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Ethnobotanical use of *Stachys* L. (Lamiaceae) taxa in Turkey

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Abstract

The purpose of this study was to determine the ethnobotanical features of taxa belonging to the genus *Stachys* L. in Turkish Flora. Their vernacular names and local usages patterns have been determined. To determine the ethnobotanical uses of *Stachys* L. taxa; ethnobotanical studies made in Turkey have examined. Also, the field study carried out in different regions in Turkey. The ethnobotanical use of 38 *Stachys* L. taxa (29 species) has been identified in Turkey. The first 2 species that are used most: *S. lavandulifolia* and *S. cretica*. They are used 59 different of the vernacular names for *Stachys* L. taxa in Turkey, They are mostly known in Anatolia as "Dağ çayı". Also ''Bareş'', ''Çaye çe'', 'Rıhena tehtan' and ''Tokalı çay'' are among the names given. *Stachys* L. species are generally consumed as a herbal tea for medicinal in Turkey. Besides, they are used for as powder for animal disease, gargle for sore throat and handkerchief and hair accessories (both from leaves) for children. In terms of food as a spice, only the *S. mardinensis* species was observed. *Stachys* L. taxa have been revealed that they are being used in the treatment of about 40 different diseases and symptoms. Top diseases and symptoms treated with *Stachys* L. taxa: stomathic, cold, cough and diabetes. The most used parts of the plants are listed aerial parts and leaves.

Key words: Ethnobotany, folk medicine, herbal tea, Lamiaceae, medicinal plant, *Stachys* L.

1. Introduction

Etnobotany is defined simply as "the study of the relationships between plants and people". Documentation of the indigenous knowledge through ethnobotanical studies important for the conservation and utilization of biological resources (Muthu et al., 2006). Therefore, the establishment of the local names and indigenous uses of plants has significant potential societal benefits (Bağcı, 2000).

Several studies have been published recently on the ethnobotany of Turkey (Sezik et al., 1991; İlçim and Varol, 1996; Sezik et al., 1997; Özgen et al., 2004; Ezer and Avcı, 2004; Everest, and Öztürk, 2005; Elçi and Erik, 2006; Ezer and Arısan, 2006). Furthermore, Ertuğ (2000) and Baytop (1984, 1994) published intensive researches provided considerable information not only on medicinal plants but also on edible plants, fodder, fuel, dyes and gums. Many more detailed studies are necessary to obtain a comprehensive picture of plant-human interactions in Turkey.

Turkey is regarded as an important centre of biodiversity for the Lamiaceae. In Turkey, the family is represented by 603 species and a total of 782 taxa (346 endemics) (Celep and Dirmenci, 2017) The extracts and essential oils of some of the species from Lamiaceae family have been used as traditional medicine for some diseases, as a food source and food preservative for thousands of years. *Stachys* L. species are one of those species. The genus *Stachys* L., one of the largest genera of the Lamiaceae (Labiatae) family. *Stachys* L. is a taxonomically large and complex genus of Lamiaceae family. While it is a subcosmopolitan genus, it spreads in the Mediterranean and Southwest Asia, secondly in North and South America and North Africa, but not in Australia and New Zealand (Bhattacharjee, 1980). It is represented by approximately 370 species and 435 taxa in the world (Harley et al., 2004; Govaerts, 2003). In Turkey, there are 91 species and 118 taxa of the genus *Stachys* L. 57 of these taxa are endemic and the rate of endemism is 48% (Davis, 1982; Guner et al., 2000; Akçiçek et al., 2016). *Stachys* L. is a Greek word, meaning “ear of corn” or “spike” and refers to the arrangement of flowers on the stem (Kaya et al., 2001). They are consumed as herbal remedies in alternative medicine and wild tea (mountain tea) in Mediterranean regions. There are many chemical studies on the essential oils of *Stachys* L. taxa. The essential oil composition of the species is one of the main reasons for their consumption as tea in Anatolian ethnobotany (Altundag and Öztürk, 2011; Polat et al., 2012); however, the species also consist of glycosides, saponins, polyphenols, tannins, phenolic acids, flavonoids, and diterpenoids together with essential oils, mono and sesquiterpenoids. Therefore, the synergistic effects of the component chemicals could be the main reason of consumption of their flowers and aerial parts as a tea for medicinal purposes in Anatolian culture (Dönmez et al., 2012; Goren, 2014; Kaya et al., 2017,). Some members of the genus have been reported to be used as anti-inflammatory and antibacterial agents. Moreover, their antianxiety, antioxidant and antinephritic properties have also been reported (Hayashi et al., 1994; Takeda et al., 1996; Maleki et al., 2001; Goren et al., 2011a, b).

Several studies and ethnobotanical notes are available indicating the consumption of some *Stachys* L. taxa in Anatolian culture. But, a specific ethnobotanical study has not been found only on the *Stachys* L. genus. In this review, ethnobotanical properties of the *Stachys* L. genus which spread in different regions of Turkey and their consumption as food and herbal remedies will be discussed.

2. Material and Methods

To determine the ethnobotanical uses of taxa determined during the field studies; plants were shown to local people and their ethnobotanical uses were revealed (Figure 1). Ethnobotanical studies were carried out in 13 provinces (Adıyaman, Balıkesir, Bursa, Çanakkale, Denizli, İznik, Kahramanmaraş, Kütahya, Manisa, Mardin, Şanlıurfa, Tunceli, Van). A total of 98 informants, ages 20 and over were reached. In addition, herbal markets and bazaars were also visited. During the study, face-to-face interviews made with the informants were determined local names and usage of taxa. Also the ethnobotanical uses of *Stachys* L. taxa ethnobotanical studies (article and thesis) made in Turkey have examined. In addition, essential oil studies and biological activity studies on the *Stachys* L. have been scanned. In these studies, the ethnobotanical uses and local names of *Stachys* L. taxa were comprehensively recorded (Table 1). Turkish names of plants are given according to Güner et al. (2012). National Thesis Center database has been used for theses in the study.

Figure 1. Field studies on genus *Stachys* L.

3. Results and Discussion

The ethnobotanical use of 38 *Stachys* L. taxa (29 species) has been identified in Turkey (Table 2). The first 2 species that are used most: *S. lavandulifolia* Vahl and *S. cretica* L. (Figure 3).

Stachys L. taxa spreading different regions of Turkey is referred to by many different vernacular names (Table 1). They are used 59 different names for *Stachys* L. taxa in Turkey.

They are mostly known as “Dağ çayı” in Anatolia. In addition ‘Bareş’, ‘Çaye çe’, ‘Rıhena tehtan’ and ‘Tokalı çay’ are among the names given (Figure 5; Table 1). Other names, except for mountain tea (Dağ çayı), are not commonly used names. They are just similar names given to some taxa.

Stachys L. taxa have been revealed that they are used in the treatment of about 40 different diseases and symptoms. Top diseases treated with *Stachys* L. taxa: Stomathic, cold, cough and diabetes (Figure 7, Table 1).

According to ethnobotanical studies and the literature survey, *Stachys* L. species are used widely as herbal tea particularly in the region covering from East to West Anatolia (Figure 2).

It was observed that the province with the most usage records was Şanlıurfa, Balıkesir, Bilecik and Rize. In addition, Thrace (such as Edirne, Tekirdağ, Kırklareli), Eastern Anatolia (such as Iğdır, Ağrı, Kars) and Southeastern Anatolia (such as Siirt, Hakkâri, Şırnak) and the western parts of the Aegean (such as Muğla, Aydın, İzmir). It was observed that they were not used. However, *Stachys* L. species are found in Turkey's in almost every region. It may be thought that the reason for their lack of these uses is due to the limited number of ethnobotanical studies.

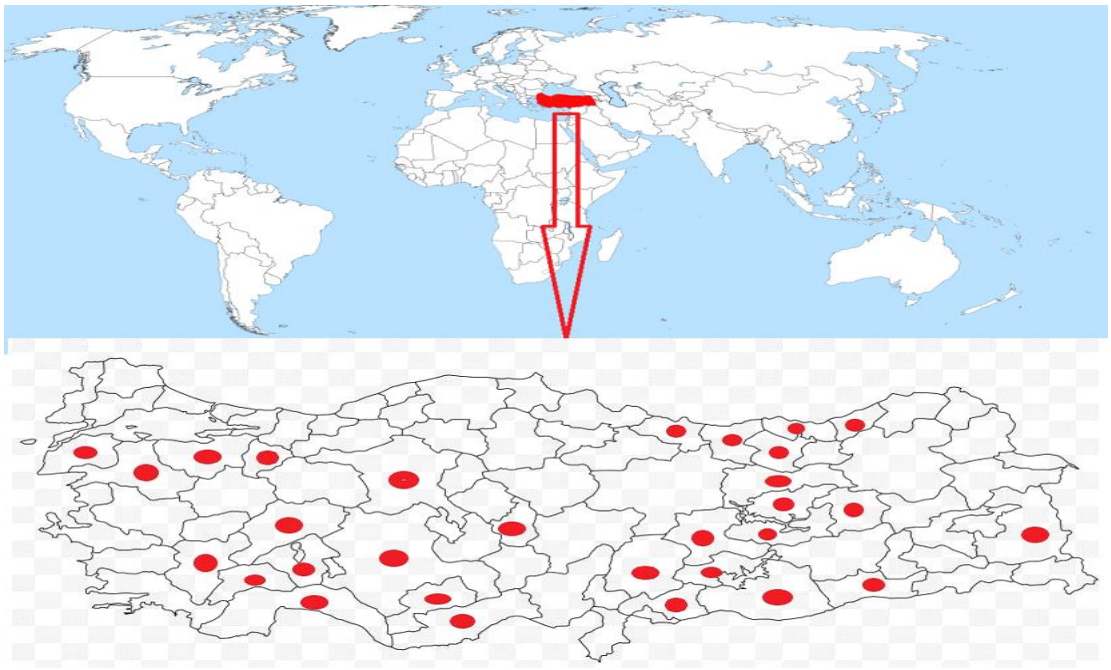

Figure 2. The map showing the provinces with ethnobotanical use of *Stachys* L. taxa in Turkey.

Figure 3. The most used species a) *S. lavandulifolia* b) *S. cretica* (Photo: Satıl F, Selvi S).

Stachys L. taxa are generally consumed as a herbal tea for medicinal in Turkey. In addition, in rare cases, in powder form in animal diseases (*S. balansae* var. *balansae* Boiss. & Kotschy, *S. kurdica* var. *kurdica* Boiss. & Hohen., *S. lavandulifolia* var. *lavandulifolia* Vahl) in the form of application to wounds (*S. cretica* subsp. *smyrnaea* Rech.f.), in the form of gargling in throat disorders (*S. lavandulifolia* var. *glabrescens* R.Bhattacharjee & Hub.-Mor.) has been observed in some places, such as handkerchief and hair accessories (*S. cretica* L., *S. byzantina* K.Koch) for children, as well as in some places such as aroma and spice (*S. mardinensis* (Post) R.R. Mill).

The most used parts of the plants are listed aerial parts (%52) and leaves (%20) (Figure 6, Table 1).

In our country, *S. cretica* is represented by 12 taxa. The *S. cretica* taxa used in our country are as follows: *S. cretica* subsp. *anatolica* Rech.f., *S. cretica* subsp. *garana* (Boiss.) Rech.f., *S. cretica* subsp. *lesbiaca* Rech.f., *S. cretica* subsp. *mersinaea* (Boiss.) Rech.f., *S. cretica* subsp. *mersinaea* (Boiss.) Rech.f., *S. cretica* subsp. *smyrnaea* Rech.f.

S. lavandulifolia is used in such as stimulant energizer antipyretic stomachic. Since *S. lavandulifolia* is used in many regions of Anatolia, it can be used for many purposes (Table 1).

Different subcategories of the same species can be used in different diseases. For example *S. cretica* subsp. *anatolica* Rech.f. is effective in rabies treatment for animals despite that *S. cretica* subsp. *garana* (Boiss.) Rech.f. for the treatment of Alzheimer disease.

Generally, infusion or decoction (as tea) form many of the species have been reported in the literature (Table 1).

The leaves and aerial parts of *S. mardinensis* are consumed against headache, diabetes treatment, cough, bronchitis and it is also aromatic for local food in Southeastern Anatolia. In terms of food as a spice, only the *S. mardinensis* species was observed.

S. iberica M.Bieb. is used for the treatment of wounds. In addition to tea, some of the *Stachys* L. taxa are used in some cases as a powder. This method of use is generally used in animal diseases (*S. balansae* var. *balansae*, *S. kurdica* var. *kurdica*, *S. lavandulifolia* var. *lavandulifolia*). The fresh aerial parts of these plants are dried and poured into powder. Then it is used to treat the inflamed wounds of for livestock. This method of use is specified by the same source person.

In addition, except medical purpose, some species provide use for children. In the literature, it was observed that only two of the *Stachys* L. species were used for the purpose of hair accessories and handkerchiefs (*S. cretica, S. byzantina*). Endemic *S. cretica* subsp. *smyrnaea* has been demonstrated that is used only in certain regions (Aegean). This herb is used for wounds and stomachic (Figure 4).

It has also been reported that there are side effects in the use of some taxa. These *S. lavandulifolia* var. *lavandulifolia* (Tea increases blood pressure) and *S. lavandulifolia* var. *glabrescens* (Increases blood pressure if consumed more*).* In addition, it was observed that *S. lavandulifolia* was named with different vernacular names. The vernacular name of the plant is 'Seyitrıza çayı' (Tunceli) and 'Reyyan' (Van) in the East Anatolian Region.

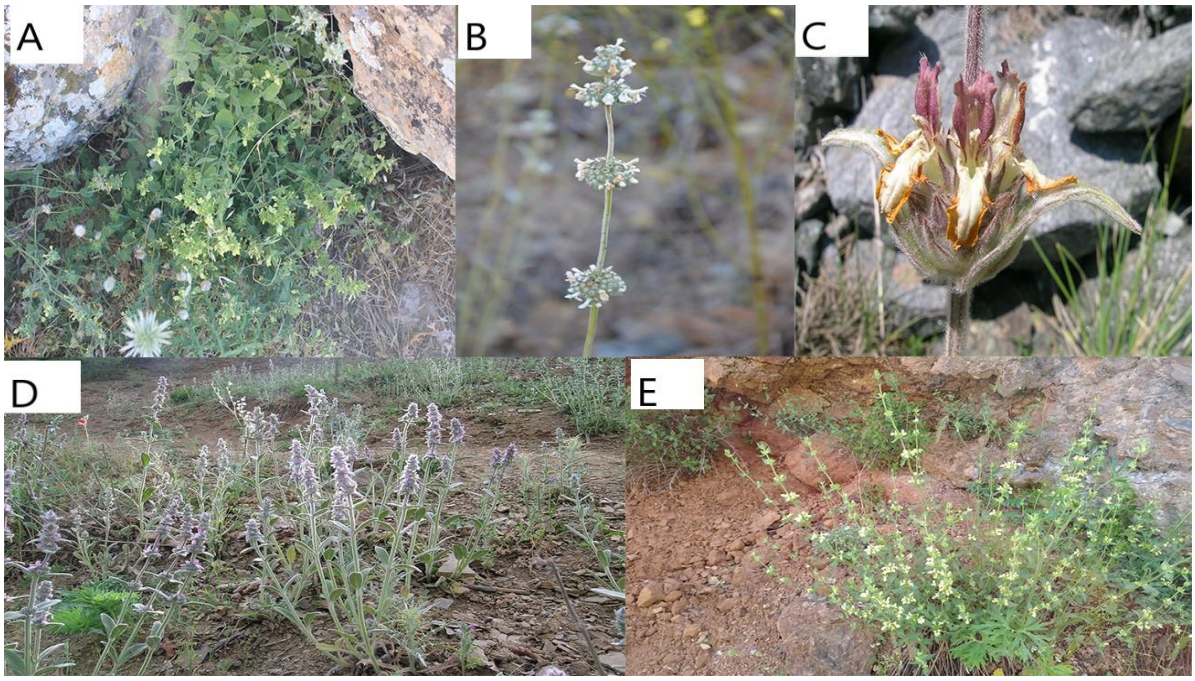

Figure 4. Some *Stachys* L. taxa with ethnobotanical use A) *S. mardinensis,* B) *S. tmolea, C*) *S. cretica* subsp. *smyrnea,* D) *S. byzantina,* E) *S. viscosa.*

Table 1. Ethnobotanical features based on the literature of *Stachys* L. taxa in Turkey.

Taxa	Turkish name	Vernacular name	Region /Province	Parts of use	Usage	Purpose of usage	References
S. aleurites Boiss. & Heldr.*	Köprülüçay	Tokalı çay	Western Mediterranean region (Burdur, Isparta, Antalya)	Aerial parts, inflorescence, leaves	Tea (infusion)	Cold and flu, stomach ache, anodyne, appetizing	Fakir et al., 2009
S. annua subsp. *annua* var. *annua* (L.) L.	Hacıosmanotu	Dağ çayı	Bilecik	Leaves and aerial parts	Tea	Insomnia, menstrual disorders	Koyuncu et al., 2010; Tuzlacı, 2011 (As cited in Ertuğ, 2014)
S. annua subsp. *annua* var. *lycaonica* R.Bhattacharjee		Dağ çayı, Hacıosman otu	East Anatolia, Bilecik, Nevşehir, Tunceli	Aerial parts	Tea (infusion and decoction/internal)	Insomnia, menstrual disorders colds, antipyretic, expectorant, rheumatism, lowering cholesterol, diabetes (lowering blood sugar)	Koyuncu et al., 2010; Altundag and Ozturk, 2011; Şenkardeş, 2014
S. arvensis (L.) L.	Tarlakarabaşı	Mayasıl otu	Rize	Aerial parts	Tea (Decoction/internal)	Hemorrhoids	Saraç et al., 2013
S. balansae var. *balansae* Boiss. & Kotschy*	Bozçayçe	Bareş	Van	Aerial parts	Powder	Animal disease (for livestock)	Mükemre, 2013
S. brantii Benth.*	Yitikçayçe	Original source is not specified. No usage details are given in the source.				Medicinal	Koyu, 2020
S. burgsdorffioides subsp. *ladanoides* Hand.-Mazz.*	Eğinkarabaşı	Eğin karabaşı	Şanlıurfa		Mix with thyme	Hemorrhoids	Şeker, 2018
S. byzantina K.Koch	Bozkarabaş	Eşek otu	Bilecik, Erzincan, Ordu, Balıkesir	Aerial parts, inflorescence, leaves	Tea, handkerchief (leaves), nectar for bees	Colds, forage	Koyuncu et al., 2010; Alpaslan, 2012; Badem, 2017
S. cretica L.	Deliçay	Dağ çayı, Şalba çayı, Pamuk prenses, Dut çiçeği	Balıkesir, Konya, Afyon, Mersin, Rize	Flowering branches, aerial parts, leaves	Tea (infusion), hair accessories, food (nectar)	Stomach ache, stimulant, dsypnea healing, anodyne, tonic, wound healing, food	Yeşilada et al., 1995; Işık et al., 1995; Metin, 2009; Polat and Satıl 2012; Baykal, 2015
S. cretica subsp. *anatolica* Rech.f.*	Yağlıkara	Çaya çe, Dağ çayı, Çay otu, Kestire, Ballık, Oğul otu, Boz çalba, Beyaz şabla, Karabaş otu	East Anatolia, Malatya, Konya, Bilecik, Denizli, Ankara, Balıkesir	Aerial part, leaves, inflorescence	Tea (infusion, decoction /internal), honey plant for bees	Colds and stomach ailments, forage, respiratory tract diseases, stomachic, anadoyne, rabies treatment (drink to animals)	Ertuğ et al., 2004; Yeşil, 2007; Vural, 2008; Yeşil & Akalın, 2009; Koyuncu et al., 2010; Ayandın, 2010; Keskin, 2011; Altundag and Ozturk, 2011; Özdemir, 2016
S. cretica subsp. *garana* (Boiss.) Rech.f.	Kabaçay	Kabaçay	Şanlıurfa		Tea	Alzheimer disease	Şeker, 2018
S. cretica subsp. *lesbiaca* Rech.f.	Şabıla	Deli ada çayı, Şabıla	Çanakkale, Denizli	Aerial parts	Tea (infusion internally)	Stomach ache, honey plant (for bees)	Ertuğ et al., 2004; Bulut, 2008
S. cretica subsp.	Boncukşalba	Çaya çe, Dağ	East Anatolia,	Aerial part	Tea (infusion and	Colds and stomach ailments,	Yeşil, 2007; Yeşil and

mersinaea (Boiss.) Rech.f.*		çayı,	Malatya		decoction internally)		Akalın, 2009; Altundag and Ozturk, 2011
S. cretica subsp. *smyrnaea* Rech.f.*	İzmirdeliçayı	Dağ çayı	Balıkesir, Denizli	Aerial parts root, leaves	Applied on wounds, infusion	Wounds, stomachic	Ertuğ et al., 2004; Güner, 2016; Polat, 2010
S. gaziantepensis M. Dinç and S. Doğu			Gaziantep		Tea	Cold	Kaya et al., 2017
S. iberica M.Bieb.	Tokdeliçay	Dağçayı	Afyon, Nevşehir	Leaves		Stomachic, stimulant, dsypnea healing (good for shortness of breath), anodyne, tonic and wound healing	Öztürk and Özçelik, 1991 (as cited in Ertuğ, 2014); Işık et al., 1995;
S. iberica subsp. *georgica* Rech.f.	Üçdeliçay	Dağ çayı	East Anatolia	Aerial parts	Tea (decoction/internal)	Colds, antipyretic	Altundag and Ozturk 2011
S. iberica subsp. *iberica* M.Bieb.	Tokdeliçay	Karaçekme	Şanlıurfa	Aerial parts	Tea		Balos and Akan 2007
S. iberica subsp. *iberica* var. *iberica* M.Bieb.	Tokdeliçay	Tok deliçay	Şanlıurfa		Tea	Alzheimer disease	Şeker, 2018
S. iberica subsp. *stenostachya* (Boiss.) Rech.f.	Benlideliçay	Benli çay, Dağ çayı	East Anatolia, Şanlıurfa	Aerial parts	Tea (decoction/internal)	Colds, antipyretic, stomach ache, alzheimer disease	Şeker, 2018; Altundag and Ozturk, 2011
S. kurdica var. *kurdica* Boiss. & Hohen.	Karadeliçay	Bareşa kulikzer	Van	Aerial parts, flowering branches	Powder, tea	Animal diseases (for livestock), cold and stomach ache	Mükemre, 2013
S. lavandulifolia Vahl	Tüylü çay	Dağ çayı, Çay otu, Tüylü çay, Bareş, Eşekotu, Tokalı çay, Adaçayı, Seyit Rıza çayı, Çay otu, Vasse çaye, Reyyan	East Anatolia, Konya, Kahramanmaraş, Adıyaman, Van, Antalya, Tunceli	Aerial parts, inflorescence, leaves	Tea (decoction, infusion/internal)	Stimulant, carminative, appetizer, stomachic, energizer, antipyretic, cough, food, stomachic, euphoria affect, forage for livestock (aerial parts)	Öztürk and Özçelik, 1991; Baytop, 1994;1999; Özhatay et al., 1997; Duran, 1998; Çömlekçioğlu and Karaman, 2008; Güldaş, 2009; Altundag andOzturk, 2011; Korkmaz and Demirkuş, 2019
S. lavandulifolia var. *lavandulifolia* Vahl	Tüylüçay	Çaye qwe, Çaye çiya, Deme çole, Deme bıri, Çayey wariy, Dağ çayı, Ada çayı, Dağ çayı, Tokalı çay, Tüylü çay, Bareş, Tavsan kuyruğu, Tüylü Kız	Bingöl, Elazığ, Tunceli, Mersin, Konya, Van, Karaman, Erzincan	Aerial parts, flowering branches, inflorescence	Tea (decoction, infusion internally), powder	Insomnia, colds, flu, sedative, food, antipyretic, headache, stomach ache, tonic, dsypnea healing (good for shortness of breath), sore throat, diabetes, urinary tract, bronchitis, stomach ailments and respiratory tract, animal diseases (for livestock), forage for livestock (aerial parts)	Yeşilada et al., 1993; Tekin, 2011; Polat et al., 2012; 2013; Mükemre, 2013 Alpaslan, 2012; Doğan, 2014; Bağcı et al., 2016; Olgun, 2019
S. lavandulifolia var.	Tüylüçay	Tüylü Adaçayı	Gümüşhane	Aerial parts,	Tea, gargle	Fatigue and weakness, cough, stomach	Karakurt, 2014

glabrescens R.Bhattacharjee & Hub.-Mor.						ache, natural antibiotic, flu infections, relaxing, to lower kidney stones, for body resistance, nerves soothing effect, sore throat, pharyngitis, bronchitis	
S. macrantha (K.Koch) Stearn	Kocasoğulcan	Karabaş, Koca Soğulcan, Dağ çayı	Rize, Trabzon	Aerial parts, inflorescence, flowering branches	Tea (infusion internally)	Relaxing stomach (mixed with honey), stimulant, anti-flatulent effect (carminative), appetizer and stomachic, anodyne	Uzun and Uzun, 2011; Saraç, 2013; Saraç et al., 2013
S. mardinensis (Post) R.R.Mill	Kayapungu	Kaya Pungu PungeTehta, Rıhana tehtan, Dağ çayı, Ot çayı, Yayla çayı, Çeya koyê, Çaya çiyan, Birîngiya, Giyapembik, Punga teğtan, Çaya çê, Mozik, Ğev, Çaya beyanî	Şanlıurfa, Mardin	Aerial parts leaves	Tea, aroma, as spices (for 'tarhana'- a local food)	Aromatic, headache and diabetes treatment cough, bronchitis disease	Korkut, 2006; Akan et al., 2008; Tuzlacı, 2011 (as cited in Ertuğ, 2014); Şeker, 2018; Kılıç, 2019
S. megalodonta subsp. *mardinensis* R.Bhattacharjee*	Gevrekdeliçay	Rıhana tehtan	Mardin		Dried leaves as raw	In diabetes	Kılıç, 2019
S. menthoides Kotschy & Boiss.*	Nanedelisi	Rıhana tehtan	Mardin		Dried leaves as raw	In diabetes	Kılıç, 2019
S. obliqua Waldst. & Kit.	Sarıçayçe	Dağ çayı	Balıkesir	Aerial parts, Flowering branches	Tea (infusion)	Colds, flu, cough treatment,	Polat, 2010; Polat and Satıl, 2012; Özdemir, 2016
S. palustris L.	Gölısırganı	Oğul otu	Bursa, Rize	Aerial parts	Powder of aerial parts of the plant	For the reproduction of bees	Aktan, 2011; Baykal et al., 2011
S. pumila Banks & Sol.	Sarıkarabaş	Sarı karabaş	Şanlıurfa		The dried plant is eaten	Stomach ache	Şeker, 2018
S. recta L.	Kara kurbağaotu	Dağçayı	Antalya	Inflorescence, leaves	Tea (infusion)	Stimulant, anti-flatulent effect (carminative), appetizer, stomach ache	Baytop, 1994; 1999; Özhatay et al., 1997
S. saturejoides Montbret & Aucher ex Benth.	Çarşakdelisi	Çarşak delisi	Şanlıurfa		Tea		Şeker, 2018
S. sericantha P.H.Davis*	Dikenliçay	Dikenli çay	Antalya	Aerial parts	Tea (infusion and decoction)	Cold, stomach ailments, fever and cough	Kaya et al., 2017
S. setifera subsp. *lycia* (Gand.) R.Bhattacharjee*	Zarifdeliçay	Zarif deliçay	Şanlıurfa		Tea		Şeker, 2018
S. sosnowskyi Kopell.*	Oltudeliçayı	Original source is not specified. No usage details are given in the source.				Medicinal	Koyu, 2020

S. spectabilis Choisy ex DC.	Alacakarabaş	Dağ çayı	Tunceli	Aerial parts	Tea (infusion)	Heart diseases	Doğan, 2014
S. sylvatica L.	Hamısırgan	Turunç, Ham sırgan	Giresun, Rize, Ankara	Aerial parts, leaves, flowering branches	Tea (infusion and decoction)	Cardiac disorder, cough	Simsek et al., 2004; Baykal et al., 2011; Polat et al., 2015
S. thirkei K.Koch	Kestere	Minare otu, Tavşanak otu	Balıkesir	Aerial parts	Tea (infusion internally)	Regulating blood pressure, colds, digestive and carminative , relaxing the nervous system	Özdemir, 2016; Güner, 2016; Koyu, 2020 (Original source is not specified)
S. tmolea Boiss.*	Sürmeliçayçe	Kestire	Bilecik, Balıkesir	Aerial parts	Tea	Colds	Koyuncu et al., 2010
S. viscosa Montbret & Aucher ex Benth. (Syn: *S. laetivirens*)**	Yağlıkarabaş	Ballıbaba, Adaçayı, Çay otu, Dağ çayı	Gümüşhane, Tunceli	Inflorescence, Aerial parts	Nectar plant (for bees), Tea (infusion)	Forage, colds, digestive	Karakurt, 2014

* endemic, ** endemic before synonym

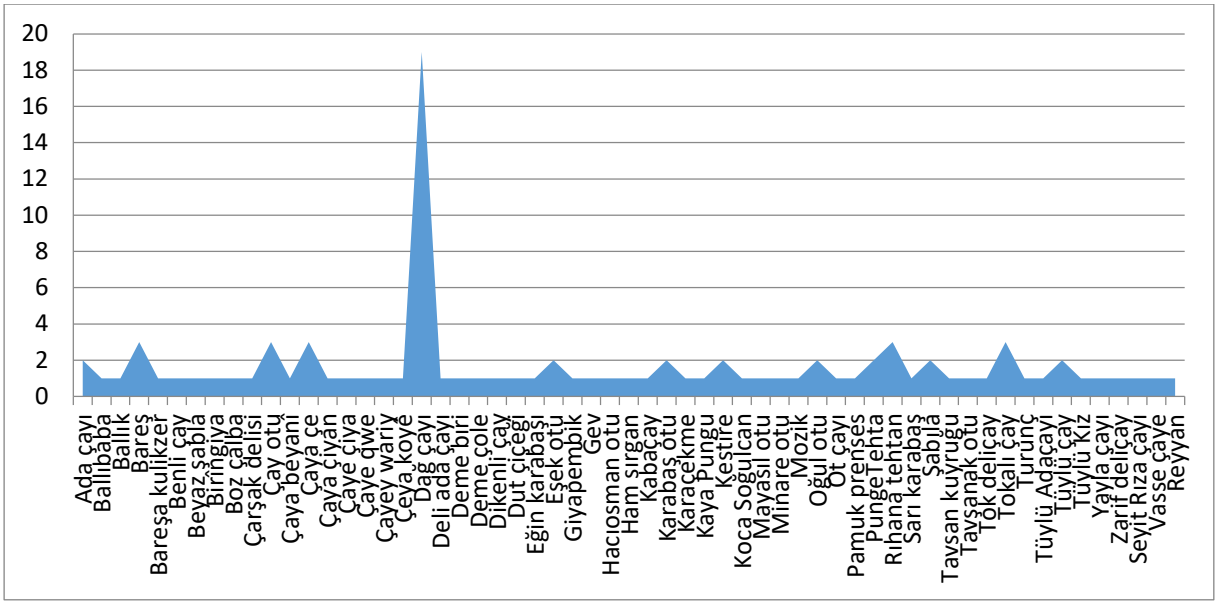

Figure 5. Vernacular names given to *Stachys* L. taxa (x axis: vernacular names, y axis: number of uses of names).

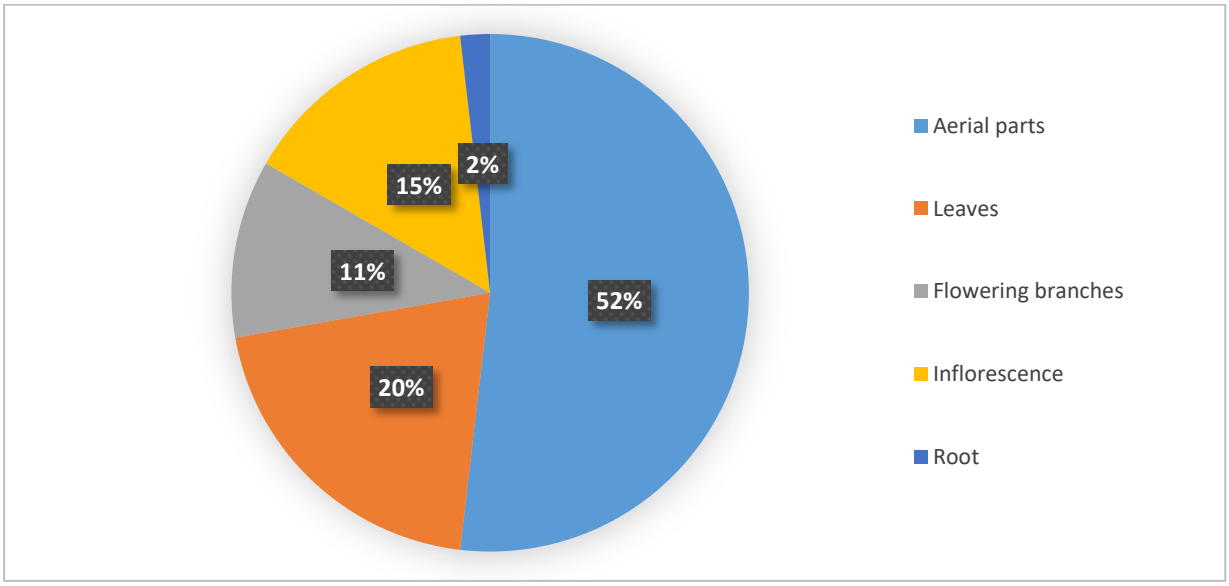

Figure 6. Parts of *Stachys L.* taxa used for ethnobotanical purposes.

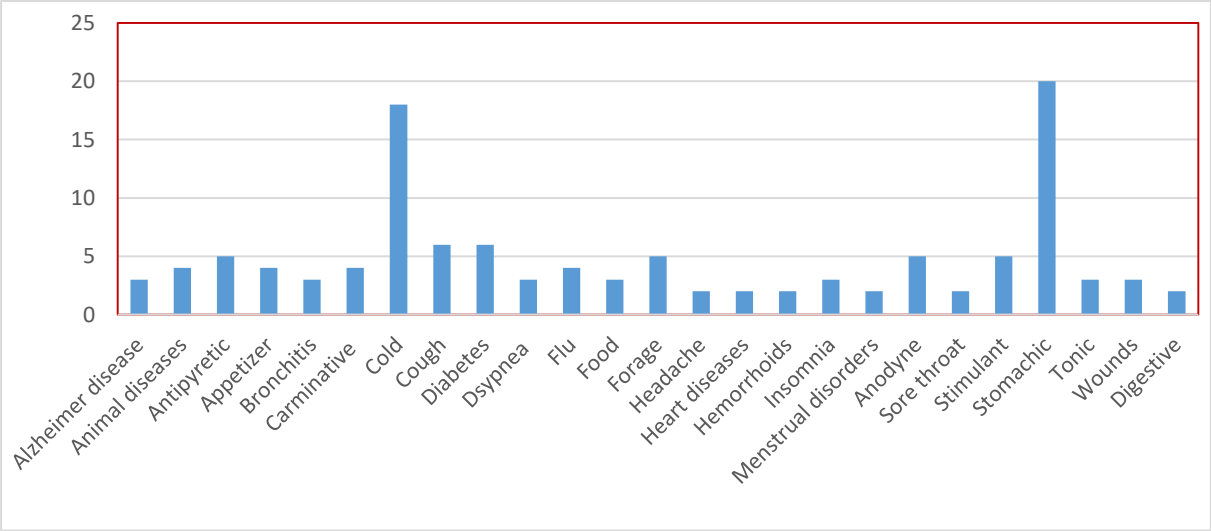

Figure 7. Purpose of use *Stachys* L. taxa according to ethnobotanical studies.

According to Goren (2014), many *Stachys* L. species are used in decoctions or infusions for the treatment of skin, stomach, ulcer, asthma, rheumatic disorders and vaginal tumours. However, in our study, the use of ulcers, asthma and vaginal tumours were not found.

The most common applications of *S. lavandulifolia* species are against fever, spasm, gastrodynia, dyspepsia, and flatulence. They also have sedative and anxiolytic effects (Goren, 2014). In our study, it was determined that many of these effects of this species are seen, as well as medical effects such as insomnia, euphoria effect, cough and other uses such as forage for livestock.

In Iran, the species *S. germanica* L. is a traditional medicine used in the treatment of painful menstruation and gastrodynia (Naghibi et al., 2005). However, although the mentioned species have spread in the Mediterranean region in our country, it has not been found any use among the people. In addition, *S. lavandulifolia* and *S. balansae* species are consumed as a tea in Azerbaijan (Goren, 2014). Although *S. lavandulifolia* is consumed as a tea in our country, *S. balansae* var. *balansae* has been used only in animal diseases in the form of powder. Its use in the form of tea has not been observed.
In the world, *Stachys officinalis* (L.) Trevis. anti-infective on the scalp and skin (Di Sanzo et al., 2013). Lans et al. (2006) stated that it is effective in colic treatment. However, no use has been encountered in our country.

Stachys L. species are used as herbal medicine and generally consumed as a tea in Anatolia and Iran. It has known that "Dağ çayı (mountain tea)", infusions and decoctions of *Stachys* L. taxa are applied as tonics and stomach diseases, also antibacterial and antifungal effect (Ozturk et al., 2009). Inhibition of pain and inflammatory processes (Khanavi et al., 2005), anxiolytic effect (Rabbani et al., 2003), antibacterial (Grujic-Jovanovic et al., 2004), antinephritic agent (Hayashi et al., 1994), anticancer

(Amirghofran et al., 2006), anti-helicobacter pylori (Stamatis et al., 2003), and antioxidant effects (Aydin et al., 2006) of explained in the literature. *S. recta* used as wound healing, another species, *S. lavandulifolia* is used for digestive disorders (Ozturk et al., 2009; Khanavi et al., 2009). However, although *S. lavandulifolia* has been used in digestive problems, it has not been found that *S. recta* is used for wound treatment.

Stachys palustris L. and *Stachys sylvatica* L. as the herb are used externally for the treatment of wounds and internally for abdominal pain, cramps, dizziness, fever, gout and menstrual disorders (in PDR for Herbal Medicines) (Gruenwald et al., 2000). However, in our study, such treatment was not observed in these species.

Besides, *Stachys floridana* Shuttlew. ex Benth., which is spread in China, is an important Chinese traditional plant for diabetics. In Anatolia, local people use plants to treat diabetes. Turkey was also seen in some of *Stachys* L. species is used in the treatment of diabetes (Cakilcioglu and Turkoglu, 2010; Xianfeng et al., 2013) (Table 1).

S. officinalis reported in Anthroposophic Pharmaceutical Codex (APC) (Jones et al., 2017). However, although *S. officinalis* has spread in our country, there is no record of use.

According to Haznagy-Radnai et al. (2008) *S. officinalis*, *S. recta*, *S. sylvatica*, and *S. palustris* are used as anti-inflammatory, anti-rheumatic, antibacterial drugs. In Hungarian folk medicine, these plants are also used as an antiphlogistic, spasmolytic, diuretic, sedative and for the treatment of tumour diseases. In addition, all of these species spread in our country. However, no use of *S. officinalis* species has been found. However, *S. recta* stimulant, anti-flatulent effect (carminative), appetizer, stomach ache; *S. sylvatica* cardiac disorder, cough and *S. palustris* are used for the purpose of the reproduction of bees, not medically. This shows that the same plants have revealed different usage patterns and purposes in different regions and cultures around the world.

Stachys L. taxa contain a wide variety of secondary metabolites. One of them is diterpenoids (Piozzi and Bruno, 2009). These diterpenoids have antibacterial, antifungal, antimycobacterial and anti-Alzheimer activities (Goren, 2014). In our study, it was seen that there are *Stachys* L. species which are used in Alzheimer. These taxa are *S. cretica* subsp. *garana*, *S. iberica* subsp. *iberica* var. *iberica*, *S. iberica* subsp. *stenostachya*.

In his study, Goren (2014) stated that *S. atherocalyx* K.Koch was used as an anti-inflammatory in Iranian folk medicine. Also in Turkey, he said that they also used antibacterial purposes. However, such an application and data were not found in our researches.

S. iberica subsp. *iberica* var. *iberica* and *S. cretica* subsp. *garana* used for alzheimer in Anatolia. According to Bahadori et al. (2019) another *S. cretica* subspecies, *S. cretica* subsp. *smyrnaea* was evaluated for its antioxidant activity, phenolics profile, and therapeutic potential. Results showed

that this plant contains amounts of significant phenolic acids and flavonoids. In addition, it was determined to be promising for anti-alzheimer, antidiabetic, antioxidant, and anti-tyrosinase potential. That study gives us *S. cretica* could be regarded as a new and rich source of bioactive ingredients for new formulations in cosmetics, functional foods, and pharmaceutical industries. This shows that the effects of herbs used in folk medicine in modern medicine are related.

Phytotherapy in animal diseases is applications from past to present. Therefore, such ethnoveterinary studies are important in the treatment and protection of animals. In the study, it has been seen that Stachys L. taxa have various uses for animals. The fresh aerial parts of the *S. kurdica* var. *kurdica* and *S. balansae* subsp. *balansae* are dried and pounded after drying and is used especially to treat the inflamed wounds of animals. In addition, *S. lavandulifolia* var. *lavandulifolia* is prepared in the same way and sprinkled on the wormy wounds of animals. Also, the infusion prepared from the aerial parts of *S. cretica* subsp. *anatolica* is drunk in rabies treatment for animals (internally).

Also, the aerial parts of *Stachys* L. taxa are generally used. However, it has been seen in the literature that only one study has root use. Its purpose is to use with the leaves for healing by rubbing them on the wounds (Güner, 2016).

4. Conclusion

The genus *Stachys* L. is represented by 118 taxa in our country. As a result of the researches, it is seen that approximately 1 in 3 of them have some kind of use (38 taxa, 13 of which are endemic).

The ethnobotanical use of genus is widely in the region covering from East to West Anatolia. However, no use has been identified in some regions of Turkey. According to ethnobotanical studies and the literature survey, *Stachys* L. species are generally consumed as herbal tea because of its volatile components (Such as Caryophyllene, germacrene D, α-pinene, linalool, β-pinene) and phenolic components.

The essential oil compositions of the *Stachys* L. genus have been well documented in the literature, but not for all the species have been described in detail.

Stachys L. taxa are used for most respiratory and stomach disorders in Turkey, as well as in diseases such as Alzheimer disease and diabetes were also found to be of use. With the idea that different people have similar uses of these species at different times and in different regions, we think that the examination of these herbal drugs will have a positive result for the treatment of related diseases.

At the same time, if *Stachys* L. taxa are not very popular like other known Lamiaceae plants (such as lavender, thyme, mint), There are many species of *Stachys* L. in Anatolia that are not yet known for any use. *Stachys* L. taxa would be more important in medicine by increasing their

ethnobotanical studies and investigating the use of these plants in medicine and traditional medicine. Consequently, the *Stachys* L. taxa; It is one of the important potential plants that can be benefited in the preventive healthcare (especially as herbal tea), pharmaceutical and cosmetic (due to essential oils).

Conflicts of Interests

Authors declare that there is no conflict of interests

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