016/j.jep.2010.05.061
- Scherrer, A. M., Motti, R., and Weckerle, C. S. (2005). Traditional Plant Use in the Areas of Monte Vesole and Ascea, Cilento National Park (Campania, Southern Italy). *J. Ethnopharmacology* 97, 129–143. doi:10.1016/j.jep.2004.11.002
- Sokal, R., and Michener, C. (1958). *A Statistical Method for Evaluating Systematic Relationships*. University of Kansas Science Bulletin, 38, 1409–1438.
- Teklehaymanot, T., and Giday, M. (2007). Ethnobotanical Study of Medicinal Plants Used by People in Zegie Peninsula, Northwestern Ethiopia. *J. Ethnobiol. Ethnomed.* 3, 12. doi:10.1186/1746-4269-3-12
- The Plant List (2013). A Working List of All Plant Species. Available at: <http://www.theplantlist.org> (Accessed October 15, 2020).
- Thomas, E., Vandebroek, I., Sanca, S., and Van Damme, P. (2009). Cultural Significance of Medicinal Plant Families and Species Among Quechua Farmers in Apillapampa, Bolivia. *J. Ethnopharmacology* 122 (1), 60–67. doi:10.1016/j.jep.2008.11.021
- Trotter, R. T., and Logan, M. H. (1986). “Informant Consensus: a New Approach for Identifying Potentially Effective Medicinal Plants,” in *Plants in Indigenous Medicine and Diet*. Editor N. L. Etkin (Bedford Hills, New York: Redgrave Publishing Company), 91–112.
- TUIK (2020). Türkiye İstatistik Kurumu (TUIK) Türkiye İstatistik Kurumu. Available at: <https://www.tuik.gov.tr> (Accessed October 28, 2020).
- Tuttolomondo, T., Licata, M., Leto, C., Savo, V., Bonsangue, G., Letizia Gargano, M., et al. (2014). Ethnobotanical Investigation on Wild Medicinal Plants in the Monti Sicani Regional Park (Sicily, Italy). *J. Ethnopharmacology* 153, 568–586. doi:10.1016/j.jep.2014.02.032
- Tuzlacı, E. (2011). Türkiye Bitkileri Sözlüğü “A Dictionary Of Turkish Plants”. second ed. İstanbul: Alfa Yayınları.
- Varga, F., Šolić, I., Jug Dujaković, M., Łuczaj, Ł., and 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 (2), 3622. doi:10.5586/asbp.3622
- Vinagre, C., Vinagre, S., and Carrilho, E. (2019). The use of medicinal plants by the population from the Protected Landscape of “serra de Montejunto”, Portugal. *J. Ethnobiol. Ethnomedicine* 15, 1–30. doi:10.1186/s13002-019-0309-0
- Vitasović Kosić, I., Juračak, J., and Łuczaj, Ł. (2017). Using Ellenberg-Pignatti Values to Estimate Habitat Preferences of Wild Food and Medicinal Plants: An Example from Northeastern Istria (Croatia). *J. Ethnobiol. Ethnomed.* 13, 2-19. doi:10.1186/s13002-017-0159-6
- Yeşilada, E., Honda, G., Sezik, E., Tabata, M., Goto, K., and Ikeshiro, Y. (1993). Traditional Medicine in Turkey. IV. Folk Medicine in the Mediterranean Subdivision. *J. Ethnopharmacol.* 39, 31–38. doi:10.1016/0378-8741(93)90048-a
- Zhou, W.-t., Abdurahman, A., Abdusalam, E., Yiming, W., Abliz, P., Aji, Q., et al. (2014). Effect of *Cydonia Oblonga* Mill. Leaf Extracts or Captopril on Blood Pressure and Related Biomarkers in Renal Hypertensive Rats. *J. Ethnopharmacology* 153, 635–640. doi:10.1016/j.jep.2014.03.014
- Živković, J., Ilić, M., Šavikin, K., Zdunić, G., Ilić, A., and Stojković, D. (2020). Traditional Use of Medicinal Plants in South-Eastern Serbia (Pčinja District): Ethnopharmacological Investigation on the Current Status and Comparison with Half a Century Old Data. *Front. Pharmacol.* 11, 1–12. doi:10.3389/fphar.2020.01020

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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APPENDIX 1: QUESTIONNAIRE FORM

- 1 Name and surname of the participant.
- 2 Age and sex of the participant.
- 3 Telephone and address of the participant.
- 4 Educational level of the participant.
- 5 Date of interview.
- 6 Place of residence of the participant.
- 7 Duration of residence of the participant.
- 8 Local name of the plant.
- 9 Human health or Animal health.
- 10 Ailments treated/therapeutic effect.
- 11 Plant part used.
- 12 Preparation.
- 13 Administration.
- 14 Dosage.
- 15 Duration of treatment.
- 16 Age group of patients (baby, child, adult).
- 17 Side effects.
- 18 Different ethnobotanical use.
- 19 Animal based remedies.