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”, ‘Rihena 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: stomatich, 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

Ethnobotany 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 Avci, 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 (Labiateae) 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, Balikesir, Bursa, Çanakkale, Denizli, İzmir, 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’, ‘Rihena 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. smymaea* 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. lesbica* Rech.f., *S. cretica subsp. mersinema* (Boiss.) Rech.f., *S. cretica subsp. mersinema* (Boiss.) Rech.f., *S. cretica subsp. smymaea* 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. smyrnæa 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.* | Köprüliçay | 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. | Hacicosmanotu | 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; Şenkardes, 2014 |
| S. arvensis (L.) L. | Tarfaqarabaği | Mayasıl otu | Rize | Aerial parts | Tea (Decoction/internal) | Hemorrhoids | Saraç et al., 2013 |
| S. balansae var. balansae Boiss. & Kotschy* | Bozçayçe | Barez | Van | Aerial parts | Powder | Animal disease (for livestock) | Mü kemire, 2013 |
| S. burgsdorffioides subsp. ladanoides Hand.-Mazz.* | Eğinkarabaği | Eğik karabaği | Şanlıurfa | Mix with thyme | Hemorrhoids | Şeker, 2018 |
| S. byzantina K.Koch | Bozkaraş | Eğik otlu | 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 prenese, Düt çiçeği | Balikesir, Konya, Afyon, Mersin, Rize | Flowering branches, aerial parts, leaves | Tea (infusion), hair accessories, food (nectar) | Stomach ache, stimulant, dyspnea healing, anodyne, tonic, wound healing, food | Yeşilada et al., 1995; İşik et al., 1995; Metin, 2009; Polat and Satılı 2012; Baykal, 2015 |
| S. cretica subsp. anatolica Rech.f.* | Yağlıkara | Çaya ççe, Dağ çayı, Çay otlu, Kestire, Balilik, Oğul otlu, 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, anodyne, rabies treatment (drink to animals) | Ertuğ et al., 2004; Yeşiğ, 2007; Vural, 2008; Yeşiğ & Akalin, 2009; Koyuncu et al., 2010; Ayandin, 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. lebiasica Rech.f. | Şabila | Deli ada çayı, Şabila | Çanakkale, Denizli | Aerial parts | Tea (infusion internally) | Stomach ache, honey plant (for bees) | Ertuğ et al., 2004; Bulut, 2008 |
| S. cretica subsp. Boncukala | Çaya ççe, Dağ | East Anatolia, | Aerial part | Tea (infusion and | Colds and stomach ailments, | Yeşiğ, 2007; Yeşiğ and |
| Species | Common Names | Uses | Plant Parts | Preparation | Benefits |
|---------|--------------|------|-------------|-------------|----------|
| S. cretica subsp. smymaea | Çayı, Malatya | Aerial parts root, leaves | Decoction internally | Applied on wounds, infusion | Wounds, stomachic |
| S. gaziantepensis | Gaziantep | Tea | Aerial parts | | Cold |
| S. iberica subsp. georgica | Üçdeliçay, Dağ çayı | Aerial parts | Tea (decoction/internal) | | Colds, antipyretic |
| S. iberica subsp. iberica | Tokdeliçay, Tok deliçay | Aerial parts, leaves | Tea | | Alzheimer disease |
| S. iberica subsp. stenostachya | Benli çay, Dağ çayı | Aerial parts | Tea (decoction/internal) | | Colds, antipyretic, stomach ache, alzheimer disease |
| S. iberica var. kurdica | Karadeliçay, Bareşa kulikzer | Aerial parts, flowering branches | Powder, tea | | Animal diseases (for livestock), cold and stomach ache |
| S. lavandulifolia | Tüylü çay | Aerial parts, flowering branches | Tea (decoction, infusion/internal) | | Stimulant, carminative, appetizer, stomachic, energizer, antipyretic, cough, food, stomachic, euphoria affect, forage for livestock (aerial parts) |
| S. lavandulifolia var. lavandulifolia | Tüylüçay | Aerial parts, flowering branches, inflorescence | Tea (decoction, infusion internally), powder | | Insomnia, colds, flu, sedative, food, antipyretic, headache, stomach ache, tonic, dyspnea 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) |
| S. lavandulifolia var. | Tüylüçay | Aerial parts | Tea, gargle | | Fatigue and weakness, cough, stomach |

References:
- Akalin, 2009; Altundag and Ozturk, 2011
- Ertuğ et al., 2004; Güner, 2016; Polat, 2010
- Kaya et al., 2017
- Oztürk and Özçelik, 1991 (as cited in Ertuğ, 2014); İşık et al., 1995;
- Yeşilda et al., 1993; Tekin, 2011; Polat et al., 2012; 2013; Korkmaz and Demirkus, 2019
- Yeşilda et al., 1993; Tekin, 2011; Polat et al., 2012; 2013; Mükemre, 2013
- Alpaslan, 2012; Doğan, 2014; Bağcı et al., 2016; Olgun, 2019
- Altundag and Ozturk, 2011; Korkmaz and Demirkus, 2019
| Species                          | Origin                           | Part                        | Use                                      | Comments                                           |
|---------------------------------|----------------------------------|-----------------------------|------------------------------------------|---------------------------------------------------|
| *S. glabrescens* R.Bhattacharjee & Hub.-Mor. |                                  | Aerial parts, inflorescence, flowering branches | Tea (infusion internally)                    | Relaxing stomach (mixed with honey), stimulant, anti-flatulent effect (carminative), appetizer and stomachic, anodyne |
| *S. macrantha* (K.Koch) Steam   | Kocasogulcan                      | Rize, Trabzon               | Tea (infusion internally)                  | Relaxing stomach, relaxing, to lower kidney stones, for body resistance, nerves soothing effect, sore throat, pharyngitis, bronchitis |
| *S. mardinensis* (Post) R.R.Mill | Kayapungu                        | Şanlıurfa, Mardin           | Tea, aroma, as spices (for *'tarhana-* a local food) | Aromatic, headache and diabetes treatment cough, bronchitis disease |
| *S. mardinensis* subsp. mardinensis R.Bhattacharjee* | Gevrekdeliçay                   | Mardin                      | Dried leaves as raw                       | In diabetes                                         |
| *S. menthoideas* Kotschy & Boiss.* | Nanedelisi                       | Mardin                      | Dried leaves as raw                       | In diabetes                                         |
| *S. obliqua* Waldst. & Kt.      | Sarıçayçe                        | Balikesir                   | Aerial parts, flowering branches          | Colds, flu, cough treatment, For the reproduction of bees |
| *S. palustris* L.               | Gölisirganı                      | Bursa, Rize                 | Powder of aerial parts of the plant       | Polat, 2010; Polat and Satlı, 2012; Özdemir, 2016 |
| *S. pumila* Banks & Sol.        | Sankarabaş                       | Şanlıurfa                   | The dried plant is eaten                  | Stomach ache                                        |
| *S. recta* L.                   | Kara kurbagaotu                   | Antalya                     | Tea (infusion)                            | Stimulant, anti-flatulent effect (carminative), appetizer, stomach ache |
| *S. satureoides* Montbret & Aucher ex Benth. | Çarşakdelisi                    | Şanlıurfa                   | Tea                                       | Baytop, 1994; 1999; Özhabat et al., 1997          |
| *S. sanguis* P.H.Davis*         | Dikenliçay                       | Antalya                     | Tea (infusion and decoction)              | Cold, stomach ailments, fever and cough             |
| *S. sosnowskyi* Kopel.*          | Oltudeliçayı                     | Original source is not specified. No usage details are given in the source. | Medicinal                                  | Koyu, 2020                                          |
| Species                  | Common Names                                                                 | Part Used                          | Use                                      | Research References                      |
|--------------------------|------------------------------------------------------------------------------|-------------------------------------|------------------------------------------|------------------------------------------|
| S. spectabilis Choisy ex DC. | Alacakarabaş, Tunceli                                                        | Aerial parts                        | Tea (infusion), Heart diseases            | Doğan, 2014                              |
| S. sylvatica L.          | Hamısırgan, Turuş, Hamşrgan, Giresun, Rize, Ankara                           | Aerial parts, leaves, flowering branches | Tea (infusion and decoction), Heart diseases | Simsek et al., 2004; Baykal et al., 2011; Polat et al., 2015 |
| S. thirkei K.Koch        | Kestere, Minare otu, Tavşanak otu, Balikesir                                 | Aerial parts                        | Tea (infusion internally), Heart diseases | Ozdemir, 2016; Güner, 2016; Koyu, 2020 (Original source is not specified) |
| S. tmolea Boiss.*        | Sümeliçayçe, Kestire, Bilecik, Balikesir                                    | Aerial parts                        | Tea, Heart diseases                       | Koyuncu et al., 2010                     |
| S. viscosa Montbret & Aucher ex Benth. (Syn: S. laetivirens)** | Yağlıkarabaş, Ballıbaba, Adaçay, Çay otu, Dağ çayı, Gümüşhane, Tunceli       | Inflorescence, Aerial parts           | Nectar plant (for bees), Tea (infusion), Heart diseases | 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.
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, spasmyloytic, 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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