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An ethnobotanical review on medicinal plants of the Lamiaceae family in Turkey

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Abstract: Medicinal plants have been used by humans for the treatment of various diseases for thousands of years from past to present. Members of the Lamiaceae family are among the most preferred medicinal plants due to the wide variety of secondary components they contain, particularly essential oils. In this review, Master's and PhD theses and books based on ethnobotanical studies investigated between 1960 and 2021 as well as internationally recognized databases (PubMed, Scopus, Google Scholar, Web of Science, SciFinder, Springer and Elsevier) were used to determine the medicinal uses of Lamiaceae taxa among the people in Turkey. As a result of the study, it was found that a total of 221 taxa (192 species) belonging to 29 genera, 51 of which are endemic, have medicinal/therapeutic uses. The local names of these taxa, the usage which are used among the people, the diseases in which they are used, and the geographical regions given in the present study. The genera of taxa most commonly used for medicinal purposes by the local people are *Salvia* (37 taxa), *Sideritis* (25 taxa), *Stachys* (22 taxa), *Thymus* (16 taxa) and *Origanum* (13 taxa). It was observed that the most frequently used two methods while preparing these plants for use was infusion (61%), and decoction (24%). Studies conducted on National (TURK, BHP), Regional (EU) and International Pharmacopoeias (WHO) and various monographs (AHP, COMISSION E, EMA, ESCOP, PDR) have revealed that there are 29 taxa included in these pharmacopoeias and monographs whose purpose of use are similar to the diseases that local people are trying to treat. Diseases that people use plants for therapeutic purposes are grouped into 12 categories. It was determined that these plants were widely used for therapeutic purposes in gastric disorders as well as otolaryngology and respiratory system diseases. This review briefly discusses whether some taxa commonly used by the local people in the treatment of diseases can be useful in the treatment of the disease in question, in the light of scientific studies.

Key words: Lamiaceae, medicinal plants, essential oil, pharmacopoeia, Turkey

1. Introduction

Plants play significant roles in human nutrition, shelter, clothing and treatment. The number of plant species known today is around 250–300 thousand. While human beings currently benefit from around 70,000 plant species, the number of plant species cultivated by humans is around 7000. Only 30 plants meet 90% of the world's nutritional needs (Arslan, 2014). Anatolia (Asian part of Turkey) has hosted many civilizations for thousands of years, from the Paleolithic era to the present day. There is a rich history lying underneath every corner of Anatolia. At the same time, Anatolia has been a region where many civilizations have developed due to its geographical location on the crossroads regulating world trade, and its geological, floral, faunal significance (Baytop, 1999; Zohary and Hopf, 2000).

The oldest report on archaeobotanical plant remains in Turkey was published by the Berliner botanist L. Wittmack in the 1880s. Wittmack conducted studies on field crops in Troy and Bozhöyük archaelogical sites (Nesbitt, 1995). The earliest archaeological artifacts of early inhabitants of Anatolia known from the surveys and excavations related to Paleolithic communities. In the coastal area of the Mediterranean territory, long-term excavations conducted in caves such as Karain, Beldibi and Öküzini. Yarımburgaz cave nearby İstanbul also provided important faunal remains and stone tools, but due to the fragile characteristics of the plant material we do have very limited information about their plant use (Martinoli and Jacomet, 2004; Taşkıran, 2018).

First systematic archaeobotanical studies were carried out in the 1960s, on sites such as Beycesultan, Çatalhöyük,

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and Hacılar. These early studies focused on known and recognizable carbonized domesticated crops. In the last few decades archaeobotanical studies were enriched by further developments in the flotation methods, and systematic excavation techniques. Archaeobotanical soil samples were collected systematically from all excavation units, while some units correspond to well-defined structures and contexts inside buildings, such as hearths, floors, pits and platforms; others come from activity, storage and working areas or middens (Ergun et al., 2018). As a result of systematic flotation, and comparisons with reference material; charred and/or mineralized seeds, fruit stones, and wood remains carefully studied, identified and listed. These lists do not only provide information on crops, but also wild and weedy plants that the humans gathered from the surrounding landscape of their settlements. Archaeobotanical studies are particularly important in Anatolia and the Near East, as this region is one of the main centres of domestication of wheat and legumes such as lentil and chickpea. DNA analysis indicated that all domesticated wheat varieties with a caryopsis (*Triticum monococcum* L. subsp. *monococcum*) are closely linked to the wild variety of the same species, documented in the Karacadağ Region (Zohary and Hopf, 2000; Ulaş, 2002).

Archaeobotanical information do not only give clues about food plants, but various uses as fodder, fuel, medicine, and aromatics. One of the early settlements of Southeastern Turkey, Körtik Tepe near Batman, dated to tenth millennium BC, provided well preserved plant remains and well exploited wild taxa, which also include *Lallemantia* L. species (Özkaya and Coşkun, 2009; Riehl et al, 2012). Another well-known site of Southeastern Turkey, Göbeklitepe near Urfa, provided monumental buildings with stone pillars, but only scarce plant material, which preliminary results indicate wild plant explotation (Neef, 2003). Ongoing excavations and recent studies over pollen and high number of grinding and pounding stones of Göbeklitepe, indicated a very intense cereal food processing in early Neolithic levels of 10th millennium BC (Dietrich et al., 2019).

Long-term excavations in early Neolithic Aşıklı, Çatalhöyük and other sites provided detailed lists of cereals, legumes, grasses and various wild seeds. Within these lists, we find out that the Neolithic inhabitants of Aşıklı Höyük, utilised species such as *Teucrium* L., *Ajuga* L., *Ziziphora* L. and *Mentha* L. from Lamiaceae family during the 9th millennium BC (Ergun et al. 2018). Within the archaeobotanical reports of Çatalhöyük Neolithic levels, *Sideritis* L, *Teucrium*, and *Ziziphora* species are also available as part of the weed assemblage (Filipovic, 2014).

Medicinal plants have been used by humans for the treatment of various diseases for thousands of years from past to present. About 10,000 of about 270,000 terrestrial plants classified taxonomically in the world are currently used for medicinal purposes (Kinghorn et al., 2011). Beneficial effects of certain botanicals on the body have been observed and these botanicals have been used primarily for promoting health and in treatments, resulting in an extensive and long history of use (Anton et al., 2019). The number of plants used for medicinal purposes in Anatolia is not known for certain, but there are some estimations between 500 and 1000, and approximately 200 medicinal and aromatic plants with export potential have been determined. In addition to archaeobotanical studies, earliest written documents of second millennium BC from Kültepe, Boğazköy, and other cuneiform tablet archives of Hittite settlements, mention plant names, which used in treatments, magic, and rituals (Ertem, 1987; Öz Kiriş, 2014).

The richness of the biocultural heritage of Turkey in terms of medicinal plants is increasing even more, thanks to the increasing number of ethnobotanical studies (Baytop, 1999; Tuzlacı, 2006; Faydaoğlu and Sürücüoğlu, 2011; Ertuğ 2014).

Ethnobotany is the study of the direct interaction between plants and man in his culture. Man's preliminary interest in plants started from his need for food, shelter, protection and then his attention shifted to the remedies for injuries and diseases (Inayat et al., 2019; Aziz et al., 2021).

The ethnobotany of the Old World Labiatae covers the different fields involved in the interaction between Labiatae and man: uses for food (vegetables, tubers, edible oils, flavourings and beverages), perfumery and cosmetics, dyes, toxins, medicines (nervous, circulatory, respiratory, digestive, reproductive systems, etc.), hallucinating drugs, insecticides, insect repellents and ornamentals (Rivera-Núñez and Castro, 1992a). One of the most important plant families used for medicinal purposes among the people from ancient times to the present is the Lamiaceae family (Rivera-Núñez and Castro, 1992b). In the light of archaeological excavations and ancient texts, we know that many species belonging to the Lamiaceae family were cultivated during the Ancient Greek and Roman periods. A Greek phsician, pharmacologist, native of Anazarbus in Kilikia, Dioscorides' Materia Medica provides information about the use of 40 Labiatae/Lamiaceae species in the Roman period (Rivera-Núñez and Castro, 1992a).

Lamiaceae, the sixth largest Angiosperm family, contains more than 245 genera and 7886 species, and distributed worldwide. It includes many economically and medicinally important species (IPNI, 2020; Zhao et al., 2021). In Lamiaceae, Harley et al. (2004) recognized seven subfamilies as Ajugoideae, Lamioideae, Nepetoideae, Prostantheroideae, Scutellarioideae, Symphorematoideae and Viticoideae. Recently, five new additional

subfamilies have been described, namely Cymarioideae, Peronematoideae, Premnoideae, Callicarpoideae, and Tectonoideae (Li et al., 2016; Li and Olmstead, 2017). In the family, the largest genera are *Salvia* L. (945 species), *Scutellaria* L. (360 species), *Stachys* L. (300 species), *Plectranthus* L'Hér. (300 species), *Hyptis* Jacq. (280 species), *Teucrium* (250 species), *Vitex* L. (250 species), *Thymus* L. (220 species) and *Nepeta* L. (200 species) (Harley et al., 2004). In Turkey, there are five subfamilies as Ajugoideae, Lamioideae, Nepetoideae, Scutellarioideae, and Viticoideae (Harley et al., 2004; Li et al., 2016; Celep and Dirmenci, 2017; Li and Olmstead, 2017).

Lamiaceae is the third largest family based on the taxon number and fourth largest family based on the species number in Turkey. The family has 48 genera and 782 taxa (603 species, 179 subspecies and varieties), 346 taxa (271 species, 75 subspecies and varieties) of which are endemic (ca. 44%) (data updated 1th February 2017) in the country. There are also 23 hybrid species, 19 of which are endemic (82%). The results proven that Turkey is one of the centres of diversity for Lamiaceae in the Old World. In addition, Turkey has about 10% of all Lamiaceae members in the World. The largest five genera in the country based on the taxon number are *Stachys* (118 taxa), *Salvia* L. (107 taxa), *Sideritis* (53 taxa), *Phlomis* L. (53 taxa) and *Teucrium* (48 taxa). According to taxon number, five genera with the highest endemism ratio are *Dorystaechas* Boiss. & Heldr. ex Benth. (1 taxon, 100%), *Lophanthus* Adans. (1 taxon, 100%), *Sideritis* (53 taxa, 75%), *Marrubium* L. (27 taxa, 59%), and *Phlomis* L. (53 taxa, 57%) (Table 1). In addition, there are two monotypic genera in Turkey as *Dorystaechas* and *Pentapleura* Hand.-Mazz (Güner et al. 2012; Bizimbitkiler, 2013; Celep and Dirmenci, 2017).

Turkey sits on the junction of three phytogeographic regions with highly diverse climate and the other ecologic features. Phytogeographic distribution of Turkish Lamiaceae taxa are 293 taxa in the Mediterranean (37.4%), 267 taxa in the Irano-Turanian (36.7%), 90 taxa in the Euro-Siberian (Circumboreal) phytogeographic region, and 112 taxa in Unknown or Multiregional (14.3%) phytogeographical elements. In the Mediterranean phytogeographic region 61% of the taxa, in the Irano-

Table 1. The genus and taxa numbers with the highest endemism rate in Turkey (Celep and Dirmenci, 2017).

No	Genus	Taxon number		Endemism ratio (%)
		Total taxon	Endemic taxon	
1	*Dorystaechas* Boiss. & Heldr. ex Benth.	1	1	100
2	*Lophanthus* Adans.	1	1	100
3	*Sideritis* L.	53	40	75
4	*Marrubium* L.	27	16	59
5	*Phlomis* L.	53	30	57
6	*Salvia* L.	107	58	54
7	*Ballota* L.	17	9	53
8	*Origanum* L.	32	15	47
9	*Stachys* L.	118	52	44
10	*Nepeta* L.	45	19	42
11	*Scutellaria* L.	40	16	40
12	*Thymus* L.	44	17	39
13	*Clinopodium* L.	32	12	38
14	*Micromeria* Benth.	14	5	36
15	*Cyclotrichium* (Boiss.) Manden. & Scheng.	6	2	33
16	*Ajuga* L.	22	7	32
17	*Satureja* L.	16	5	31
18	*Teucrium* L.	48	14	29
19	*Thymbra* L.	5	1	20
20	*Dracocephalum* L.	5	1	20

Turanian phytogeographic region 50% of the taxa, and in the Euro-Siberian (Circumboreal) phytogeographic region 13% of the taxa are endemic. Some endemic taxa are widely distributed in the country, so their phytogeograhic elements are not clearly defined, the endemism ratio of these taxa are 13%. In time, species of Lamiaceae genera are migrated from one phytogeographic region to another one and specialised in specific habitats in the country. *Stachys, Salvia, Sideritis, Phlomis, Teucrium, Nepeta, Thymus, Scutellaria, Origanum* and *Clinopodium* are species rich genera in Turkey (Table 1). These genera have also quite high endemism ratio. Due to high taxon number and endemism ratio, different habitats, climates and soil types, high altitutinal range and diverse pollinators, it is clear that Turkey is a very good example for evolution and speciation of Lamiaceae family in the Old World (Celep and Dirmenci, 2017).

The oldest written records about the use of Lamiaceae members as medicine in Anatolia belong to Dioscorides. In his work called De Materia Medica, Dioscorides included the medicinal use of 107 Lamiaceae members (Dioscorides et al., 2000). Baytop (1999) included the medicinal use of 74 taxa belonging to the Lamiaceae family in his work titled "Türkiye'de Bitkilerle Tedavi", which is renown as one of the most comprehensive ethno-medicinal studies. He mentioned that the most commonly used genera are *Salvia, Sideritis* and *Origanum* (Baytop 1999). A total of 52 taxa have been approved for use as medicinal drugs in world pharmacopoeias and various other pharmacopoeias (WHO, 2010; EMA, 2012; PDR, 2014).

Due to the adverse effects of synthetic drugs in the body, interest in natural treatments and medicinal plants is increasing day by day. This study explains plant taxa, which are traditionally used in the treatment of various diseases, particularly gastro-intestinal and microbial diseases. This review also enlists the medicinal uses of taxa belonging to the Lamiaceae family in detail from Turkey. The study further explains the parts of the taxa that were found to be used for medicinal purposes, their patterns and purposes of use; the distribution according to phytogeographic regions and the geographical regions where it is used are also exhibited in the table. We hope that this study will be a significant reference source for further scientific studies to be conducted on Lamiaceae family, particularly for ethnopharmacological, ethnozoological and ethnomedicinal studies.

2. Methodology

2.1. Literature review

Books published as well as Master's and PhD theses written based on ethnobotanical studies investigated between 1960 and 2021 for the purpose to determine the medicinal uses of Lamiaceae taxa by the local people in Turkey as well as internationally recognized databases (PubMed, Scopus, Google Scholar, Web of Science, SciFinder, Springer and Elsevier) were searched while preparing this review. Data were searched in search engines by entering various words and their combinations such as "ethnobotany", "ethnobotany + Turkey", "ethnobotanical + Turkey", "ethnopharmacology + Turkey", "ethnobotany + Lamiaceae + Turkey, "Lamiaceae + medicinal plants". Literature review have also revealed therapeutic uses of Lamiaceae taxa on National (TURK (2016, 2018), BHP, 2009), Regional (EU) and International pharmacopoeias (WHO) and various monographs (AHP, COMISSION E, EMA, ESCOP, PDR). Current names of plant taxa were verified using IPNI (2020). Turkish names of taxa were provided in accordance with Güner et al. (2012).

2.2. Data analysis

The significant essential oil compounds of Turkish Lamiaceae taxa are given in Table 2. The scientific (Latin name), Turkish and local names, parts used, patterns of use and phytogeographical regions of the plants found to be used for medicinal purposes in ethnobotanical studies are presented in Table 3 in alphabetical order (according to their scientific names). In addition, taxa that are used for medicinal purposes in our country and included in pharmacopoeia and monographs are given in Table 4. The genera with ethnobotanical use and their taxa numbers, the genera with the highest number of taxa, their distribution by phytogeographic regions, usage patterns, organs used, symptoms and diseases to which they are applied, and endemic taxa are presented graphically (Figures 1–4).

3. Phytochemistry of Turkish Lamiaceae taxa

The phytochemistry of Lamiaceae is very complex because several groups and subgroups coexist in it, and each of them has its own phytochemical characteristics and peculiarities. As first differentiation within the family, species belonging to Lamiaceae can be distinguished into two major groups that both produce secondary metabolites: the first one comprises all those species that are known to mainly produce volatile terpenoids, found in the essential oil, whereas the second one comprises all those species that are known to mainly produce nonvolatile metabolites in the polar fraction and are poor essential oil producers (Frezza et al., 2019). The phytochemicals observed in the Turkish Lamiaceae family are mainly composed of terpenoids, phenols, iridoid glycosides, tannins, and fatty acids.

3.1.Terpenoids

Terpenoids, or terpenes, comprise one of the most important groups of active compounds in plants with over 20,000 known structures. The Lamiaceae are a rich source of terpenoids which possess antiinsect, antibacterial and antifungal activity. Terpenoid compounds the most

Table 2. Essential oil components of Lamiaceae taxa in Turkey (Baser et al., 1998; Baser and Kırımer, 2006; Başer and Kırımer, 2018; Frezze et al., 2019).

Genus	**Main compounds**
Ajuga	1-octen-3-ol, caryophyllene oxide, cubenol, dodecanoic a, germacrene-D, heptacosane hexahydrofarnesyl acetone, Linalool, n-hexadecanoic acid, nonacosane, p-cymene, phytol tetradecanoic acid, viridiflorol, α-phellandrene, α-pinene, β-pinene, β-terpineol
Ballota	bisabolene, caryophyllene oxide, germacrene D, hexadecanoic acid, hexenal, β-caryophyllene
*Clinopodiu*m	caryophyllene, caryophylleneoxide, cis-piperitone epoxide, cis-piperitone oxide isomenthone, limonene, menthone, piperitenone oxide, pulegone, terpinen-4-ol, trans-piperitone oxide,
Cyclotrichium	isomenthol, isomenthone, pulegone
Dorystaechas	1,8-cineole, borneol, camphor
Hyssopus	isopinocamphone, pinocamphone pinocarvone, terpinene-4-ol, β-myrcenepinocarvone, β-phellandrene, β-pinene
Lamium	4-hydroxy-4-methyl-2-pentanone, 6,10,14-trimethyl-2-pentadecanone, hexadecanoic acid, hexahydrofarnesyl acetone, methyl hexadecanoate, methyl linolenate, n-tetracosane, octadecanol, pentanol, trans-phytol
Lavandula	linalool, linalyl acetate, isoborneol,α-fenchone, 1,8-cineole, camphor, myrtenyl acetate,α-thujone, L-camphor, T-cadinol, borneol, δ-3-carene, lavandulyl acetate
Leonurus	epi-cedrol, dehydro-1,8-cineole, germacrene D, spathulenol, α-humulene
Marrubium	β-farnesene, β-caryophyllene, hexadecanoic acid, hexahydrofarnesyl asetone, spathulenol, β-caryophyllene
Melissa	citral, citronellal, geranial, linalool, neral
Mentha	1,8-cineole, carvone, cis-piperitone oxide, dihydrocarvone, eucalyptol, isomenthone limonene, menthofuran, menthol, menthone, menthyl acetate, neomenthol, piperitone, piperitenone oxide, pulegone, α-pinene, β-caryophyllene,
Micromeria	isomenthone, piperitenone, piperitone piperitone oxide, pulegone, β-caryophyllene, β-pinene
Nepeta	1,8-cineole, borneol, camphor, eucalyptol, germacrene D, linalool, naphthalenone, nepetalactone, p-cymene, sabinene, T-cadinol
Ocimum	1,8-cineole, apiole, estragole, eugenol, limonene, linalool, methyl chavicol, methyl cinnamate, p-cymene, β-sesquiphellandrene, γ-cadinene
Origanum	carvacrol, ɣ-terpinene, linalool, myrcene, p-cymene, thymol
Phlomis	bicyclogermacrene, germacrene D, heptacosane, hexadecanoic acid, hexahydrofarnesyl acetone, hexenal, limonene, manoyl oxide, pentacosane, spathulenol, vinyl amyl carbinol α-cedrene, α-cubebene, α-curcumene, α-eudesmol, α-pinene, β-caryophyllene, β-caryophyllene, β-curcumene, β-eudesmol, β-farnesene.
Prunella	decane, dodecane, ethyl caprinate, germacrone, myristic acid, nonacosane, spathulenol, squalene, tetradecane, viridiflorol
Rosmarinus	1,8-cineole, borneol, bornyl acetate, camphene, camphor, verbenone, α-pinene, α-terpineol
Salvia	1,8-cineole, borneol, camphene, camphor, germacrene-D, ledol, p-cymene, spathulenol, α / β thujone, viridiflorol,, α-copaene, α-cubebene, α-limonene, α-pinene,, α-terpineol, β-myrcene, β-pinene, δ-cadinene
Satureja	carvacrol, cyclohexanone, ɣ-terpinene, p-cymene, phenol-2-methyl, thymol
Scutellaria	bicyclogermacrene, caryophyllene oxide, germacrene D, hexadecanoic acid, palmito-ɣ-lactone, tetradecanoic acid, β-caryophyllene
Sideritis	1-octen-3-ol,3-carene, α -copaene, β-bourbonene bicyclogermacrene, carvacrol, caryophyllene oxide, germacrene D, limonene, linalool, myrcene, naphthalene, nonanal, sabinene, spathulenol, valeranone, α-bisabolol, α-cadinene, α-pinene, β-caryophyllene, β-farnesene, β-phellandrene,β-pinene
Stachys	benzaldehyde, bicyclogermacrene, carvacrol, dodecanoic acid, farnesyl acetate, geranyl acetate, germacrene D, hexadecanoic acid, limonene, linalool, linalyl acetate, phytol, sabinene, spathulenol, thymoquinone, valeronone, verbenol, α-bisabolol, α-cadinene, α-cadinol, α-copaene, α-ledrene, α-pinene, α-terpineol, β-bourbonene, β-caryophyllene, β-myrcene, β-ocimene, β-phellandrene, β-pinene, γ-muurolene

Table 2. (Continued).

Teucrium	2-methyl cumarone, bicyclogermacrene, caryophyllene oxide, germacrene D, hexadecanoic acid, nonacosane, α-humulene, α-pinene, β-caryophyllene, β-pinene
Thymbra	carvacrol, ɣ-terpinene, p-cymene, thymol, α-terpinene
Thymus	1,8-cineole, borneol, carvacrol, carvacrol methyl etherl, cymene, farnesol, ɣ-terpinen, limonene, linalool, thymol, α-pinene
Vitex	1,8-cineole, bicyclogermacrene, caryophyllene, myrcene, sabinene, α-pinene, α-terpinyl acetate, β-farnesene
Ziziphora	1,8-cineole, limonene, piperitone, pulegone, β-pinene

observed in Turkish Lamiaceae taxa can be classified as monoterpene (essential oils), diterpene, sesquiterpene and triterpene. Monoterpenes are the major class of chemical compounds found in essential oils. Essential oils are odorous principles stored in special plant cell glands, glandular hairs, oil ducts or resin ducts—situated in any part of a plant or its exudations. These oils have antiseptic, antibacterial, antiviral and antifungal effects on the human body (Pengelly, 2004; Topçu et al., 2004; Brand et al., 2015; Puškárová et al., 2017). The essential oil of Lamiaceae taxa is particularly rich in volatile monoterpenes, sesquiterpenes, and diterpenes. Among monoterpenes, the main compounds are α- pinene, β- pinene, 1,8-cineole, menthol, limonene, and gamma-terpinene (Frezze et al., 2019). Two monoterpenes of the Lamiaceae that have attracted much attention are thymol and carvacrol which are often found in *Thymus, Origanum, Satureja* and *Thymbra*. These two phenolic monoterpenes are especially known for their antiherbivore, antimicrobial, and antioxidant activities (Tümen et al., 1998; Kılıç, 2006; Naghdi et al., 2017). One of the important monoterpenic compounds is pulegone. This compound is frequently observed in *Mentha*, *Ziziphora*, *Clinopodium* and *Cyclotrichium* taxa (Baser et al., 1994; Baser et al., 1996; Baser et al., 1998; Oumzil et al., 2002; Dawoud and Shebab, 2019). The significant essential oil compounds of Turkish Lamiaceae taxa are given in Table 2. Sesquiterpenes are represented by germacrene D, caryophyllene, cadinen, farnesene and spathulenol as main compounds. These components are found in more or less quantities in all taxa of the Lamiaceae family (Frezza et al., 2019). Diterpenes show antimicrobial, antifungal and antiviral activities such as monoterpene and sesquiterpene. Diterpenes are more common in *Ajuga*, *Salvia*, *Stachys*, *Teucrium*, *Marrubium* and *Sideritis* than other genera (Bisio et al., 2015; Frezza et al., 2019).

3.2. Phenols

Phenols are one of the largest groups of secondary plant compounds. They are aromatic alcohols since the hydroxyl group is always attached to a benzene ring. General properties of simple phenols are bactericidal, antiseptic and anthelmintic. Phenol itself is a standard for other antimicrobial agents. The simplest phenols are C6 (Pengelly, 2004). Phenols can be divided into five group, including phenylpropanoids, flavonoids, lignans, phenolic acids, stilbenes, and coumarins (Pengelly, 2004; Deng and Lu, 2017). All phenolic compounds as they possess aromatic rings linked to hydroxyl groups are potent antioxidants with usually high redox potentials (Hýsková and Ryšlavá, 2019). Phenols found in Turkish Lamiaceae taxa mostly consist of phenylpropanoids, flavonoids, lignans, and coumarins.

3.2.1 Phenylpropanoids

Phenylpropanoids are a large class of secondary metabolites synthesized from primary metabolites, phenylalanine or tyrosine, through a series of enzymatic reactions. A group of possible taxonomic significance in the family are the caffeoyl esters. The most important are the hydroxycinnamic acids: caffeic acid, *p*-coumaric acid, ferulic acid and sinapic acid. Caffeic acid, rosmarinic acid, chlorogenic acid, and lithospermic acid are the most common phenylpropanoids in Lamiaceae taxa in our country (Richardson, 1992).

3.2.2 Flavonoids

Flavonoids are mainly 15- C compounds found generally throughout the plant kingdom. These compounds occur as yellow and white plant pigments. Flavonoids have been ascribed positive effects on human and animal health and the current interest is for disease therapy and chemoprevention. Experiments have proven flavonoids affect the heart and circulatory system and strengthen the capillaries. They are also known to have synergistic effects with ascorbic acid. Their protective actions are mainly due to membrane stabilising and antioxidant effects. Therapeutic effects of flavonoids such as antioxidant, antiviral, hepatoprotective, antiatheromatous, antiinflammatory and antihypertensive have been widely reported, though it must be remembered these effects are dependent on their degree of absorption (Pengelly, 2004; Rehan et al., 2014). Flavonoids are subdivided into flavones, flavonols, flavanones, flavanonols, flavanols or catechins, anthocyanins and chalcones (Panche et al., 2016). The main structure of flavonoids in the Lamiaceae family is flavones

Table 3. Lamiaceae taxa used for medicinal purposes in Turkey.

Taxon number	Scientific name	Turkish name	Vernacular name's	Used parts	Utilization methods **	Use	Recorded literature uses	Regions	Phytogeographical region
1	*Ajuga chamaepitys* (L.) Schreb. subsp. *chia* (Schreb.) Arcang.	acıgıcı	Bodur ot, bozca ot, kokar ot, mayasıl otu, yer çamı, yermeşesi	Aerial parts	Crs, Dec, Inf	Int. (analgesic, tonic); Ext. (hemorrhoid, wound healing)	Antalya (Fakir et al., 2016); Aladağlar (Özdemir and Alpınar, 2015); Andırın (Demirci and Özhatay, 2012); East Anatolia (Altundag and Ozturk, 2011); Osmaneli (Koyuncu et al., 2010)	Central Anatolia, East Anatolia, Mediterranean, Marmara	Unknown
2	*Ajuga chamaepitys* (L.) Schreb. subsp. *laevigata* (Banks & Sol.) P.H.Davis	kelmayasıl	Mayasıl otu, vaş basur	Aerial parts	Dec	Ext. (hemorrhoid)	Bingöl (Polat, 2019); Hatay, (Güzel et al., 2015)	East Anatolia, Mediterranean	Irano-Turanian
3	*Ajuga laxmannii* (Murray) Benth.	bozmayasıl	Mayasıl otu	Aerial parts	Inf, Comp	Ext. (hemorrhoid, skin diseases)	Osmaneli (Koyuncu et al., 2010).	Marmara	Euro-Siberian
4	*Ajuga orientalis* L.	dağmayasılı	Mayasıl otu	Aerial parts	Comp	Ext. (skin diseases)	Osmaneli (Koyuncu et al., 2010).	Marmara	Unknown
5	*Ballota acetabulosa* (L.) Benth.	hoşnemnem	Köpek siği	Leaves	Crs, Dec, Inf	Ext. (hemorrhoid)	Maldan (Akyol and Altan, 2013).	Aegean	East Mediterranean
6	*Ballota nigra* L. subsp. *anatolica* P.H.Davis	gıripotu	Arıotu, ballık otu, yalancı ısırgan, oğul otu, köpek otu, köpek siğeni	Leaves	Dec, Inf	Int.(analgesic,antihypertensive,asthma, burns, cold, high cholesterol, jaundice, respiratory tract problem, urinary diseases); Ext. (wound healing)	East Anatolia (Altundag and Ozturk, 2011); Gönen (Tuzlacı and Aymaz, 2001); Malatya (Tetik et al., 2013); Manisa (Ugurlu and Secmen, 2008); Osmaneli	Aegean, East Anatolia, Marmara	Irano-Turanian

Table 3. (Continued).

							(Koyuncu et al., 2010).		
7	*Clinopodium acinos* (L.) Kuntze	kayrakçayı	Kayrak çayı	Aerial parts	Dec	Int. (colds and flu, cough)	Kırklareli (Kültür, 2007).	Marmara	Euro-Siberian
8	*Clinopodium congestum* (Boiss. & Hausskn. ex Boiss.) Kuntze	başlıfesleğen	Gihaye paluk	Aerial parts	Dec, Inf	Int. (cold and flu, cough, respiratory tract problem)	Birecik (Akan et al., 2008); Edremit, (Polat and Satıl, 2012).	Aegean, Marmara, Southeastern	Irano-Turanian
9	***Clinopodium dolichodontum* (P.H.Davis) Brauchler & Heubl***	dişlifesleğen	Kaya yarpuzu	Aerial parts	oint	Ext. (dyspnea, eye ailments)	Gaziantep (Şıvga and Seçmen, 2009).	Southeastern Anatolia	East Mediterranean
10	*Clinopodium graveolens* (M.Bieb.) Kuntze subsp. *graveolens*	filiskin	Güvercin otu, kayrak çayı	Aerial parts	Inf	Int. (colds and flu, common cold)	Osmaneli (Koyuncu et al., 2010)	Marmara	Unknown
11	*Clinopodium nepeta* (L.) Kuntze subsp. *glandulosum* (Req.) Govaerts	sümüklüfesleğen	Yılan otu	Aerial parts	Fresh (raw)	Ext. (snakebites)	Çatalca (Genç and Özhatay, 2006).	Marmara	Euro-Siberian
12	*Clinopodium serpyllifolium* (M.Bieb.) Kuntze subsp. *barbatum* (P.H.Davis) Bräuchler	naneliçay	Taş nanesi, viks otu	Aerial parts	Dec	Int. (colic spasms); Ext. (antiseptic,wound healing)	Antakya (Güzel et al., 2015).	Mediterranean	Mediterranean
13	*Clinopodium serpyllifolium* (M.Bieb.) Kuntze subsp. *brachycalyx* (P.H.Davis) Bräuchler	şarşarçayı	Taş nanesi	Aerial parts	Inf	Int. (diuretic, antiseptic, stomachache)	Selvi et al., 2014	Mediterranean	Mediterranean
14	*Clinopodium serpyllifolium* (M.Bieb.) subsp. *fruticosum* (L.) Bräuchler	unknown	Çemen, dağ kekiği	Aerial parts	Inf	Int. (cough, stomachache)	Aziziye (Karakaya et al., 2020).	Mediterranean	Mediterranean
15	*Clinopodium vulgare* L. subsp. *vulgare*	yabanifesleğen	Ballıbaba	Aerial parts	Comp	Ext. (stomachache)	İzmit, (Kızılarslan and Özhatay 2012)	Marmara	Unknown
16	***Cyclotrichium niveum* (Boiss.) Manden & Scheng.***	külotu	Nane otu	Leaves	Inf	Int.(asthma, fungal infection, respiratory tract problem)	Malatya (Tetik et al., 2013).	East Anatolia	Irano-Turanian
17	*Cyclotrichium origanifolium* (Labill.) Manden & Scheng.	dağnanesi	Mentol, mentolnane, tüter ot	Leaves	Inf	Int. (abdominal pain, respiratory tract problem, urinary inflammations)	Aladağlar (Özdemir and Alpınar, 2015); Sarıveliler (Bağcı et al., 2016).	Central Anatolia	Mediterranean
18	*Cyclotrichium leucotrichum* (Stapf ex Rech.f.) Leblebici	karaçekme	Punge tata	Leaves	Inf	Int. (asthma)	Batman (Bulut et al., 2019).	East Anatolia	Irano-Turanian
19	***Dorystaechas hastata* Boiss. & Heldr. ex Benth.***	Devren kekiği	Unknown	Aerial parts	Dec	Int. (diuretic)	Celep and Dirmenci, 2017	West Mediterranean	East Mediterranean

Table 3. (Continued).

20	*Hyssopus officinalis* L. subsp. *officinalis*	zufaotu	Çördük	Aerial parts	Dec, Inh	Ext. (purgative)	East Anatolia (Altundag and Ozturk, 2011).	East Anatolia	Blacksea
21	*Lamium album* L. subsp. *album*	balıcak	Ballıbaba	Leaves, flowers	Dec, inf, pol., oint	Int. (antipyretic, diuretic, respiratory tract problem), Ext. (vasodilator)	İzmir (Ugulu et al., 2009); Malatya (Tetik et al., 2013).	Aegean, East Anatolia	Euro-Siberian
22	*Lamium amplexicaule* L. var. *amplexicaule*	baltutan	Pung	Aerial parts, flowers	Inf	Int. (colds, prostate)	Karlıova (Nadiroğlu et al., 2019); Osmaneli (Koyuncu et al., 2010)	East Anatolia, Marmara	Unknown
23	*Lamium garganicum* L. subsp. *striatum* (Sm.) Hayek	telbalıcak	Ballıbaba, ballıkabak	Aerial parts	Inf	Int. (cancer, headache, prostate, stomachache)	Manisa (Ugurlu and Seçmen, 2008; Sarıgöl (Sargın et al., 2015a).	Aegean, Marmara	Unknown
24	*Lamium moschatum* Mill. subsp. *micranthum* (Boiss.) Mennema	misbalıcak	Ballıbaba, zihrinnehil	Aerial parts	Inf	Int. (emmenagogue, laxative, menstrual irregularity)	Hatay (Güzel et al., 2015).	Mediterranean	Unknown
25	*Lamium orientale* (Fisch. & C.A.Mey.) E.H.L.Krause	güzelce	No name	Aerial parts	Inf	Int. (digestive disorders, menstrual irregularity, prostate, urinary tract inflammation)	Elazığ (Doğan and Bağcı, 2011).	East Anatolia	Irano-Turanian
26	*Lamium purpureum* L. var. *purpureum*	ballıbaba	Ballıbaba, ballı	Aerial parts, flowers	Inf, Dec.	Int. (high cholesterol, kidney diseases, prostate)	Osmaneli (Koyuncu et al., 2010); Ordu (Gül and Seçkin Dinler, 2016); Rize (Saraç et al., 2013).	Black Sea, Marmara	Euro-Siberian
27	*Lavandula angustifolia* Mill. subsp. *angustifolia*	lavanta	Lavanta	Flowers	Inf	Int. (diuretic, migraine, carminative, stress, dyspepsia)	Bozüyük (Güler et al., 2015); İzmir (Ugulu et al., 2009)	Marmara	Unknown
28	*Lavandula pedunculata* (Mill.) Cav. subsp. *cariensis* (Boiss.) Upson & S.Andrews	karan	Karabaş otu, kargan	Flowers leaves	Inf, Dec.	Int. (cough, bronchitis, embolism, hypertension, mucolitic, sedative, stomachache, tremor)	Buldan (Ertuğ, 2004); Koçarlı (Tuzlacı and Sadıkoğlu, 2007)	Aegean	Mediterranean
29	*Lavandula stoechas* L. subsp. *stoechas*	karabaş	Karabaş otu, kekik, karağan	Aerial parts, flowers	Dec, Inf, oint	Int. (analgesic, anticoagulant, asthma, cancer (breast, prostrate),cardiac diseases, colds and flu, cystitis, diabetes, heart diseases, insomnia, sedative, stomachache, kidney ailments, vasodilator. Ext. (headache)	Ayvacık (Uysal et al., 2012); Dalaman (Sağıroğlu et al., 2013a); Erzincan (Korkmaz et al.,	Aegean, East Anatolia, Marmara, Mediterranean	Mediterranean

Table 3. (Continued).

							2016); Karaisalı (Güneş et al., 2017); Şahin et al., 2019.		
30	*Leonurus cardiaca* L.	aslankuyruğu	Unknown	Aerial parts	Inf, pol.	Int. (cardiotonic); Ext. (wound healing)	Celep and Dirmenci, 2017	Marmara	Euro-Siberian
31	*Leonurus glaucescens* Bunge	bozaslankuyruğu	Öküzguyruğu	Aerial parts	Inf, pol.	Int. (cardiotonic); Ext. (wound healing)	East Anatolia (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
32	*Marrubium astracanicum* Jacq. subsp. *astracanicum*	moryayotu	Dağ çayı	Aerial parts	Inf	Int. (antipyretic, common cold)	East Anatolia (Altundag and Ozturk, 2011).	East Anatolia	Unknown
33	*Marrubium catariifolium* Desr.	bozyayotu	Boz ot, acı ot	Aerial parts	Dec	Int. (kidney and menstruation regulator)	Kars (Güneş and Özhatay, 2011).	East Anatolia	Unknown
34	*Marrubium cuneatum* Banks & Sol.	elkurtaran	No name	Aerial parts	Inf	Int. (abdominal pain)	Malatya (Tetik et al., 2013).	East Anatolia	Irano-Turanian
35	***Marrubium globosum* Montbret & Aucher ex Benth. subsp. *globosum****	bozcaboğum	Amel otu, beyaz şabla, boz ot	Aerial parts	Inf	Int. (Colic, diuretic, analgesic)	Aladağlar (Özdemir and Alpınar, 2015); Antalya (Fakir et al., 2016).	Central Anatolia, Mediterranean	Irano-Turanian
36	***Marrubium parviflorum* Fisch. & C.A.Mey. subsp. *oligodon* (Boiss.) Seybold***	küllübozotu	Dağ çayı	Aerial parts	Inf,	Int. (antipyretic, colds and flu)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
37	*Marrubium parviflorum* Fisch. & C.A.Mey. subsp. *parviflorum*	bozotu	Köpek otu	Aerial parts	Inf	Int. (expectorant,diuretic)	Osmaneli (Koyuncu et al., 2010).	Marmara	Irano-Turanian
38	*Marrubium peregrinum* L.	yabaniderme	Boz ot	Aerial parts	Inf	Int. (expectorant,diuretic)	Osmaneli (Koyuncu et al., 2010).	Marmara	Unknown
39	***Marrubium rotundifolium* Boiss.***	kalartopu	Bozot, şerefe kekiği, yabani calba	Aerial parts	Ca, Inf	Int. (carminative, colds and flu, dyspepsia); Ext. (intestinal spasm)	Sarıgöl (Manisa), (Sargın et al., 2015a).	Aegean	Mediterranean
40	*Marrubium vulgare* L.	karaderme	Boz ot, dağ çayı	Aerial parts, flowers	Inf	Int. (expectorant, carminative, diuretic)	Edremit (Polat and Satıl, 2012); Osmaneli (Koyuncu et al., 2010).	Aegean, Marmara	Mediterranean
41	*Melissa officinalis* L. subsp. *officinalis*	oğulotu	Arı otu, limon otu, limon	Leaves	Dec, fresh (raw), Inf	Int. (cardiovascular diseases, colds and flu, diabetes, earache, embolism,	Antalya, (Fakir et al., 2016); Ayvacık	Aegean, Black Sea, East	Blacksea

Table 3. (Continued).

			çiçeği, melisa, oğulotu, Giyake çöle, Giyake tırş			forgetfulness, insomnia, nephritis, refreshing, rejuvenate, respiratory tract problem, sedative, stomachache,tranquillizer, vasodilator)	(Uysal et al., 2012); Edremit (Polat and Satıl, 2012); Düzce (Gürbüz et al., 2019); Espiye (Polat et al., 2015a); Gediz (Yücel and Tülükoğlu, 2000); Kırklareli (Kültür, 2007); Malatya (Tetik et al., 2013); Lalapaşa (Tuzlacı et al., 2010); Sivrice (Cakilcioglu and Turkoglu, 2010) ;(Yeşil and Inal, 2019).	Anatolia, Marmara, Mediterranean Southeastern	
42	*Melissa officinalis* L. subsp. *inodora* Bornm.	anababakokusu	Turunccuk	Leaves	Dec, Inf	Int. (vasodilator, cardiac diseases)	West Anatolia (Yeşilada et al., 1999); Andırın (Demirci and Özhatay, 2012).	Mediterranean	Mediterranean
43	*Mentha aquatica* L.	sunanesi	Dağ nanesi, nane	Leaves	Inf	Int. (bad breath, gastritis, nausea, stomachache)	Karaisalı (Güneş et al., 2017); Rize (Saraç et al., 2013).	Black Sea, Mediterranean	Unknown
44	*Mentha arvensis* L.	kırnanesi	Nane	Leaves	Dec	Int. (colds and flu, stomachache)	Geyve (Koyuncu et al., 2009)	Marmara	Unknown
45	*Mentha longifolia* (L.) L. subsp. *typhoides* (Briq.) Harley	derenanesi	Dere nanesi, it nanesi, pune, punı, nane, yarpuz, yabani nane, pung	Leaves	Inf, Comp	Int. (abdominal ache, antispasmodic, colds and flu, constipation, digestive, kidney stones, problems); Ext. (wound healing)	Aladağlar (Özdemir and Alpınar, 2015); Çankırı (Ezer and Avcı, 2004); Osmaneli (Koyuncu et al., 2010); Sivrice (Cakilcioglu and	Central Anatolia, East Anatolia, Maramara Southeastern	Unknown

Table 3. (Continued).

							Turkoglu, 2010); Solhan (Polat et al., 2013).		
46	*Mentha longifolia* (L.) L. subsp. *longifolia*	pünk	Eşek nanesi, köpek nanesi, nane, pune, punı, pung, püng	Leaves	Dec, Inf	Int. (abdominal ache, colds and flu); Ext. (hemorrhoid, rheumatism)	Akçakoca (Doğru Koca and Yıldırımlı, 2000); Aladağlar, (Özdemir and Alpınar, 2015); Bingöl, (Polat et al., 2012); Çatak, (Mükemre et al., 2015); Edremit, (Polat and Satıl, 2012); Geçitli, (Kaval et al., 2014); (Yeşil and Inal, 2019).	Aegean, Black Sea, Central Anatolia, East Anatolia, Marmara	Unknown
47	*Mentha pulegium* L.	yarpuz	Nane, filiskin, mentollü adaçayı, yarpuz	Flowers Arial parts	Dec, Inf	Int. (appetizer, colds and flu, gallbladder, menstruation, stomachache, vulnerary)	Antalya, (Fakir et al., 2016); East Anatolia (Altundag and Ozturk, 2011); Edremit (Polat and Satıl, 2012); Espiye, (Polat et al., 2015b); Osmaneli (Koyuncu et al., 2010).	Aegean, Marmara, Black Sea, East Anatolia, Mediterranean	Unknown
48	*Mentha spicata* L. subsp. *condensata* (Briq.) Greuter & Burdet	kıvırcıknane	Yabani nane, yarpız	Leaves	Inf	Int. (headache, hypertension, respiratory tract problem)	Osmaneli (Koyuncu et al., 2010); Sarıveliler (Bağcı et al., 2016).	Central Anatolia, Marmara	Mediterranean
49	*Mentha spicata* L. subsp. *spicata*	eşeknanesi	Nane, eşek nanesi, köpek nanesi, narpız, pune	Leaves, Aerial parts	Dec, Inf	Int. (antispasmodic, colds and flu, hemorrhoid, respiratory tract problem, stomachache)	Akçakoca (Doğru Koca and Yıldırımlı, 2000); Maden (Cakilcioglu et al.,	Black Sea, East Anatolia, Mediterranean	Unknown

Table 3. (Continued).

							2011); Malatya (Tetik et al., 2013); Karaisalı (Güneş et al., 2017); Sivrice (Cakilcioglu and Turkoglu, 2010).		
50	*Mentha* x *piperita* L.	nane	Nane	Leaves	Dec	Int. (antispasmodic, colds and flu, digestive, halitosis, kidney diseases, nausea, stomach diseases)	Malatya (Tetik et al., 2013); Manisa (Ugurlu and Secmen, 2008); Ordu (Türkan et al., 2006); Ürgüp, (Tuzlacı and Şenkardeş, 2011).	Aegean, Black Sea, East Anatolia, Central Anatolia	Unknown
51	***Micromeria cristata* (Hampe) Griseb. subsp. *orientalis* P.H.Davis***	kayaboyumcuğu	Kekik	Aerial parts	Dec.	Int. (bronchitis, common colds, diabetes, headache, stomachache, kidney diseases, prostrate)	Kelkit, (Korkmaz and Karakurt, 2015)	East Black Sea	Irano-Turanian
52	*Micromeria juliana* (L.) Benth. ex Rchb.	topukçayı	Kekik, taş kekiği	Aerial parts	Inf	Int. (stomachache)	Bayramiç, (Bulut and Tuzlacı, 2009).	Marmara	Mediterranean
53	*Micromeria myrtifolia* Boiss. & Hohen.	boğumluçay	Dağçayı, kıkboğum, yeşil çay	Aerial parts	Inf	Int. (colds and flu, stomachache, throat disease)	Adana, (Everest and Ozturk, 2005); Bayramiç, (Bulut and Tuzlacı, 2009); Aydıncık (Mersin), (Sargın et al., 2015b); Osmaneli, (Koyuncu et al., 2010).	Marmara, Mediterranean	Unknown
54	*Nepeta betonicifolia* C.A.Mey. subsp. *betonicifolia*	sivripisikotu	Hakiki nojda, nojda	Aerial parts	Inf, Pow	Int. (cancer, coughing, diabetes); Ext. (rheumatism, wound healing)	Çatak, (Mükemre et al., 2015); Van, (Dalar, 2018).	East Anatolia	Irano-Turanian
55	*Nepeta cataria* L.	kedinanesi	Kedinanesi	Aerial parts, leaves	Dec	Int. (stomachache, stimulant)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Euro-Siberian

Table 3. (Continued).

56	*Nepeta italica* L.	eşekçayı	Boğmaca otu, nezle otu	Aerial parts, leaves	Inf	Int. (bronchitis, common colds)	Aladağlar, (Özdemir and Alpınar, 2015); Torosdağları, (Yeşilada et al., 1995).	Central Anatolia, Mediterranean	Mediterranean
57	*Nepeta lamiifolia* Willd.	dağpisikotu	Nojda	Aerial parts	Inf	Int. (diabetes)	Van, (Dalar, 2018).	East Anatolia	Irano-Turanian
58	*Nepeta meyeri* Benth.	çorbaotu	Unknown	Aerial parts	Inf	Int. (antiseptic, diuretic, stomachache)	Celep and Dirmenci, 2017	East Anatolia	Irano-Turanian
59	*Nepeta nuda* L. subsp. *albiflora* (Boiss.) Gams	karaküncü	Kese otu	Aerial parts	Inf	Int. (fever); Ext. (wound healing)	Karaisalı, (Güneş et al., 2017).	Mediterranean	Unknown
60	*Nepeta racemosa* Lam.	pisikotu	Unknown	Aerial parts	Inf	Int. (antiseptic, diuretic, stomachache)	Celep and Dirmenci, 2017	East Anatolia	Irano-Turanian
61	*Ocimum basilicum* L.	fesleğen	Reyhan, rıhon, rıhan, rehan, fesleğen, oğul otu	Leaves	Fresh (raw), Inf	Int. (abdominal pain, cold and flu, cough, dizziness,heart disease, kidney diseases, pertussis); Ext. (earache, hemorrhoid, indigestion, sedative)	Edremit, (Polat and Satıl, 2012); Elazığ, (Hayta et al., 2014); Kapadokya, (Akgül et al., 2016); Karaisalı, (Güneş et al., 2017); Malatya, (Tetik et al., 2013); Solhan (Polat et al., 2013).	Aegean, East Anatolia, Central Anatolia, Marmara, Mediterranean	Unknown
62	***Origanum acutidens* (Hand.-Mazz.) Ietsw.***	zemul	Anık, onıx, anıx	Flowers	Inf	Int. (colds and flu, sedative)	Bingöl, (Polat, 2019).	East Anatolia	Irano-Turanian
63	***Origanum bilgeri* P.H.Davis***	çıngıllı kekik	Kekik	Aerial parts, flowers	Inf	Int. (colds and flu)	Antalya, (Şenkardeş and Tuzlacı, 2014).	West Mediterranean	East Mediterranean
64	***Origanum hypericifolium* O.Schwarz & P.H.Davis***	delikmercan	Acımık, Kozalı kekik	Aerial parts	Inf	Int. (abdominal pain)	Acıpayam, (Bulut et al., 2017)	Aegean	East Mediterranean
65	*Origanum majorana* L.	mercanköşk	Balıkotu, fesleğen, mercanköşk, nane kekiği	Aerial parts, flowers	Ca, Fresh (raw), Inf	Int (antitussive, asthma, atherosclerosis, bronchital, calmative, colds and flu, diaphoretic, diuretic, sedative, stomachic	Adana, (Everest and Ozturk, 2005); Ayvacık, (Uysal et al., 2012); East Anatolia, (Altundag and	Aegean, East Anatolia, Marmara, Mediterranean	East Mediterranean

Table 3. (Continued).

							Ozturk, 2011); Kapıdağ, (Uysal et al., 2010); Sarıgöl (Manisa), (Sargın et al., 2015a).		
66	***Origanum minutiflorum* O.Schwarz & P.H.Davis***	tokakekik	Sütçüler kekiği	Aerial parts, flowers	Inf, Ess Oil	Int. (abdominal ache, waist pain)	Antalya, (Fakir et al., 2016).	Mediterranean	East Mediterranean
67	*Origanum onites* L.	bilyalıkekik	Bilyalı kekik, incir kekiği, kaya kekiği, kekik, mercan köşk	Aerial parts, flowers	Dec (gar), Inf, oil	Int. (abdominal ache, colds and flu, headache, stomach ache); Ext. (toothache)	Antalya, (Fakir et al., 2016); Ayvacık, (Uysal et al., 201)2; Edremit, (Polat and Satıl, 2012); Turgutlu, (Bulut and Tuzlaci, 2013).	Aegean, Mediterranean, Marmara	Unknown
68	***Origanum sipyleum* L.***	mormercan	Sümbüllü çay	Aerial parts	Inf	Int. (common colds)	Afyonkarahisar, (Kargıoglu et al., 2008).	Aegean	East Mediterranean
69	*Origanum syriacum* L. subsp. *bevanii* (Holmes) Greuter & Burdet	hababa	Dağ nanesi, Dağ kekiği, kekik	Aerial parts	Inf	Int. (colds and flu, stomachache)	Karaisalı, (Güneş et al., 2017), Andırın, (Demirci and Özhatay, 2012).	Mediterranean	East Mediterranean
70	***Origanum vogelii* Greuter & Burdet***	küçükkekik	Sinek kanadı	Aerial parts	Inf	Int. (antiseptic, diuretic, stomachache)	Celep and Dirmenci, 2017	Central Mediterranean	East Mediterranean
71	*Origanum vulgare* L. subsp. *gracile* (K.Koch) Ietsw.	kuşzemulu	Eşek kekiği	Aerial parts	Inf, Dec (gar, pol)	Int. (asthma, cold, epilepsy, headache, hypertension, stomachache); Ext. (toothache, vulnerary)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
72	*Origanum vulgare* L. subsp. *hirtum* (Link) Ietsw.	karamercan	Kekik, mercan köşk, yavşan	Aerial parts, flowers	Dec, Inf	Int. (diabetes, hemorrhoid, kidney stone, stomachache)	Aladağlar, (Özdemir and Alpınar, 2015); Ayvacık, (Uysal et al., 2012); Osmaneli, (Koyuncu et al., 2010).	Central Anatolia, Marmara	East Mediterranean
73	*Origanum vulgare* L. subsp. *viridulum* (Martrin-Donos) Nyman	istanbulkekiği	Kekik, çay kekiği	Aerial parts	Dec	Int. (colds and flu)	Espiye, (Polat et al., 2015a).	Black Sea	Unknown

Table 3. (Continued).

74	*Origanum vulgare* L. subsp. *vulgare*	karakınık	Anık, anıks, cantirik, dağ kekiği, onıx, yayla kekiği, rehan, rehane rebel	Aerial parts, flowers	Dec (gar.), Inf, fresh (raw)	Int. (colds and flu, headache, high cholesterol, urinary inflammations, sedative, stomachic); Ext. (toothache)	East Anatolia, (Altundag and Ozturk, 2011); Edremit, (Polat and Satıl, 2012); Espiye, (Polat et al., 2015a): Maden, (Cakilcioglu et al., 2011); Rize, (Saraç et al., 2013); Solhan, (Polat et al., 2013); (Yeşil and Inal, 2019).	Aegean, Black Sea, East Anatolia, Marmara Southeastern	Euro-Siberian
75	*Phlomis armeniaca* Willd.	bozşavlak	Adaçayı, bozkulak, boz şavlak, çalba, emecen, şalvarotu	Aerial parts, flowers	Dec, Fresh (raw), Inf	Int. (colds and flu, colic, milk enhancer, stomachache)	Aladağlar, (Özdemir and Alpınar, 2015); Çatak, (Mükemre et al., 2015); Karlıova (Nadiroğlu et al., 2019).	Central Anatolia, East Anatolia	Irano-Turanian
76	*Phlomis bourgaei* Boiss.	çobançırası	Çoban çırası	Aerial parts, flowers	Dec	Int. (stomachache)	Eğirdir, (Tuzlacı and Erol, 1999).	Mediterranean	East Mediterranean
77	*Phlomis grandiflora* H.S.Thompson var. *grandiflora*	bahargulü	Bahar gülü, çalba	Aerial parts, flowers	Dec, Inf, pol.	Int. (high cholesterol, pain)	Marmaris, (Gürdal and Kültür, 2013).	Aegean	East Mediterranean
78	*Phlomis kurdica* Rech.f.	gubel	Sığırkuyruğu	Aerial parts, flowers	Inf	Int. (colds and flu)	Kurtalan, (Yapıcı et al., 2009).	Southeastern	Irano-Turanian
79	*Phlomis lycia* D.Don	tüylüçalba	Salba, çalba	Aerial parts	Inf, pol.	Int. (appetizing, colds and flu, constipation, stomachache); Ext. (furuncle, rheumatism)	Antalya, (Fakir et al., 2016); Marmaris (Gürdal and Kültür, 2013).	Aegean, Mediterranean	East Mediterranean
80	***Phlomis nissolii* L.***	öbekçalba	Sarı şalba, sarı çalba	Aerial parts, flowers	Inf	Int. (cancer)	Sarıgöl, (Sargın et al., 2015a).	Aegean	Irano-Turanian

Table 3. (Continued).

81	*Phlomis pungens* Willd. var. *hispida* K.Koch	silvanok	No name	Aerial parts	Inf	Int. (stomachache)	Elazığ, (Civelek and Türkoğlu, 2000)	East Anatolia	Unknown
82	*Phlomis pungens* Willd. var. *hirta* Velen.	silvanok	Şalba	Aerial parts	Inf	Int. (cough)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Unknown
83	*Phlomis pungens* Willd. var. *pungens*	silvanok	Çalba, gihareşık, salba	Aerial parts	Inf	Int. (diabetes, stomachache)	Antalya, (Fakir et al., 2016); Karlıova, (Nadiroğlu et al., 2019).	East Anatolia, Mediterranean	Unknown
84	***Phlomis sintenisii* Rech.f.***	yanıkçalba	No name	Aerial parts	Inf	Int. (stomachache)	Elazığ, (Civelek and Türkoğlu, 2000)	East Anatolia	Irano-Turanian
85	*Phlomis tuberosa* L.	yerçalbası	Bareş	Aerial parts	Comp	Int. (wound healing)	Çatak, (Mükemre et al., 2015).	East Anatolia	Unknown
86	*Prunella laciniata* (L.) L.	bodurfesleğen	Yara otu	Aerial parts	Comp	Int. (wound healing)	Osmaneli, (Koyuncu et al., 2010).	Marmara	Euro-Siberian
87	*Prunella orientalis* Bornm.	acıfesleğen	Çay otu, karabaş otu	Aerial parts	Inf	Int.(antitussive, colds and flu)	Akkuş, (Badem et al., 2018).	eeeee	Mediterranean
88	*Prunella vulgaris* L.	gelinciklemeotu	Belgsesing, kargelincik, sosın, yara otu	Aerial parts	Comp, Inf	Int. (abdominal pain, gastric pain, menstruation pain, wound healing)	Geçitli, (Kaval et al., 2014); Karlıova, (Nadiroğlu et al., 2019), Osmaneli, (Koyuncu et al., 2010); Rize, (Saraç et al., 2013); Şile, (Tuzlacı and Tolon, 2000).	Black Sea, East Anatolia, Marmara	Euro-Siberian
89	*Rosmarinus officinalis* L.	biberiye	Biberiye, kuşdili	Aerial parts, flowers	Dec, Inf	Int. (blood pressure therapy, carminative, colds and flu, cholesterol management, headache, migraine, wound healing)	Alaşehir, (Ugulu, 2011); Edremit, (Polat and Satıl, 2012); Karaisalı, (Güneş et al., 2017).	Aegean, Marmara, Mediterranean	Mediterranean
90	***Salvia absconditiflora* (Montbret & Aucher ex Benth.) Greuter & Burdet***	karaşalba	Boz şabla, kara şabla, karaot, yabani adaçayı	Aerial parts, flowers	Ca, Inf, lc	Int. (asthma, bronchitis, colds and flu, diuretic, expectorant, kidney gravel,	Aladağlar, (Özdemir and Alpınar, 2015);	Aegean, Central Anatolia	Irano-Turanian

Table 3. (Continued).

	(Syn: *Salvia cryptantha* Montbret & Aucher ex Benth.)					stomachache, urethritis, cardiac diseases) Ext. (hemorrhoid)	Sarıgöl, (Sargın et al., 2015a); Elazığ, (Doğan and Bağcı, 2011); Ürgüp, (Tuzlacı and Şenkardeş, 2011).		
91	***Salvia adenophylla* Hedge & Hub.-Mor.***	poruk	Dağ çayı	Aerial parts, flowers	Inf	Int. (abdominal pain)	Acıpayam, (Bulut et al., 2017).	Aegean	Mediterranean
92	*Salvia aethiopis* L.	habeşadaçayı	Tüylü adaçayı	Aerial parts, flowers	Inf	Int. (colds and flu, gastric disorders)	Elazığ, (Doğan and Bağcı, 2011);Osmaneli (Koyuncu et al., 2010).	East Anatolia, Marmara	Unknown
93	*Salvia aramiensis* Rech.f.	pohur	Adaçayı, Bozot	Aerial parts	Inf	Int. (bronchitis)	Antakya, (Altay and Çelik, 2011). Antakya, (Altay and Karahan (2012)	Mediterranean	Mediterranean
94	*Salvia argentea* L.	gümüşşalba	Adaçayı	Aerial parts	Inf	Int. (colds and flu)	Osmaneli, (Koyuncu et al., 2010).	Marmara	Mediterranean
95	*Salvia bracteata* Banks & Sol.	çobanşalbası	Adaçayı	Aerial parts	Inf	Int. (colds and flu)	Osmaneli, (Koyuncu et al., 2010).	Marmara	Irano-Turanian
96	***Salvia cadmica* Boiss. var. *cadmica***	kayaşalbası	Adaçayı, meryemana adaçayı	Aerial parts	Inf	Int. (abdominal pain, bleeding, colds and flu)	Acıpayam, (Bulut et al., 2017); Aladağlar, (Özdemir and Alpınar, 2015); Osmaneli, (Koyuncu et al., 2010).	Aegean, Marmara, Mediterranean, East Black Sea	Unknown
97	*Salvia candidissima* Vahl subsp. *candidissima*	galabor	Adaçayı, galabor	Aerial parts	Inf, gargle	Int. (angına, bronchitis, colds and flu, kidney stone)	East Anatolia, (Altundag and Ozturk, 2011); Kelkit (Korkmaz and Karakurt, 2015); Osmaneli,	East Anatolia, Marmara	Irano-Turanian

Table 3. (Continued).

							(Koyuncu et al., 2010).		
98	***Salvia dichroantha* Stapf***	kutnu	Yağlıkara	Aerial parts	Inf	Int. (stomachache)	Central Anatolia, (Sezik et al., 2001).	Central Anatolia	Irano-Turanian
99	*Salvia forskahlei* L.	dolmayaprağı	Adaçayı	Aerial parts	Inf	Int. (calmative, constipation, stomachache)	Trabzon, (Akbulut and Bayramoğlu., 2014).	Black Sea	Euro-Siberian
100	*Salvia fruticosa* Mill.	adaçayı	Adaçayı, boşalba, boş şiklik, moşaplı	Leaves	Inf	Int. (abdominal pain, antiseptic, carminative, colds and flu, dyspepsia, headache, prostate, sedative, stomach disorders, tonsilitis)	Ayvacık, (Uysal et al., 2012); Bayramiç, (Bulut and Tuzlacı, 2009); Manisa, (Ugurlu and Secmen, 2008); Mersin, (Everest and Ozturk, 2005); Silivri, (Bulut, 2011).	Aegean, Marmara, Mediterranean	Mediterranean
101	*Salvia glutinosa* L.	okluşalba	Purçuma	Aerial parts	Inf	Ext. (burns wound)	Rize, (Saraç et al., 2013).	Black Sea	Euro-Siberian
102	***Salvia huberi* Hedge***	meryemiye	Adacayi	Aerial parts	Inf	Int. (calmative, constipation, stomachache)	Eastern Black Sea. (Toksoy et al., 2010).	Black Sea	Irano-Turanian
103	*Salvia hydrangea* DC. ex Benth.	koçşalba	Çay otu, koç otu	Aerial parts	Inf	Int. (antipyretic, colds and flu, diabetes,emmenagogue, stomach disorders)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
104	***Salvia hypargeia* Fisch. & C.A.Mey.***	siyahot	Kök çayı	Aerial parts	Inf	Int. (colds and flu)	Aladağlar, (Özdemir and Alpınar, 2015); Central Anatolia, (Ertuğ, 2000).	Central Anatolia	Irano-Turanian
105	*Salvia limbata* C.A.Mey.	maldili	Bareşa spî, Kedi kuyruğu	Aerial parts	Dec (gar), Inf	Int. (diabetes); Ext. (toothache)	Ilıca, (Özgen et al., 2012); Van (Dalar, 2018).	East Anatolia	Irano-Turanian
106	*Salvia macrochlamys* Boiss. & Kotschy	gevrekşalba	Çirçirk	Aerial parts	Inf	Int. (diabetes)	Van, (Dalar, 2018).	East Anatolia	Irano-Turanian
107	*Salvia multicaulis* Vahl	kürtreyhanı	Adaçayı, dağ çayı, punga reş, rihan, giya çaye	Aerial parts, flowers	Dec, Inf	Int. (appetizing, asthma, diabetes, colds and flu, digestive, migraine, tonsillitis, respiratory and urinary tract disorders)	Kurtalan, (Yapıcı et al., 2009); Karaisalı, (Güneş et al., 2017);	East Anatolia, Mediterranean, Southeastern	Irano-Turanian

Table 3. (Continued).

							Karlıova, (Nadiroğlu et al., 2019); Malatya, (Tetik et al., 2013); Sivrice, (Cakilcioglu and Turkoglu, 2010); (Yeşil and Inal, 2019).		
108	*Salvia nemorosa* L.	gehareş	Gemtaş	Aerial parts	Dec, Inf	Int. (catarrh, cold, hemostatic)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
109	*Salvia officinalis* L.	Tıbbi adaçayı	Adaçayı	Leaves	Inf	Int. (colds and flu, kidney diseases)	Düzce (Gürbüz et al., 2019); Kazdağı, (Uysal, 2010); Maden, (Cakilcioglu et al., 2011).	West and East Anatolia, Black Sea	Unknown
110	*Salvia palaestina* Bentham	sürmelişalba	Ada çayı	Aerial parts	Inf	Int. (colds and flu, diabetes, expectorant)	Batman, (Bulut et al., 2019).	East Anatolia	Irano-Turanian
111	*Salvia pinnata* L.	çanakşalbası	Ellik otu	Aerial parts	Inf	Int. (colds and flu)	Osmaneli, (Koyuncu et al., 2010).	Marmara	Mediterranean
112	*Salvia poculata* Náb.	küllüşalba	Bareş	Aerial parts	Inf	Int. (diabetes)	Van, (Dalar, 2018).	East Anatolia	Irano-Turanian
113	***Salvia rosifolia* Sm.***	gülmeryemiye	Adacayi	Aerial parts	Inf	Int. (carminative, constipation, kidney stone, stomachache)	Eastern Black Sea, (Toksoy et al., 2010); Kelkit, (Korkmaz and Karakurt, 2015).	Black Sea	Irano-Turanian
114	*Salvia russellii* Benth.	kurdeşk	Şaplamaotu	Aerial parts	Dec	Int. (abdominal pain, common cold)	Central Anatolia, (Sezik et al., 2001).	Central Anatolia	Irano-Turanian
115	*Salvia sclarea* L.	paskulak	Dağ çayı, misk adaçayı, yağlı kara	Aerial parts, flowers	Inf	Int. (colds and flu, digestive, respiratory system diseases, throat ache)	Aladağlar, (Özdemir and Alpınar, 2015); Antalya, (Fakir et al., 2016); East Anatolia, (Altundag and Ozturk, 2011);	East Anatolia, Central Anatolia, Marmara, Mediterranean	Unknown

Table 3. (Continued).

							Osmaneli, (Koyuncu et al., 2010); Ovacık, (Tuzlacı and Doğan, 2010).		
116	*Salvia staminea* Montbret & Aucher ex Benth.	erkekşalba	No name	Aerial parts	Pol	Ext. (wound healing)	Kars, (Güneş and Özhatay, 2011).	East Anatolia	Irano-Turanian
117	*Salvia syriaca* L.	çevlikotu	Kılkırk, polağ, sıvsıvok	Aerial parts	Fresh (raw)	Int. (abscess, antacid)	Korkut, (Behçet and Arık, 2013); Malatya, (Tetik et al., 2013).	East Anatolia	Irano-Turanian
118	*Salvia tomentosa* Mill.	şalba	Adaçayı, salba, hoşaflama, moşafla, moşapla	Leaves	Inf	Int. (abdominal pain, colds and flu, kidney stone, pharyngitis)	Antalya, (Fakir et al., 2016); Bayramiç, (Bulut and Tuzlacı, 2009); Edremit, (Polat and Satıl, 2012); Torul, (Karaköse et al., 2019).	Aegean, Black Sea, Marmara, Mediterranean	Mediterranean
119	*Salvia trichoclada* Benth.	meşeşalbası	Bareş	Aerial parts	Inf	Int. (diabetes)	Van, (Dalar, 2018).	East Anatolia	Irano-Turanian
120	*Salvia verticillata* L. subsp. *amasiaca* (Freyn & Bornm.) Bornm.	hartşalbası	Karabaş otu, yağlıkara		Dec, Inf	Int. (abdominal pain, colds, laxative, nausea)	East Anatolia, (Altundag and Ozturk, 2011);Central Anatolia (Sezik et al., 2001).	East Anatolia, Central Anatolia	Irano-Turanian
121	*Salvia verticillata* L. subsp. *verticillata*	dadırak	Bareş, karabaş otu, yağlıkara	Aerial parts	Dec, Inf	Int. (catarrh, colds and flu, diabetes, gastric pain, laxative)	East Anatolia, (Altundag and Ozturk, 2011); Osmaneli, (Koyuncu et al., 2010); Van, (Dalar, 2018).	East Anatolia, Marmara	Euro-Siberian
122	*Salvia virgata* Jacq.	fatmanaotu	Adaçayı, ellik otu, pengi		Inf	Int. (colds and flu, muscle pain)	Karlıova, (Nadiroğlu et al., 2019); Osmaneli, (Koyuncu et al., 2010).	East Anatolia, Marmara	Irano-Turanian

Table 3. (Continued).

123	*Salvia viridis* L.	zarifşalba	Adaçayı, yeşilbaş	Aerial parts, flowers	Dec, Fresh (raw), Inf	Int. (colds and flu, gastric pain, stomachache)	Birecik, (Akan et al., 2008); Karaisalı, (Güneş et al., 2017); Osmaneli, (Koyuncu et al., 2010).	Marmara, Mediterranean, Southeastern	Mediterranean
124	***Salvia wiedemannii* Boiss.***	sultantacı	Adaçayı	Aerial parts	Inf	Int. (colds and flu)	Osmaneli, (Koyuncu et al., 2010).	Marmara	Irano-Turanian
125	*Salvia verbenaca* L.	elmakekiği	Dağ çayı	Aerial parts	Inf	Int. (antiseptic,diuretic,stomachache)	Buldan, (Ertuğ et al., 2004).	Aegean, Mediterranean, Marmara, Blacksea	Mediterranean
126	***Satureja aintabensis* P.H.Davis***	antepkayakekiği	Antep kekiği	Flowers, leaves	Inf	Int. (antiseptic,diuretic,stomachache)	Öz Aydın et al. 2005	Southeast Anatolia	Irano-Turanian
127	*Satureja boissieri* Hausskn. ex Boiss.	cantiri	Kekik	Flowers, leaves	Inf	Int. (antiseptic,diuretic,stomachache)	Madra (Satıl et al. 2008b)	East Anatolia	Irano-Turanian
128	***Satureja cilicica* P.H.Davis***	kınalıkekik	Dağ kekiği	Flowers, leaves	Inf	Int. (abdominal pain, menstruation pain)	Andırın, (Demirci and Özhatay, 2012).	Mediterranean	East Mediterranean
129	*Satureja cuneifolia* Ten.	kayakekiği	Kekik	Flowers, leaves	Inf	Int. (abdominal pain, common cold)	Central Anatolia, (Sezik et al., 2001).	Central Anatolia	Mediterranean
130	*Satureja hortensis* L.	çibriska	Anık, kekik, pungi	Flowers, leaves	Inf	Int. (antihypertensive, antispasmodic, colds and flu, urinary inflammations)	Maden, (Cakilcioglu et al., 2011); Malatya, (Tetik et al., 2013), Solhan, (Polat et al., 2013).	East Anatolia	Unknown
131	*Satureja icarica* P.H.Davis	adakekiği	Kekik	Flowers, leaves	Inf	Int. (antiseptic,diuretic,stomachache)	Satıl and Kaya 2007	Marmara	East Mediterranean
132	*Satureja macrantha* C.A.Mey.	sülünkekiği	Kekik	Flowers, leaves	Inf	Int. (antiseptic,diuretic,stomachache)	Satıl and Kaya 2007	East Anatolia	Irano-Turanian
133	*Satureja pilosa* Velen.	eybekkekiği	Kayakekiği, taş kekikği	Aerial parts	Inf	Int. (abdominal pain)	Madra (Satıl et al. 2008b)	Aegean	Euro-Siberian
134	*Satureja spicigera* (K.Koch) Boiss.	çorbakekiği	Kekik, zımpara	Flowers, leaves	Inf	Int. (antihypertensive, cardiac disorder)	Espiye, (Polat et al., 2015a).	Black Sea	Blacksea
135	*Satureja thymbra* L.	halilibrahimzahteri	Kekik	Aerial parts	Inf	Int. (shortness of breath)	Antakya, (Altay and Çelik, 2011).	Mediterranean	East Mediterranean

Table 3. (Continued).

136	*Scutellaria orientalis* L. subsp. *orientalis*	sarıkaside	Kaside, kesel mahmut, şimşekotu	Aerial parts	Inf	Int. (abdominal pain, analgesic, astringent, cancer, stomachache), Ext. (hemorrhoid, wound healing)	East Anatolia, (Altundag and Ozturk, 2011); Çatak, (Mükemre et al., 2015); Sivrice, (Cakilcioglu and Turkoglu, 2010).	East Anatolia	Irano-Turanian
137	*Scutellaria orientalis* L. subsp. *sosnowskyi* (Takht.) Fed.	erkekkaside	Sancı otu	Aerial parts	Inf	Int. (abdominal pain, carminative, nephralgia)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
138	*Scutellaria orientalis* L. subsp. *pinnatifida* J.R.Edm.	kırbaçsırımı	Qesel mehmud	Aerial parts	Inf	Int. (diabetes)	Van, (Dalar, 2018).	East Anatolia	Unknown
139	*Scutellaria tomentosa* Bertol.	bozkaside	Korku otu	Aerial parts	Dec	Int. (depression)	Birecik, (Akan et al., 2008).	Southeastern	Irano-Turanian
140	*Sideritis athoa* Papan. & Kokkini	kedikuyruğuçayı	Kandil çayı, Dağ çayı, Tilkikuyruğu çayı, Yüzüklü çay, Adaçayı	Aerial parts, flowers	Inf	Int. (colds and flu)	Edremit, (Polat and Satıl, 2012).	Aegean, Marmara	East Mediterranean
141	***Sideritis bilgerana* P.H.Davis***	altınbaşçayı	Boz şabla, dağ çayı	Aerial parts, flowers	Inf	Int. (stomachache)	Aladağlar, (Özdemir and Alpınar, 2015); Karaisalı, (Güneş et al., 2017).	Central Anatolia, Mediterranean	East Mediterranean
142	***Sideritis caesarea* H.Duman, Aytaç & Başer***	topalçay	Dağ çayı	Aerial parts, flowers	Dec	Int. (sedative, stomach ache)	Pınarbaşı, (Gençler Özkan and Koyuncu, 2005).	Central Anatolia	Irano-Turanian
143	***Sideritis condensata* Boiss. & Heldr.***	kozalıkekik	Dağ adaçayı	Aerial parts, flowers	Inf	Int. (analgesic, stomachache)	Antalya, (Fakir et al., 2016).	Mediterranean	East Mediterranean
144	***Sideritis congesta* P.H.Davis & Hub.-Mor.***	başakçayı	Adaçayı, dağ çayı	Aerial parts, flowers	Dec, Inf	Int.(antitussive, carminative, emmenagogue, orexigenic, sedative)	Adana, (Everest and Ozturk, 2005).	Mediterranean	East Mediterranean
145	***Sideritis erythrantha* Boiss. & Heldr. subsp. *erythrantha****	morçay	Adaçayı	Aerial parts, flowers	Inf	Int. (bronchitis, colds and flu, pharyngitis)	Aydıncık, (Sargın et al., 2015b).	Mediterranean	East Mediterranean

Table 3. (Continued).

146	***Sideritis galatica* Bornm.***	kırçayı	Dağ çayı	Aerial parts, flowers	Inf	Int. (colds and flu)	Osmaneli, (Koyuncu et al., 2010).	Marmara	Irano-Turanian
147	***Sideritis germanicopolitana* Bornm. subsp. *germanicopolitana* ***	karakurbağaçayı	Dağ çayı	Aerial parts, flowers	Inf	Int. (colds and flu)	Osmaneli, (Koyuncu et al., 2010).	Marmara	Euro-Siberian
148	***Sideritis hispida* P.H.Davis***	sertçay	Dağ çayı	Aerial parts	Inf	Int. (antiseptic,diuretic,stomachache)	Duman et al. 2005	West Mediterranean	Irano-Turanian
149	***Sideritis hololeuca* Boiss. & Heldr.***	çalıçayı	DağDçayı	Aerial parts	Inf	Int. (antiseptic,diuretic,stomachache)	Duman et al. 2005	Central Mediterranean	East Mediterranean
150	*Sideritis lanata* L.	ipekçayı	Dağ çayı	Aerial parts	Inf	Int. (colds and flu, kidney diseases)	Osmaneli, (Koyuncu et al., 2010); Mersin (Sargın et al., 2015).	Marmara, Mediterranean	East Mediterranean
151	***Sideritis leptoclada* O.Schwarz & P.H.Davis***	kızlançayı	Adaçayı	Aerial parts, flowers	Inf	Int. (high cholesterol, vasodilator)	Burdur, (Özçelik and Balabanlı, 2005).	Mediterranean	East Mediterranean
152	*Sideritis libanotica* Labill. subsp. *kurdica* (Bornm.) Hub.-Mor.	inceçay	Adaçayı	Aerial parts	Dec, Inf, pol.	Int. (astringent, colds and flu, sedative); Ext. (wound healing, skin diseases)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
153	*Sideritis libanotica* Labill. subsp. *libanotica* Labill.	gevreğen	Dağçayı, torosçayı, yaylaçayı	Aerial parts	Dec, Inf	Int. (colds and flu, diarrhea, digestive)	Aladağlar, (Özdemir and Alpınar, 2015); Malatya, (Tetik et al., 2013).	Central Anatolia, East Anatolia, Mediterranean	East Mediterranean
154	*Sideritis libanotica* Labill. subsp. *linearis* (Benth.) Bornm.	torosçayı	Çaye çe, tüylü dağ adaçayı	Aerial parts	Dec, Inf	Int. (colds and flu, stomachache)	Antalya, (Fakir et al., 2016); Kürecik, (Yeşil and Akalın, 2009).	East Anatolia, Mediterranean	Mediterranean
155	*Sideritis montana* L. subsp. *montana*	karaçay	Dağ çayı, tilkikuyruğu, yaraotu	Aerial parts	Inf	Int. (cough, colds and flu)	Aladağlar, (Özdemir and Alpınar, 2015); East Anatolia, (Altundag and Ozturk, 2011); Osmaneli, (Koyuncu et al., 2010).	Central Anatolia, East Anatolia, Mediterranean, Marmara	East Mediterranean

Table 3. (Continued).

156	*Sideritis perfoliata* L.	fincançayı	Cavca, dağ çayı	Aerial parts, flowers	Dec, Inf	Int. (colds and flu, cough, stomachache); Ext. (sore throat)	Acıpayam, (Bulut et al., 2017); Ayvacık, (Uysal et al., 2012).	Aegean, Marmara	East Mediterranean
157	***Sideritis phrygia* Bornm.***	taşlıkçayı	Dağ çayı	Aerial parts	Inf	Int. (antiseptic,diuretic,stomachache)	Duman et al. 2005	Central Anatolia	Irano-Turanian
158	***Sideritis pisidica* Boiss. & Heldr.***	eldivençayı	Dallıadaçayı, havaotu	Aerial parts	Dec	Int. (abdominal pain)	Torosdağları, (Yeşilada et al., 1995).	Mediterranean,	East Mediterranean
159	*Sideritis scardica* Griseb. subsp. *scardica*	pazlakçayı	Adaçayı, bazlak çayı, kuyruklu adaçayı, tilkikuyruğu	Aerial parts	Dec	Int. (bronchitis, cough, colds and flu)	Kırklareli, (Kültür, 2007).	Marmara	Euro-Siberian
160	***Sideritis sipylea* Boiss.***	sipilçayı	Adaçayı, calba, dağ çayı, şalba	Aerial parts, flowers	Inf	Int. (colds and flu)	Sarıgöl, (Sargın et al., 2015a).	Aegean	East Mediterranean
161	***Sideritis stricta* Boiss. & Heldr.***	tilkikuyruğuçayı	Dağ çayı	Aerial parts, flowers	Inf	Int. (colds and flu)	Aladağlar, (Özdemir and Alpınar, 2015).	Central Anatolia	East Mediterranean
162	***Sideritis tmolea* P.H.Davis***	sivriçay	Yakıotu, yakı şalbası	Aerial parts, flowers	Ca, Inf, Mashed	Int. (carminative, cold and flu, diarrhea, dyspepsia, intestinal spasm)	Sarıgöl, (Sargın et al., 2015).	Aegean	East Mediterranean
163	***Sideritis trojana* Bornm.***	sarıkızçayı	Cılbak çay, kazdağı çayı, tüylü çay, sarıkız çayı, dağ çayı	Aerial parts, flowers	Inf	Int. (abdominal pain, kidney ailments, laxative, stomachache, sore throat)	Bayramiç, (Bulut and Tuzlacı, 2009); Burhaniye, Havran, (Polat and Satıl, 2010).	Marmara	East Mediterranean
164	***Sideritis vuralii* H.Duman & Başer***	babaçayı	Dağ çayı	Aerial parts	Inf	Int. (antiseptic, diuretic, stomachache)	Duman et al. 2005	East Mediterranean	East Mediterranean
165	***Stachys aleurites* Boiss. & Heldr.***	köprülüçay	Tokali	Aerial parts	Inf	Int. (anodyne, colds and flu, stomachache)	Antalya, (Fakir et al., 2016); west mediterranean (Fakir et al., 2009; Satıl and Açar, 2020)	Mediterranean	East Mediterranean
166	*Stachys annua* (L.) L. subsp. *annua* var. *annua*	hacıosmanotu	Dağ çayı	Aerial parts, flowers	Dec, Inf	Int. (antipyretic, colds and flu, insomnia, menstrual irregularity)	East Anatolia, (Altundag and Ozturk, 2011), Osmaneli	East Anatolia, Marmara	Unknown

Table 3. (Continued).

							(Koyuncu et al., 2010).		
167	*Stachys annua* (L.) L. subsp. *lycaonica* R.Bhattacharjee	hacıosmanotu	Dağ çayı	Aerial parts	Inf, Dec.	Int (antipyretic, cholesterol, colds, diabetes, expectorant, insomnia, menstrual disorders, rheumatism)	Bilecik (Koyuncu et al., 2010); East Anatolia (Altundag and Ozturk, 2011),	East Anatolia	Irano-Turanian
168	*Stachys arvensis* (L.) L.	tarlakarabaşı	Mayasıl otu	Aerial parts	Dec	Int. (hemorrhoid)	Rize, (Saraç et al., 2013).	Black Sea	Unknown
169	*Stachys byzantina* K.Koch	bozkarabaş	Eşek otu	Aerial parts	Inf	Int. (colds and flu)	Osmaneli, (Koyuncu et al., 2010).	Marmara	Euro-Siberian
170	*Stachys cretica* L. subsp. *lesbiaca* Rech.f.	şabıla	Deli ada çayı	Aerial parts	Inf	Int. (stomachache)	Bayramiç, (Bulut and Tuzlacı, 2009).	Marmara	East Mediterranean
171	***Stachys cretica* L. subsp. *anatolica* Rech.f.***	yağlıkara	Aslankuyruğu, beyaz şabla, boz şabla, dağ çayı	Aerial parts, flowers	Dec, Inf	Int. (colds and flu, diarrhea, stomachache, insomnia, menstrual irregularity)	Aladağlar, (Özdemir and Alpınar, 2015); East Anatolia, (Altundag and Ozturk, 2011); Osmaneli, (Koyuncu et al., 2010).	Central Anatolia, East Anatolia, Mediterranean, Marmara	Unknown
172	***Stachys cretica* subsp. *mersinaea* (Boiss.) Rech.f.***	boncukşalba	Boncuk şabla, dağ çayı, deli çayı, rizeçayı	Aerial parts	Dec, Inf	Int. (colds and flu, hypertension, stomachache)	Aladağlar, (Özdemir and Alpınar, 2015); East Anatolia, (Altundag and Ozturk, 2011).	Central Anatolia, East Anatolia, Mediterranean	East Mediterranean
173	***Stachys gaziantepensis* Dinç & Doğu***	unknown	Unknown	Aerial parts	Inf	Int. (colds)	East Anatolia (Kaya et al.,2017; Satıl and Açar, 2020)	Unknown	Unknown
174	*Stachys iberica* M. Bieb. subsp. *georgica* Rech.f.	üçdeliçay	Dağ çayı	Aerial parts	Dec	Int. (antipyretic, colds and flu)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
175	*Stachys iberica* M. Bieb. subsp. *stenostachya* (Boiss.) Rech.f.	benlideliçay	Dağ çayı	Aerial parts	Dec	Int. (antipyretic, colds and flu, stomachache)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian

Table 3. (Continued).

176	*Stachys iberica* M.Bieb.subsp. *iberica*	tokdeliçay	Gihaye zerıke	Aerial parts	Inf	Int. (jaundice)	Karlıova, (Nadiroğlu et al., 2019).	East Anatolia	Unknown
177	*Stachys kurdica* Boiss. & Hohen. var. *kurdica*	karadeliçay	Bareşa kulikzer	Aerial parts	Dec	Int. (cold, stomachache)	Çatak, (Mükemre et al., 2015).	East Anatolia	Irano-Turanian
178	*Stachys lavandulifolia* Vahl	tüylüçay	Bareş, çaye qwe, çaya, beci, Çaya çiye, dağ çayı, kasel mahmud, tüylü çay	Aerial parts, flowers, leaves	Inf	Int. (antipyretic, anypnia, cough, cancer, colds and flu, diabetes, digestive, diuretic, headache,insomnia, throat ache sedative)	Aladağlar, (Özdemir and Alpınar, 2015); Antalya, (Fakir et al., 2016); East Anatolia, (Altundag and Ozturk, 2011); Karlıova, (Nadiroğlu et al., 2019), Solhan, (Polat et al., 2013); Van, (Dalar, 2018); Yüksekova, (Bulut et al., 2016).	Central Anatolia, East Anatolia, Mediterranean	Unknown
179	*Stachys macrantha* (K.Koch) Stearn	kocasoğulcan	Unknown	Aerial parts	Inf	Int. (digestive)	Rize, (Saraç et al., 2013).	Black Sea	Blacksea
180	*Stachys mardinensis* (Post.) R.R.Mill	kayapungu	Kaya pungu, punge, tehta, rıhana tehtan, dağ çayı, ot çayı	Aerial parts	Inf	Int. (bronchitis, cough, diabetes, headache)	Birecik (Akan et al., 2008)	Southeast Anatolia	Irano-Turanian
181	*Stachys obliqua* Waldst. & Kit.	sarıçayçe	Dağ çayı	Aerial parts, leaves	Inf	Int. (colds and flu)	Edremit, (Polat and Satıl, 2012).	Aegean, Marmara	East Mediterranean
182	*Stachys recta* L.	karakurbağaotu	Dağ çayı	Leaves, Flowers	Inf	Int. (appetizer, carminative, stomachache)	Özhatay et al., 1997; Baytop, 1999; Satıl and Açar, 2020	Mediterranean, Marmara	Unknown
183	***Stachys sericantha* P.H.Davis***	dikenliçay	Dikenliçay	Aerial parts	Inf, Dec	Int. (colds, cough, stomachache)	Antalya (Kaya et al.2017)	Mediterranean	Unknown
184	*Stachys sylvatica* L.	hamısırgan	Ham sırgan		Inf	Int. (cardiac disorder)	Espiye, (Polat et al., 2015a).	Black Sea	Euro-Siberian

Table 3. (Continued).

185	*Stachys thirkei* K.Koch	kestere	Minareotu, tavşanakotu	Aerial parts	Inf	Int. (caminative, colds, digestive, sedative)	Kepsut (Özdemir Nath and Kultur, 2016)	West Anatolia	Unknown
186	***Stachys tmolea* Boiss.***	sürmeliçayçe	Kestire	Aerial parts	Inf	Int. (colds and flu)	Osmaneli, (Koyuncu et al., 2010).	Marmara	East Mediterranean
187	*Teucrium chamaedrys* L. subsp. *chamaedrys*	kısamahmut	Cipkesen, kısacıkmahmut, kısamahmut otu	Aerial parts, flowers	Inf	Int. (abdominal pain, analgesic, kidney stones)	Antalya, (Fakir et al., 2016); Central Anatolia, (Sezik et al., 2001); Edremit, (Polat and Satıl, 2012); Gümüşhacıköy, (Cansaran et al., 2007).	Aegean, Black Sea, Marmara, Central Anatolia, Mediterranean	Unknown
188	*Teucrium chamaedrys* L. subsp. *lydium* O. Schwarz	bodurmahmut	Mayasıl otu	Aerial parts, flowers	Dec	Int. (hemorrhoid)	Ayvacık, (Uysal et al., 2012).	Marmara	Mediterranean
189	*Teucrium chamaedrys* L. subsp. *sinuatum* (Celak.) Rech.f.	sancıotu	Çaye qwe, çaye çiya, mayasıl otu	Aerial parts	Dec, Inf	Int. (anypnia, antispasmodic, colds and flu, gastric pain, poisoning,sedative); Ext. (hemorrhoid, rheumatism)	Geçitli, (Kaval et al., 2014); Sivrice, (Cakilcioglu and Turkoglu, 2010); Solhan, (Polat et al., 2013).	East Anatolia	Irano-Turanian
190	*Teucrium chamaedrys* L. subsp. *syspirense* (K.Koch) Rech.f.	sıcakotu	Neman	Aerial parts,	Inf	Int. (diabetes)	Van, (Dalar, 2018).	East Anatolia	Irano-Turanian
191	*Teucrium chamaedrys* L. subsp. *tauricola* Rech.f.	çobansargısı	Hüseyinbetre	Aerial parts	Mashed, Inf	Int. (stomachache); Ext. (hemorrhoid)	Karaisalı, (Güneş et al., 2017), Andırın, (Demirci and Özhatay, 2012).	Mediterranean	Mediterranean
192	*Teucrium divaricatum* Sieber subsp. *graecum* (Celak.) Bornm.	böceotu	Mürcüotu, buhurcuoğlu otu, böceotu	Aerial parts	Inf	Int. (cough, tonic for eyes, sickness, stomachache, urinary diseases)	Marmaris, (Gürdal and Kültür, 2013).	Aegean	Mediterranean
193	*Teucrium flavum* L. subsp. *hellenicum* Rech.f.	sarıyavşan	Mayasıl otu	Aerial parts	Dec	Ext. (Hemorrhoid)	Gönen, (Tuzlacı and Aymaz, 2001).	Marmara	Unknown
194	*Teucrium orientale* L. var. *puberulens* Ekim	kirveotu	Neman	Aerial parts	Inf	Int. (diabetes)	Van, (Dalar, 2018).	East Anatolia	Irano-Turanian

Table 3. (Continued).

195	*Teucrium parviflorum* Schreb.	koyunotu	Dağ kekiği	Aerial parts	Dec	Ext. (antihemorrhoidal)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
196	*Teucrium polium* L. subsp. *polium*	acıyavşan	Bovijana şin, meyrem xort, pey uşağı, ürper, neman, kesel mehmut, kefen otu, kısa mahmutotu, mayasılotu, kokar yavşan, tehlik, ververik	Aerial parts, flowers	Dec, Inf, fresh (raw)	Int. (antipyretic, antihypertensive, cancer, colds and flu, diarrhea, diabetes, digestive, gastric, headache, kidney pains, kidney stones, menstruation, shortness of breath, stomachache; Ext. (hemorrhoid, rheumatism)	Ayvacık, (Uysal et al., 2012); Birecik, (Akan et al., 2008); Çankırı (Ezer and Avcı, 2004); Çatak, (Mükemre et al., 2015); Edremit, (Polat and Satıl, 2012); Geçitli, (Karaisalı, Güneş et al., 2017); Malatya, (Tetik et al., 2013); Sivrice, (Cakilcioglu and Turkoglu, 2010); Solhan, (Polat et al., 2013); İzmit, (Kızılaslan and Özhatay, 2012).	Aegean, Central Anatolia, East Anatolia, Marmara, Mediterranean, Southeastern	Unknown
197	*Thymbra capitata* (L.) Cav.	acıkekik	Kara kekik	Aerial parts, flowers	Dec	Int. (tonic)	Dalaman, (Sağıroğlu et al., 2013a).	Aegean	Mediterranean
198	*Thymbra spicata* L. subsp. *spicata*	zahter	Eşek zahteri, kekik, kır çayı, kır kekiği, kayakekiği, seyil kekiği, zahter, cahter	Aerial parts, flowers	Dec, Inf	Int. (antiseptic, colds and flu, cough, chest pain, diabetes, gastric pain, headache, stomachache); Ext. (toothache)	Bayramiç, (Bulut and Tuzlacı, 2009); Birecik, (Akan et al., 2008); East Anatolia, (Altundag and Ozturk, 2011); Edremit, (Polat and Satıl, 2012); Karaisalı, (Güneş et al., 2017); Yalova, (Koçyiğit and Özhatay,	Aegean, East Anatolia, Marmara, Mediterranean, Southeastern	Mediterranean

Table 3. (Continued).

							2006): (Yeşil and Inal, 2019).		
199	*Thymbra sintenisii* Bornm. & Azn. subsp. *sintenisii*	akzahter	Catire	Aerial parts, flowers	Inf	Int. (colds and flu)	Batman, (Bulut et al., 2019).	East Anatolia	Irano-Turanian
200	*Thymus cilicicus* Boiss. & Balansa	kılçıkkekiği	Kekik limonkekiği, kılıçkkekiği, peynir kekiği	Aerial parts, flowers	Inf	Int. (stomachache)	Antalya, (Fakir et al., 2016); Marmaris, (Gürdal and Kültür, 2013).	Aegean, Mediterranean	East Mediterranean
201	*Thymus comptus* Friv.	boğumlukekik	Kekik	Aerial parts, flowers	Inf	Int. (antibacterial, antifungal)	Celen 2006	Thracian	Unknown
202	*Thymus fallax* Fisch. & C.A.Mey.	catri	Kekik	Aerial parts, flowers	Dec, Inf	Int. (antiinflammatory, backache, cancer, hypertension, enteralgia, vermifuge)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
203	***Thymus haussknechtii* Velen.***	fıratkekiği	Çatır kekik, dağ kekiği, kekik	Aerial parts, flowers	Dec	Int. (respiratory tract problem, colds and flu, high cholesterol)	Sivrice, (Cakilcioglu and Turkoglu, 2010); Maden, (Cakilcioglu et al., 2011); Malatya, (Tetik et al., 2013).	East Anatolia	Irano-Turanian
204	*Thymus kotschyanus* Boiss. & Hohen. subsp. *kotschyanus*	kekik	Anıx, çatır, çatıra kuvi, kekik, onıx, cahter	Aerial parts, flowers	Dec	Int. (colds and flu, gastritis, high cholesterol, sedative, shortness of breath, tonsillitis)	Çatak, (Mükemre et al., 2015); Geçitli, (Kaval et al., 2014); Maden, (Cakilcioglu et al., 2011); Solhan, (Polat et al., 2013).	East Anatolia Southeastern	Irano-Turanian
205	***Thymus leucostomus* Hausskn. & Velen.***	anakekik	Kekik	Aerial parts, flowers	Inf	Int. (anorexia, bronchitis, expectorant, cancer, diabetes, halitosis, hemorrhoid, renal inflammations)	Haymana, (Sarper et al., 2009); Osmaneli, (Koyuncu et al., 2010); (Yeşil and Inal, 2019).	Central Anatolia, Marmara	Irano-Turanian
206	*Thymus leucotrichus* Hal.	dağkekiği	Deli kekik, kekik	Aerial parts, flowers	Dec, Inf	Int. (abdominal pain, bronchitis, common cold, breathing problems, high cholesterol)	Aladağlar, (Özdemir and Alpınar, 2015);	Black Sea, Central Anatolia	Unknown

Table 3. (Continued).

							Espiye, (Polat et al., 2015b).		
207	*Thymus longicaulis* C. Presl. subsp. *chaubardii* (Rchb.f.) Jalas	dağkekiği	Kekik, keklik otu, yer kekiği	Aerial parts, flowers	Dec, Inf	Int. (bronchitis, common colds, diabetes, enteralgia, hemorrhoid, kidney stone,stomachache)	Ayvacık, (Uysal et al., 2012); Inner-West Anatolia, (Kargıoğlu et al., 2008); İzmit, (Kızılarslan and Özhatay 2012); Osmaneli, (Koyuncu et al., 2010).	Inner Anatolia, Marmara	Mediterranean
208	*Thymus longicaulis* C.Presl. subsp. *longicaulis*	aşkekiği	Dağ çayı, kekik, timira, yayla kekiği, orman kekiği	Aerial parts, flowers	Inf	Int. (abdominal pain, colds and flu, cough, edema, respiratory disorder)	Edremit, (Polat and Satıl, 2012); Güdül, (Elçi and Erik, 2006); Torul, (Karaköse et al., 2019).	Aegean, Black Sea, Central Anatolia, Marmara	Euro-Siberian
209	*Thymus migricus* Klokov & Des.-Shost.	peynirkekiği	Kekik	Aerial parts, flowers	Inf	Int. (antiinflammatory, backache, hypertension, enteralgia, cancer, common cold, kidney stones, vermifuge)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Irano-Turanian
210	*Thymus nummularius* M.Bieb.	limonkekiği	Anzer çayı, kekik	Aerial parts, flowers	Inf	Int. (antitussive, bronchial, colds and flu, digestive, stomachache)	Rize, (Saraç et al., 2013); Trabzon, (Akbulut and Bayramoğlu, 2014).	Black Sea	Blacksea
211	*Thymus praecox* Opiz. subsp. *grossheimii* (Ronniger) Jalas	yaylakekiği	Kekik	Aerial parts, flowers	Inf	Int. (antiinflammatory, common colds, hypertension, enteralgia, cancer, vermifuge)	East Anatolia, (Altundag and Ozturk, 2011).	East Anatolia	Blacksea
212	*Thymus sibthorpii* Benth.	topkekik	Kekik, keklikotu	Aerial parts, flowers	Dec, Inf	Int. (hypertrophy, kidney stones, prostatic, stomachache); Ext. (antidandruff)	Çatalca, (Genç and Özhatay, 2006).	Marmara	Euro-Siberian
213	*Thymus sipyleus* Boiss.	sipilkekiği	Anıx, kekik, gara kekik, yayla kekiği, erkek kekik, catri, feklik otu, kekik	Aerial parts, flowers	Inf, dec. (gar)	Int. (asthma, colds and flu, diabetes, hemorrhoid, kidney diseases, prostrate, sedative, stomachache, uterine cancer); Ext. (toothache)	Andırın, (Demirci and Özhatay, 2012); Merzifon, (Ezer and Mumcu Arslan, 2006); East Anatolia, (Altundag and	Black Sea, Central Anatolia, East Anatolia, Marmara, Mediterranean	Unknown

Table 3. (Continued).

							Ozturk, 2011); Bingöl, (Polat, 2019); Karaisalı, (Güneş et al., 2017); Kelkit, (Korkmaz and Karakurt, 2015); Osmaneli, (Koyuncu et al., 2010); Sarıveliler, (Bağcı et al., 2016).		
214	*Thymus transcaucasicus* Ronniger	kırkekiği	Kekik, çatıra	Aerial parts, flowers	Inf	Int. (antiinflammatory, backache, cancer, common cold, eczema, enteralgia, hypertension, kidney disease, rheumatism, stomachache, vermifuge)	East Anatolia, (Altundag and Ozturk, 2011), Kars, (Güneş and Özhatay, 2011).	East Anatolia	Unknown
215	*Thymus zygioides* Griseb.	bodurkekiği	Kabekekiği, Kekik, kır çayı, taş kekiğ	Aerial parts, flowers	Inf	Int. (diabetes, digestive, throat ache and stomachache)	Antalya, (Fakir et al., 2016); Bayramiç, (Bulut and Tuzlacı, 2009); Manisa, (Ugurlu and Secmen, 2008).	Aegean, Marmara, Mediterranean	Mediterranean
216	*Vitex agnus-castus* L.	hayıt	Ayıt, hayıt	Fruit, Flowers	Dec, Inf, Comp	Int. (abdominal pain, antipyretic,headache, kidney sand); Ext. (eczema)	Bayramiç, (Bulut and Tuzlacı, 2009); Turgutlu, (Bulut and Tuzlaci, 2013).	Aegean, Marmara	Mediterranean
217	*Ziziphora capitata* L.	anuk	Dağ reyhanı, mor kekik, nane ruhu, reyhan	Whole plant	Inf, dec. (gar)	Int. (colds and flu, cough, diuretic, hypertension, intestinal worms, sore throat, stomachache); Ext. (toothache)	Aladağlar, (Özdemir and Alpınar, 2015); Ayvacık, (Uysal et al., 2012); Kütahya, (Satıl and Selvi, 2020); Tarsus and Yahyalı (Sağıroğlu et al., 2013b).	Central Anatolia, Marmara, Mediterranean	Unknown

Table 3. (Continued).

218	*Ziziphora clinopodioides* Lam.	dağreyhanı	Reyhan	Aerial parts	Dec, Inf	Int. (carminative, colds and flu, orexigenic, stomachache)	East Anatolia, (Altundag and Ozturk, 2011); Erzurum, Kütahya	East Anatolia	Irano-Turanian
219	***Ziziphora taurica* M.Bieb. subsp. *cleonioides* (Boiss.) P.H.Davis***	naneruhu	Kekik	Whole plant	Inf	Int. (colds and flu)	Manisa, (Satıl and Selvi, 2020).	Mediterranean	Mediterranean
220	*Ziziphora taurica* M.Bieb. subsp. *taurica*	çölreyhanı	Merze, nane, nane çayı	Whole plant	Inf	Int. (carminative, colds and flu, hypertension, orexigenic, stomachache)	Balıkesir, (Satıl and Selvi, 2020); East Anatolia, (Altundag and Ozturk, 2011); Edremit, (Polat and Satıl, 2012).	Aegean, Marmara, East Anatolia	Unknown
221	*Ziziphora tenuior* L.	fareotu	Catira kuvî	Whole plant	Inf	Int. (common colds, cough, diabetes)	Konya, Şanlıurfa, Van, (Dalar, 2018).	Central Anatolia, East Anatolia	Irano-Turanian
		*Endemic taxon (These taxa is shown as bold). **Abbreviations:** Int: internally; Ex: externally, ca: cataplasm, comp: compress: crs: crushed, dec: decoction, oil: essential oil of drug, gar: gargle; Inf: infusion, Inh: inhalation, pol:poultice; lc; leaves chewing, ess. oil: essential oil, oint: ointment.							

*Endemic taxon (These taxa is shown as bold). **Abbreviations:** Int: internally; Ex: externally, ca: cataplasm, comp: compress: crs: crushed, dec: decoction, oil: essential oil of drug, gar: gargle; Inf: infusion, Inh: inhalation, pol:poultice; lc; leaves chewing, ess. oil: essential oil, oint: ointment.

Table 4. Lamiaceae taxa included in monographs and pharmacopoeias (the ones found in Turkey are highlighted in bold).

No	Taxa	English name	Monographs						Pharmacopies		
			AHP	COM. E	EMA	ESCOP	PDR	WHO	EU	BHP	TURK
1	***Ajuga chamaepitys* (L.) Schreb.**	**Ground Pine**		-			+				
2	*Ajuga reptans* L.	Bugle		-			+				
3	***Ballota nigra* L.**	**Black Horehound**		+		+	+	-	+	+	+
4	***Calamintha nepeta* Willk. (syn.)**	**Calamint**		-			+				
5	*Galeopsis segetum* Neck.	Hempnettle		-			+				
6	*Glechoma hederacea* L.	Ground Ivy		-			+			+	
7	***Hyssopus officinalis* L.**	**Hyssop**					+				
8	***Lamium album* L.**	**White Nettle**		+			+			+	
9	***Lavandula angustifolia* Mill.**	**English Lavender**		+	+	+	+	+	+		+
10	*Lavandula* × *intermedia* Emeric ex Loisel.	Lavender						+			
11	***Leonurus cardiaca* L.**	**Motherwort**		+	+	+	+	+	+	+	+
12	*Leonurus japonicus* Houtt.	Chinese Motherwort		-			+				
13	*Lycopus virginicus* L.	Bugleweed		+	-	-	+	-	-		
14	***Marrubium vulgare* L.**	**Horehound**		+	+	+	+	-	+	+	+
15	***Melissa officinalis* L.**	**Lemon Balm**		+	+	+	+	+	+	+	+
16	***Mentha aquatica* L.**	**Wild Mint**		-			+				
17	***Mentha arvensis* L.**	**Japanese Mint**		+			+		+	+	+
18	***Mentha longifolia* (L.) L.**	**English Horsemint**		-			+				
19	***Mentha* × *piperita* L.**	**Peppermint**		-	+	+	+	+	+	+	+
20	***Mentha pulegium* L.**	**Pennyroyal**		-			+				
21	***Mentha spicata* L.**	**Spearmint**		-			+				
22	*Monarda punctata* L.	Horsemint		-			+				
23	***Nepeta cataria* L.**	**Catnip**		-			+				
24	***Ocimum basilicum* L.**	**Basil**		+			+				
25	*Ocimum sanctum* L.	Badrooj		-			-	+			
26	*Origanum dictamnus* L	Dittany of Crete herb		-	+	-	-	-	-	-	-
27	***Origanum onites* L.**	**Oregano**		-	-	-	-	-	+		+
28	***Origanum majorana* L.**	**Sweet Marjoram**		-	+	-	+	-	-	-	-
29	***Origanum vulgare* L.**	**Oregano**					+		+		
30	*Orthosiphon stamineus* Benth. (syn.)	Java tea		-	+	+	-	-		+	+
31	*Perilla frutescens* (L.) Britton	Perilla		-			+				
32	***Prunella vulgaris* L.**	**Self-Heal**		-			+				
33	***Rosmarinus officinalis* L.**	**Rosemary**		+	+	+	+	+	+	+	+
34	***Salvia fruticosa* Mill.**	**Greek Sage**		-	+	+	+	-	+		+
35	*Salvia miltiorrhiza* Bunge	Red-Rooted Sage		-	+	-	+	-	-	+	-
36	***Salvia officinalis* L.**	**Sage**		+	+	+	+	+	+	+	+
37	***Salvia sclarea* L.**	**Clary Sage**		-		-	-	-	+	+	+
38	***Satureja hortensis* L.**	**Summer Savory**		-	-	-	+	-	-	-	-
39	*Scutellaria baicalensis* Georgi	Baical skullcap		-	-	-	-	+	-	-	-
40	*Scutellaria lateriflora* L.	Scullcap	+	-	-	-	+	-	-	-	-
41	*Sideritis scardica* Griseb.	Ironwort		-	+	-	-	-	-	-	-

Table 4. (Continued).

42	*Sideritis clandestina* (Bory & Chaub.) Hayek	Ironwort		-	+	-	-	-	-	-	-
43	*Sideritis raeseri* Boiss.	Ironwort		-	+	-	-	-	-	-	-
44	*Stachys palustris* L.	Woundwort		-	-	-	+	-	-	-	-
45	***Teucrium chamaedrys* L.**	**Germander**		-	-	-	+	-	-	-	-
46	***Teucrium polium* L.**	**Poley**		-	-	-	+	-	-	-	-
47	*Teucrium scorodonia* L.	Wood Sage		-	-	-	+	-	-	-	-
48	*Thymus serpyllum* L.	Wild Thyme		+	-	+	+	-	-	+	-
49	*Thymus vulgaris* L.	Thyme		+	+	+	+	+	+	+	+
50	*Thymus zygis* L.	Thyme		+	+	-	-	+	+	+	+
51	***Vitex agnus-castus* L.**	**Chaste Tree**	+	+	+	+	+	+	+	+	+

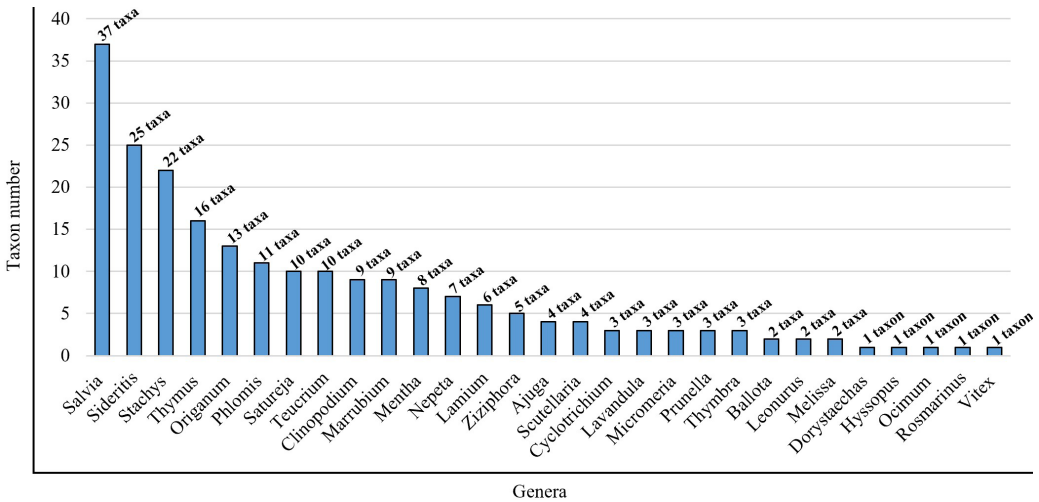

Figure 1. The genera and taxa numbers determined to be used for medicinal purposes.

and flavonols. Luteolin, apigenin, quercetin, scutellarin and diosmetin are the most common flavonoids in the Lamiaceae taxa (Atasü and Konuklugil, 1988).

3.2.3. Lignans

Lignans are dimeric compounds in which phenylpropane (C6C3) units are linked between their side chains at the C-8 positions to form three-dimensional networks. Several compounds of lignans have been isolated from Lamiaceae species. In particular, aryltetralin- and resinol-like lignans represent the most common compounds in this family (Frezza et al., 2019). However, aryltetralin- and resinol-like lignans have not been observed Lamiaceae taxa in Turkey. Only podophyllotoxin compounds were found. This compound has been detected in some taxa of *Phlomis, Nepeta, Salvia, Teucrium* and *Thymus*. Lignans, especially podophyllotoxin, are of interest to scientists because of their antimitotic and antitumour activity (Konuklugil, 1996).

3.2.4 Coumarins

Coumarins are lactones of hydroxycinnamic acids, with cyclic C6C3 skeletons. Coumarins in general have antimicrobial and fungicidal activity. There are coumarins as perfumes, cosmetics, and industrial additives. Some of its derivatives have been used as aroma enhancers in tobaccos and certain alcoholic drinks (Pengelly, 2004; Stiefel et al., 2017). Nevertheless, their most relevant role is described in natural products, organic chemistry, and medicinal chemistry**.** Coumarins have been made mainly in developing coumarin-based anticoagulant, antioxidant, antimicrobial, anticancer, antidiabetic, analgesic, antineurodegenerative, and antiinflammatory agents. Coumarins found in some taxa of the genus *Lavandula* (hernairin, santonin), *Ocimum* (ausculetin, aesculin) and *Salvia* (esculetin) have been identified (Pengelly, 2004; Maggi et al., 2011; Matos et al., 2015).

3.3. Iridoid glycosides

Glycosides are a group of compounds characterised by the fact that chemically they consist of a sugar portion attached by a special bond to one or more nonsugar portions. Chemically they are hydroxyls of a sugar that are capable of forming ethers with other alcohols, or esters with acids.

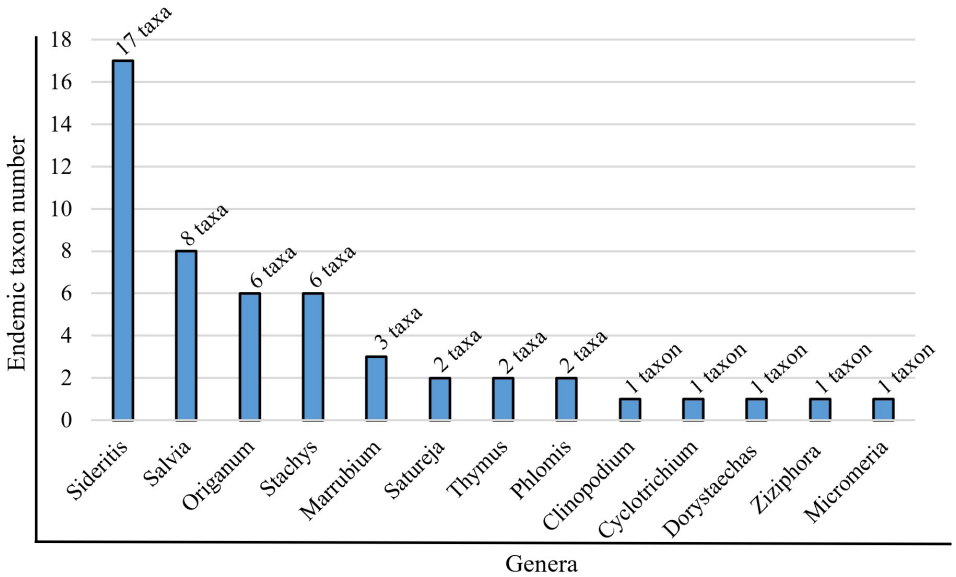

Figure 2. Endemic genera and their taxa numbers.

iridoid glycosides, phenylethanoid glycoside. There are iridoid glycosides in the Lamiaceae family. Iridoids are monoterpene lactones which can ocur as glycosides, with one or more sugar molecules attached such as loganin or as aglycones, with no sugar attached e.g., nepetalactone (Kooiman, 1972; Richardson, 1992; Pengelly, 2004).

Nepeta, *Salvia*, and *Satureja*, all in the Nepetoideae, were found to contain species with iridoid glycosides (Boros and Stermitz, 1990; Richardson, 1992). Iridoids often have a bitter taste and show a wide range of pharmacological activities, including analgesic, antihepatotoxic, antitumour, antiplasmodic, antiviral, antimutagenic, cardiovascular, antiinflammatory, choleretic, hypoglceamic, immunomodulatory and laxative effects (Bello et al., 2018). Iridoids are found in some taxa of *Ajuga, Lamium, Leonurus, Nepeta, Prasium, Phlomis, Salvia, Satureja, Scutellaria, Sideritis, Stachys, Teucrium* and *Vitex* (Rizk et al., 1985; Boros and Stermitz, 1990; Richardson, 1992; Háznagy-Radnai et al., 2006; Hammami et al., 2007; Bello et al., 2018; Güven et al., 2021). Triterpenes constitute a large structurally diverse group of natural compounds biogenetically derived from active isoprene. Two C15 units build squalene or related acyclic 30-carbon precursors (Nazaruk et al., 2015). They are found in almost all genera in Turkey. These compounds presents several biological activities including antiinflammatory, antioxidant, antiviral, antidiabetic, antitumour, hepato-protective and cardio-protective. In the Turkish Lamiaceae taxa, ursolic and oleanolic acids are common triterpenoid (Richardson, 1992).

3.4. Tannins

Tannins represent the largest group of polyphenols with bitter taste. They are widely distributed in the aerial plants such as leaves and stems. They are the chief plant constituents responsible for astringency. Tannins are externally astringent and internally antidiarrheal. It has a vasoconstricting effect in thin vessels. For this reason, it is used in superficial wounds and hemorrhoids. They are found in almost all genera in Turkey (Sever Yılmaz and Saltan Çitoğlu, 2003; Pengelly, 2004; Jaiswl et al., 2018; Zengin et al., 2021).

3.5. Fatty oils

The fatty acid components of the seed oils of Lamiaceae taxa mostly are palmitic, palmitoleic, stearic, oleic, linoleic, linolenic, and arachidic acids. These fatty acids are responsible for the antioxidant activity. It is seen more or less fatty acid in seeds of all taxa in Turkey (Marin et al., 1991; Ayas et al., 2004).

4. Results and discussion

A significant part of ethnobotanic studies in Turkey has been carried out in rural areas. The ethnobotanical analyses were presented statistically by Ertuğ (2014). According to Ertuğ (2014), a total of 1420 studies were carried out, and an additional 156 thesis were completed. Regional distribution of the studies revealed that Central Anatolia Region ranks first with 192 studies whereas Southeastern Anatolia Region ranks the last with 59 studies. With 28 studies, the province hosting the majority of the studies is Muğla, located in the Aegean Region. These studies have played a significant role in bringing the ethnobotanical inventory of Anatolia to light.

The number of plants used as food in Turkey reaches 1200. This figure corresponds to approximately 10% of the plants grown in Turkey (Ertuğ, 2014). The number of endemic edible plants is 104 which corresponds to 8.6%.

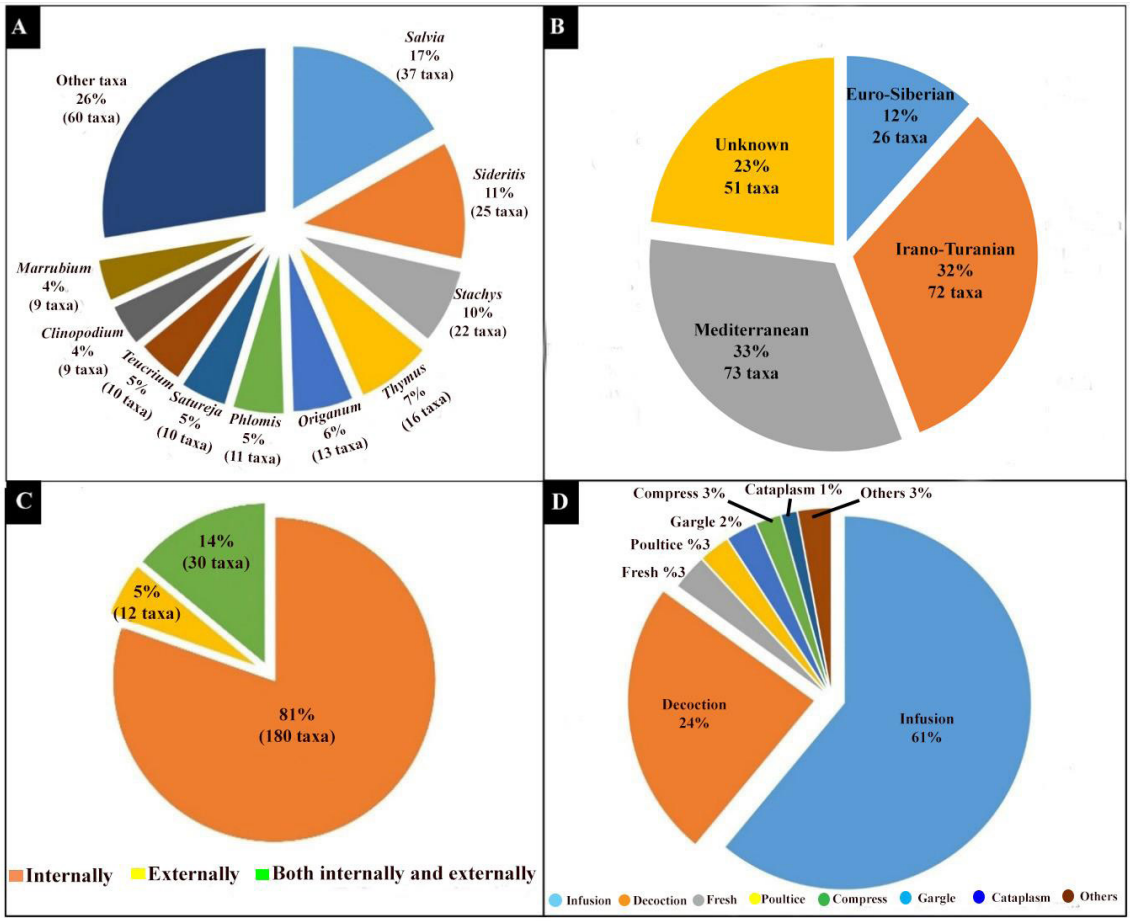

Figure 3. Various graphical datas. A) The genera with the highest number of taxa; B) distribution of taxa by phytogeographic regions; C) means of uptake for drugs into the human body; D) patterns of use concerning herbal drugs.

Among 81 families covering edible plants, Lamiaceae family ranks first with 169 plants (23.6%), while the patterns of use for these plants is generally as spices and tea (Ertuğ, 2000, 2014). Most commonly used plants in the Lamiaceae family are *Sideritis*-mountain tea (27), *Salvia*-sage (26), *Thymus*-thyme (23), and *Origanum*-marjoram (Ertuğ, 2000). Medicinal herbs and plants with therapeutical uses come to mind first, when considering medicinal plants in Turkey. Plants such as "mint, sage, thyme" from the Lamiaceae family, which are among the "heritage plants", are widely used in everyone's family (Ertuğ, 2014). *Vitex agnus-castus* is used to weave baskets (Ertuğ, 2004). While the rate of being endemic among edible plants is 9%, this rate is around 20% in the Lamiaceae family (Ertuğ, 2014).

As a result of the study, it was determined that a total of 221 taxa (192 species) of plants naturally distributed in Turkey belonging to 29 genera, 51 (23%) of which are endemic have medicinal/therapeutic uses in Turkey (Figure 1). The scientific and local names of these taxa, the geographical regions where they are used and their phytogeographic elements, the usage they are used by the local people and the diseases they are used as treatment are shown in Table 3 in alphabetical order. The genera with the most endemic taxa are *Sideritis* (17 endemic taxa), *Salvia* (8 endemic taxa), and *Origanum* (6 endemic taxa) (Figure 2).

The genera with the most taxa are *Salvia* (37 taxa), *Sideritis* (25 taxa), *Stachys* (22 taxa), *Thymus* (16 taxa) and *Origanum* (13 taxa) (Figures 1 and 3a). When examining the distribution of taxa according to phytogeographic regions, it was determined that 33% have Mediterranean, 32% have Irano-Turanian and 12% have Euro-Siberian elements. The phytogeographic element of 23% is unknown (Figure 3b). Mostly aerial parts, flowers and leaves of plants are used as herbal drugs. While 81% of the herbs are taken internally and orally, 5% are applied externally on the skin or in the mouth (mouthwash). Fourteen percent of them are found to be used both internally and externally (Figure 3c). Ten different patterns of use for Lamiaceae taxa plants among the people were determined. Most preferred patterns of use are infusion (61%) and decoction (24%) (Figure 3d).

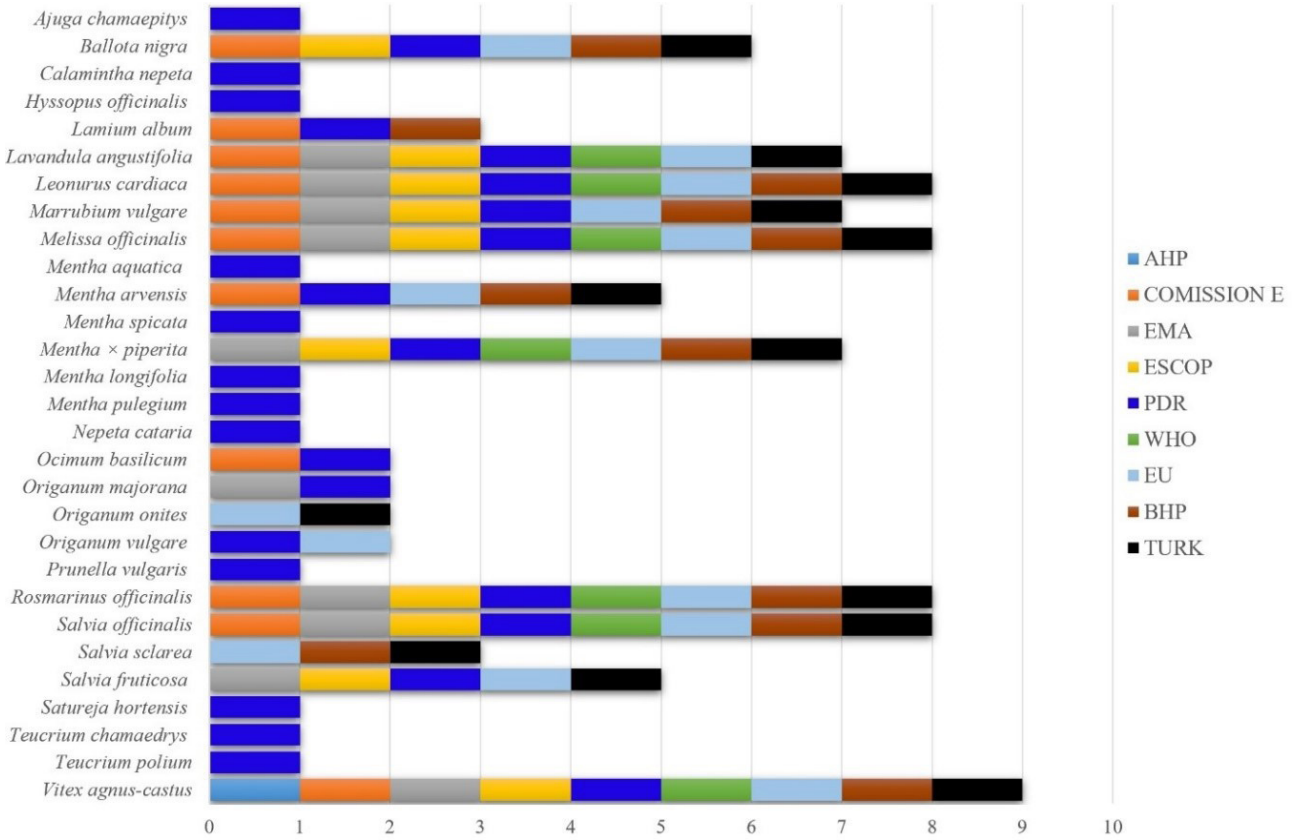

Figure 4. Lamiaceae taxa of Turkey included in pharmacopoeia and monographs.

Lamiaceae family is most frequently included in the first 5 families in the ethnobotanical studies conducted on the traditional use of medicinal plants in Turkey (Satıl et al., 2008a; Çakılcıoğlu and Türkoğlu, 2009; Sarper et al., 2009; Toksoy et al., 2010; Çakılcıoğlu and Civelek, 2011; Polat and Satıl, 2012; Polat et al., 2012; Gürdal and Kültür, 2013; Polat et al., 2013; Kaval et al., 2014; Güler et al., 2015; Güzel et al., 2015; Polat et al., 2015a,b; Sargın et al., 2015a,b; Mükemre et al., 2016; Yüce-Babacan et al., 2017; Bulut et al., 2017; Güneş et al., 2018; Karaköse et al., 2019; Güler et al., 2021; Yalçın et al., 2021a,b).

Within the framework of the research, a total of 97 articles were reviewed for investigating the traditional medicinal uses of Lamiaceae family taxa, generally published in field indexed journals. Considering the distribution of the reviewed articles by regions, 27 studies were found out to be conducted in the Eastern Anatolia region, 14 studies in the Aegean, Mediterranean and Marmara regions, 12 studies in the Black Sea and Central Anatolia regions and 4 studies in the Southeastern Anatolia region. It is observed that 82 plant taxa belonging to Lamiaceae family are used in the treatment of diseases in the Eastern Anatolia region whereas this number is 73 in the Marmara region, 55 in the Mediterranean region, 42 in the Aegean region, 41 in the Central Anatolia region, 27 in the Black Sea region and 14 in the Southeastern Anatolia region. Eastern Anatolia and Marmara regions come to the fore when considering the distribution of the number of plants by region. Major reason for the high number of plants used in the Eastern Anatolia region is the high number of studies conducted in the region. The number of taxa used for medicinal purposes is only 8 in the Southeastern Anatolia region, where the least research is conducted.

These researches concluded that *Salvia, Sideritis, Origanum, Thymus, Mentha, Lavandula, Satureja* and *Stachys* genera are more commonly used than other genera among local people.

Salvia belongs to the subfamily Nepetoideae in the Lamiaceae family. In traditional medicine, *Salvia* is one of the oldest medicinal plants used by humans, and it is considered as a universal panacea (Uritu et al., 2018). In the folk medicine of Anatolia, *Salvia* (mostly *S. fruticosa* Mill., *S. tomentosa* L., *S. multicaulis* Vahl.) was used to treat several diseases such as asthma, bronchitis, colds–flu, tonsilitis, stomach disorders, carminative and diabetes (Everest and Ozturk, 2005; Polat and Satıl, 2010; Senol et al, 2010; Sargın et al., 2013; Özdemir and Alpınar, 2015;

Fakir et al., 2016; Güneş et al., 2017; Polat et al. 2017). Many biological activity studies conducted on *Salvia* taxa have revealed that the taxa have antiinflammatory, antibacterial, and antiviral effects in parallel with the traditional uses of the genus (Akkol et al., 2008; Karataş and Ertekin, 2010; Erdogan et al., 2011; Coisin et al., 2012; Firuzi et al., 2013). Essential oil combination obtained from some taxa, including *S. fruticosa* species, is demonstrated to be effective against influenza A/H1N1 and human rhinovirus 14 (HRV14) viruses that cause upperrespiratory tract diseases (Tseliou et al., 2019). In addition, *S. fruticosa* extract in ethanol is found out to be effective against many bacterial species such as gram (+) *Escherichia coli, Salmonella typhimurium*, and gram (–) *Staphylococcus aureus*, *Bacillus cereus* (Duletic-Lausevic et al., 2018). In another study investigating the biological activities of *Salvia fruticosa* and *S. tomentosa*, extract and essential oil obtained from taxa have been determined to have a strong antibacterial effect on *Mycobacterium tuberculosis* bacteria and in addition antifungal effects against *Microsporum gypseum*, *Trichophyton mentagrophytes* and some other *Candida* species (Tan et al., 2015). This case is very significant for the common traditional medicinal uses of the genus *Salvia* to come together with modern studies on a common ground.

Sideritis comprises over 150 species distributed in the Western Palearctic zone. The generic name *Sideritis* originates from the Greek, meaning iron. It is related to the use of the herb for curing wounds caused by metal arms (Castro and Nuñez, 1994). Ethnobotanical studies have revealed that *Sideritis* taxa in Turkey have traditionally been used in the treatment of diseases such as stomatoid diseases, upperrespiratory tract problems, wound treatment and diarrhea (Gençler Özkan and Koyuncu, 2005; Polat and Satıl, 2010; Altundag and Ozturk, 2011; Özdemir and Alpınar, 2015). Activity studies conducted on *Sideritis* species have revealed that many species belonging to this genus have antibacterial and antiviral effects (Aligiannis et al., 2001a; Aneva et al., 2019; Pihan et al., 2019). This finding supports the traditional use of *Sideritis* taxa against colds, flu and diarrhea. A study conducted in 2007 by Saraç and Uğur (2007) set forth the strong effect of ethanol extract of *Sideritis leptoclada* O. Schwarz & P.H. Davis against gram-positive bacteria (*Bacillus subtilis, Micrococcus luteus, Staphylococcus aureus, Staphylococcus epidermidis*). In another activity study on *Sideritis trojana* Bornm. the antihelicobacter activity of essential oils obtained from the taxon was identified (Kırmızıbekmez et al., 2017). In addition, activity studies conducted on *Sideritis perfoliata, Sideritis scardica* Griseb. revealed the antiinflammatory effects of the taxa (Tadić et al., 2007; Charami et al., 2008).

Origanum is a genus of herbaceous perennials and subshrubs in the Lamiaceae family, native to Europe, North Africa, and much of temperate Asia and can be found in open or mountainous environments (Uritu et al., 2018). Hippocrates used *Origanum majorana* L. as an antiseptic agent. The ancient Greeks consider *Origanum* as a symbol of love, honour, and happiness. Aristotle declares that *Origanum* is an antipoison. The people from old Egypt used *Origanum* to disinfect and preserve food (Prerna and Vasudeva, 2015). In the folk medicine of Turkey, *Origanum* was used to treat several illnesses such as asthma, bronchitis, colds–flu, coughs, urinary inflammations, abdominal pains, headache and stomach disorders (Cakilcioglu et al., 2011; Polat et al., 2013; Saraç et al., 2013; Özdemir and Alpınar, 2015; Yeşil and İnal, 2019). There are many antimicrobial, antifungal, antioxidant activity studies conducted on *Origanum* species (Adam et al., 1998; Aligiannis et al., 2001b; Faleiro et al., 2005; Busatta et al., 2008). Biological activity studies reveal data supporting the traditional intensive use of *Origanum* taxa against upperrespiratory tract diseases, cough and stomach disorders.

Thymus, part of the Lamiaceae family, consists of over 200 species of aromatic plants with evergreen leaves. Geographically, these plants extend to Asia, North Africa, and Europe. Used for thousands of years in traditional medicine, the effects of *Thymus* species in medicine is wide (Uritu et al., 2018). Considering the traditional medicinal uses of *Thymus* taxa in our country, it is observed that they are commonly used as antiinflammatory against upperrespiratory tract diseases as well as against skin diseases, diabetes, hypertension and stomach disorders (Ezer and Mumcu Arslan, 2006; Koyuncu et al., 2010; Altundag and Ozturk, 2011; Kızılarslan and Özhatay 2012; Gürdal and Kültür, 2013). There are many antimicrobial, antifungal, antioxidant activity studies conducted on *Thymus* species (Karaman et al., 2001; Lee et al., 2005; Rota et al., 2008; Zuzarte et al., 2013; Nabavi et al., 2015). Biological activity studies reveal data supporting the traditional intensive use of *Thymus* taxa against upperrespiratory tract diseases, cough and stomach disorders. However, no data was encountered confirming the use of *Thymus* species against diabetes and hypertension disorders.

Mentha species belong to the family Lamiaceae and are widely distributed in Europe, Asia, Africa, Australia, and North America (Lawrence, 2006). Extracts of this genus are traditionally used as foods and are highly valued due to the presence of significant amounts of antioxidant phenolic compounds (Salehi et al., 2018). *Mentha* taxa are traditionally used in Turkey as antispasmodic against stomach ailments and nausea as well as against respiratory diseases and hemorrhoids (Ugurlu and Secmen, 2008; Cakilcioglu et al., 2011; Tuzlacı and Şenkardeş, 2011;

Güneş et al., 2017). There are many antimicrobial, antifungal, antioxidant activity studies conducted on *Mentha* species (Işcan et al., 2002; Gulluce et al., 2007; Soković et al., 2009; Dorman et al., 2013). Biological activity studies reveal data supporting the traditional intensive use of *Mentha* taxa against upperrespiratory tract diseases, cough and stomach disorders. However; a single study has been reached revealing that only essential oils obtained from *Mentha* × *piperita* L. have an antispasmodic effect on rats, when trying to validate widespread use as an antispasmodic among the public (Sousa et al., 2010). No activity study has been found that confirms the widespread traditional use of *Mentha spicata* L. and *Mentha longifolia* L. in the treatment of hemorrhoids.

Lavandula includes more than 39 known species, mostly distributed in Arabia, Mediterranean Coasts, Asia, Middle East, and Northern Africa (Uritu et al., 2018). Dioscorides stated that this plant is called "Stoechus" from its growing on the Stoechades, a group of islands on the south coast of Gaul (a region in Western Europe) near Massilia (modern Marseilles). Three species, *Lavandula stoechas*, *L. pedunculata* (Mill.) Cav., and *L. dentata* L. were known to Romans, and in Spain *L. stoechas* was known as 'Romero Santo' (sacred rosemary), and its oil was used as hemostatic and for cleansing wounds (Akbar, 2020). *Lavandula stoechas* and *L. angustifolia* Mill. are traditionally used in Turkey as a diuretic and sedative, as well as against high blood pressure, heart ailments, upperrespiratory tract problems and stomach ailments (Tuzlacı and Sadıkoğlu, 2007; Polat and Satıl, 2012; Güler et al., 2015; Güneş et al., 2017). Activity studies have revealed that the essential oil obtained from *L. angustifolia* is highly effective against many bacterial and fungal species (Hammer et al., 1999). It has also been suggested that essential oils, including lavender, may be useful in treating bacterial infections that are resistant to antibiotics. For example, *L. angustifolia* oil was demonstrated to have in vitro activity against both MRSA (methicillin-resistant *Staphylococcus aureus*) and VRE (vancomycin-resistant *Enterococcus faecalis*) at a concentration of less than 1% (Nelson, 1997). Essential oils derived from *L. stoechas*, with the main components such as fenchone (55.79%), camphor (18.18%), 1,8-cineole (8.03%), and myrtenyl acetate (6.25%) have been determined to have a strong effect on *Escherichia coli, Listeria monocytogenes, Salmonella typhimurium* and *Staphylococcus aureus* pathogens (Dadalioglu and Evrendilek, 2004). In addition, active substance studies on *Lavandula stoechas* confirm the sedative effect of the taxon (Gilani et al., 2000).

Satureja consists of aromatic plants of the Lamiaceae family that are related to rosemary and thyme (Uritu et al., 2018). It is known that *Satureja hortensis* L. is traditionally used in Turkey against high blood pressure, as an antispasmodic, against upperrespiratory tract problems and reproductive system inflammations (Cakilcioglu et al., 2011; Polat et al., 2013). In some activity studies on *Satureja hortensis*, carvacrol and γ-terpinene were identified as the main components of the taxon. In the same study, *S. hortensis* was found to be an antibacterial agent against different gram-positive and gram-negative bacteria and powerful antioxidants in different in vitro methods (ABTS and DPPH). These effects were mainly due to the high amount of phenolics content in the oil. On the other hand, using *S. hortensis* essential oils (SEO) at inhibited concentrations for pathogenic bacteria can also affect the beneficial bacteria negatively. SEO showed toxicity on normal lung, liver and epithelial cells (Abou Baker et al., 2020). Activity studies conducted on *S. hortensis* revealed that the taxon has antioxidant, antimicrobial, antiparasitic and antiinflammatory effects (Momtaz and Abdollahi, 2010; Hajhashemi et al., 2012).

Stachys is one of the largest genera in the Lamiaceae. Estimates of the number of species in the genus are ranging between 300 and about 450 (Uritu et al., 2018). *Stachys* species (hedgenettle or woundwort) are important medicinal plants known for their flavor and fragrance. They are widely consumed in Europe and Asia as aromatic herbal teas (Bahadori et al., 2020). Ethnobotanical studies conducted in Turkey have revealed that *Stachys annua* (L.) L., *Stachys lavandulifolia* Vahl., *Stachys cretica* L. subsp. *anatolica* Rech.f. taxa are traditionally used as antipyretic, against menstrual cycle disorders, insomnia, stomach disorders and upperrespiratory tract disorders (Altundag and Ozturk, 2011; Polat et al., 2013; Özdemir and Alpinar, 2015; Fakir et al., 2016; Dalar, 2018). Activity studies have revealed that essential oil obtained particularly from *Stachys* (*S. inflata* Benth., *S. lavandulifolia, and S. byzantina* K.Koch) taxa has antioxidant, antidiabetic and antiobesity effects (Bahadori et al., 2020). In another study on the *Stachys lavandulifolia*, it was determined that the taxon has an antidepressant effect due to the flavonoids it contains (Jahani et al., 2019).

Lamiaceae taxa, which are used for medicinal purposes, were identified on National (TURK, BHP), Regional (EU) and International Pharmacopoeias (WHO) and various monographs (AHP, COMISSION E, EMA, ESCOP, PDR) and it has been observed that 51 taxa in the world are included in these books. Twenty-nine (57%) of these taxa are widely used by local people in Turkey (Table 4; Figure 4).

The local names of the Lamiaceae family taxa clearly indicate the reflections of the cultural heritage and language diversity in Anatolia on the plant names (Table 3). We also see that many plant names are named according to the disease they are used to treat. Ex: Eczama herb/St. John's wort (*Ajuga* spp., *Teucrium chamaedrys*), diarrhea

Table 5. Disease categories and subcategories in which medicinal plants are used for therapeutic purposes.

Categories	Subcategories
Otolaryngology and respiratory system	Asthma, Antipyretic, Antitussive, Bronchitis, Breathing problems, Bronchitis, Catarrh, Chest pain, Colds and flu, Common cold, Cough, Diaphoretic, Dizziness, Dyspnea, Earache, Expectorant, Fever, Mucolitic, Pharyngitis, Refreshing, Respiratory disorder, Respiratory tract problem, Shortness of breath, Sore throat, Throat ache, Tonsillar inflammation, Tonsillitis
Gastric disorders	Abdominal ache, Abdominal pain, Antacid, Antispasmodic, Appetizing, Bellyache, Digestive, Digestive disorders, Dyspepsia, Gallbladder, Gastric disorders, Gastric pain, Gastritis indigestion, Nausea, Poisoning, Sickness, Stomachache, Ulcer
Urogenital system	Cystitis, Diaphoretic, Diuretic, Earache, Emmenagogue, Fever, Forgetfulness, Furuncle, Kidney stones, Nephralgia, Prostate, Renal Inflammations, Urethritis, Urinary diseases
Intestinal diseases	Antihemorrhoidal, Carminative, Colic, Colic Spasms, Constipation, Diarrhea, Enteralgia, Hemorrhoid, Intestinal spasm, İntestinal Worms, Laxative, Purgative, Vermifuge
Nervoussystem	Analgesic, Anorexia, Anypnia, Calmative, Depression, Dizziness, Epilepsy, Forgetfulness, Headache Insomnia, Migraine, Sedative, Stimulant, Tranquillizer, Tremor
Cardiovascular	Anticoagulant, Antihypertensive, Astringent, Atherosclerosis, Bleeding, Blood pressure therapy, Cardiac diseases, Cardiac Disorder, Cardiotonic, Cardiovascular diseases, Cholesterol management, Embolism, Heart diseases, High cholesterol, Hypertension, Infarction, Vasodilator
Dermatology	Abscess, Antidandruff, Antiinflammatory, Antiseptic, Burns, Burns wound, Eczema, Edema, Fungal infection, Furuncle, Inflamed wounds, Rejuvenate, Skin diseases, Snakebites, To remove the umbilical cord, Tonic vulnerary, Wound healing, Wounds
Hormonaldisorders	Diabetes Disease, Emmenagogue, Hemostatic, Hypertrophy, Jaundice, Menstrual irregularity, Menstruation, Menstruation, Menstruation pain, Menstruation regulator, Milk enhancer, Oreksijenik, Roborant
Mouth and dental health	Bad breath, Halitosis, Toothache
Eye diseases	Eye ailments, Tonic for eyes
Muscle and joint pain	Backache, Muscle pain, Rheumatism, Waist pain
Cancer	Lung, Prostate, Uterine

herb (*Marrubium globosum*), catarrh herb (*Nepeta italica*), hemorrhoid herb (*Ajuga chamaepitys*), pain herb (*Scutellaria sosnowskyi*) etc.

Considering the Lamiaceae taxa, which are used extensively among indigenous people for their therapeutic effects, taxa such as *Ajuga chamaepitys* (L.) Schreber subsp. *chia* (Schreber) Arcang. (St. John's wort), *Lavandula stoechas* L. (French lavender), *Melissa officinalis* L. (Lemon grass), *Mentha longifolia* (L.) L. subsp. *typhoides* (Briq.) Harley (peppermint), *Micromeria myrtifolia* Boiss. et Hohen. (Sage), *Ocimum basilicum* L. (Basil), *Origanum onites* (Oregano, Marjoram), *Origanum vulgare* L. (Mountain thyme, onyx), *Salvia fruticosa* (Sage), *Salvia multicaulis* (Mountain tea), *Sideritis montana* L. (Mountain tea), *Stachys lavandulifolia* (Mountain tea), *Teucrium polium* L. (Meyremhort), *Thymus sipyleus* Boiss. (Oregano), *Ziziphora capitata* L. (purple thyme) are widely used in Turkey (Table 3).

Considering different traditional medicinal uses of Lamiaceae taxa, colds and flu (100 uses), stomachache (74 uses) and antimicrobial (45 uses) symptoms are the most prominent (Table 3). Symptoms and diseases that people use plants for therapeutic purposes are grouped into 12 categories. Each category is also divided into subcategories (Table 5).

5. Conclusion

Turkey has a rich flora in terms of medicinal and aromatic plants. Majority of these medicinal and aromatic plants are members of the Lamiaceae family. These taxa are used reliably in the treatment of various diseases, particularly gastro-intestinal and upperrespiratory tract infections, for their aromatic odor due to the active ingredients in their essential oils and antimicrobial effects. These taxa, particularly 29 medicinal plants with scientifically proven effectiveness in pharmacopoeia and monographs, which do not cause toxic effects as long as there is no overdose are highly reliable and should be taken into account in the production of domestic drugs and brought into the country's economy.

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