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**Plant diversity for sarma in Turkey: nature, garden and traditional cuisine in the modernity**

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1 **Plant diversity for *sarma* in Turkey: nature, garden and traditional cuisine in the**  
2 **modernity**

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10  
11 **Abstract**

12 The selection of leaves for *sarma* is the result of human experience and observation, and the  
13 transmission of traditional knowledge in areas with different species richness. Seventy-three  
14 taxa whose leaves are used to prepare *sarma* in Turkey are reported. The prevalent species are  
15 from *Rumex* (11), *Salvia* (5), *Beta* and *Malva*, (4), *Alcea*, *Arum*, *Brassica*, *Morus*, and  
16 *Plantago* (3). Wild herbaceous plants (69.5%) dominate. Trees (8) and shrubs (2) mostly  
17 belong to the Rosaceae, Moraceae, Betulaceae and Malvaceae. Grapevine and cabbage  
18 predominate, together with beet, dock, sorrel, horseradish, lime tree, bean, and spinach. The  
19 use of leaves of three endemics was recorded: *Centaurea haradjianii*, *Rumex gracilescens*,  
20 and *Rumex olympicus*. Some toxic plants are used after preliminary treatment, including those  
21 of *Arum*, *Convolvulus*, *Tussilago* and *Smilax* species. *Colocasia esculenta* is a novel *sarma*  
22 plant that has been involved to the cuisine in the last decade, following its introduction into  
23 Turkey.

24 **Key words:** Edible leaf; Ethnobotany; *Sarma*; Traditional knowledge; Turkey

25  
26 **Introduction**

27 Since ancient times, these plants have been variously used for food, as dyes, and for  
28 ornamental and medicinal purposes by people. During the last decade, this relationship  
29 between people and the plants in their environment, in an historical and socio-cultural  
30 context, has been the subject of many ethnobotanical studies in Turkey (Dogan et al., 2003;

1 Dogan et al., 2004; Simsek et al., 2004; Dogan et al., 2008; Ugulu et al., 2009; Nedelcheva et  
2 al., 2011; Dogan and Ugulu, 2013). A large number of these studies relate to the use of wild  
3 plants for food (Ertug, 2004; Dogan et al., 2004, Ozbucak et al., 2006; Kargioglu et al., 2010;  
4 Dogan, 2012), including wild edible plants sold on the open market (Dogan et al., 2013,  
5 Dogan and Nedelcheva, 2015).

6 These studies clearly show that widely used cultivated plants that are consumed as  
7 vegetables and fruits in Turkey include many wild plants, many of which have been used as  
8 salad and vegetable dishes in traditional recipes. An important component of the Turkish  
9 cuisine inherited from the Ottomans consists of *sarmas* and *dolmas*. *Dolma* consists of stuffed  
10 or dried fruit and root vegetables, whereas *sarma*, which means “wrapping” in Turkish,  
11 consists of rolling vegetable leaves around the ingredients. *Dolmas* and *sarmas* are prepared  
12 either with olive oil (with rice or bulgur stuffing with fresh or dried herbs and seasoning and  
13 often served hot with yogurt), or with meat (prepared with minced lamb and veal meat mixed  
14 with rice and seasoned with fresh or dried herbs). Additionally, a meatless, so-called pseudo-  
15 *dolma* (*yalanci dolma*) is prepared with rice, onion, currants and pine nuts (Basaran, 2009). In  
16 Turkish cuisine, the filling ingredients might include pine kernels (*Pinus pinea*), black corinth  
17 (*Vitis vinifera*), blackcurrants (*Ribes nigrum*), and even mastic (resin of *Pistacia lentiscus*); an  
18 old tradition in Turkey was also to add sour cherries to the filling.

19 *Sarma* represents an important part of Ottoman cuisine, in which the term *dolma* is  
20 occasionally used to mean *sarma*, especially for grapevine leaf-based *sarma*. However, it is  
21 correct to refer to *dolma* only as stuffed vegetables (pepper, eggplant, zucchini, tomato, onion,  
22 potato, artichoke, okra and celery). The most widely known among *dolmas* and *sarmas*  
23 worldwide is *sarma*, which is prepared with olive oil and grapevine leaves (*yaprak sarmasi*).  
24 However, grapevine-leaf *sarma* is known as “*dolma*” in many parts of the world (Basaran,

1 2009). *Sarma* represents one of the most widespread feasting dishes of Ottoman and Turkish  
2 cuisine (Dogan et al., 2015).

3 *Sarma* is used in everyday language and in a much broader sense, to refer to the form  
4 and method of preparation of thin wraps. *Tütün sarma* is a name of some tobacco wrapping  
5 products.

6 As a result of the increased interest in food ethnobotany, research has been conducted  
7 in Turkey and the Balkans (Bosnia, Bulgaria, Macedonia, Greece, Albania, in the Balkan  
8 areas of Croatia and Romania) concerning the traditional knowledge (TK) about plants that  
9 are used to prepare *sarma* (Dogan et al., 2015). This study reviews the species used (taxa),  
10 and focuses on the importance of plant leaves and folk botanical knowledge for their use in  
11 the past and today. Eighty-seven taxa were found to represent the Turkish and Balkan *sarma*  
12 plant heritage. Turkey retains approximately half of the entire *sarma* plant biodiversity  
13 recorded in the countries listed above, thus confirming the strong link between this culinary  
14 preparation and the Ottoman cuisine of the last four centuries. The results also demonstrate  
15 the extremely dynamic and changeable nature of folk ethnobotanical practices. The richness  
16 of species and preservation of TK today justify a closer survey of this ethnobotanical sample  
17 of species and its analysis according to plant biodiversity and the impact of factors resulting  
18 from modern society.

19 Thus, the purpose of this study was to update the list of leaf vegetable plants that are  
20 used to prepare the traditional dish *sarma* and to analyse the biodiversity of the species and  
21 their status in the Turkish flora.

22

## 23 **Materials and Methods**

## 1 **Study Site and Traditional Cuisine**

2 Turkey has the largest coastal area of all Mediterranean countries and due to its climate and  
3 geographical position, possesses an extraordinarily rich flora, with more than 10,000 taxa.  
4 One-third of the plant taxa of Turkey is endemic (Dogan, 2012).

5 Turkish cuisine is mostly based on Ottoman cuisine, which is influenced by Chinese,  
6 Iranian, Byzantine, Arab, European and Mediterranean cuisines. Although it contains many  
7 contributions, the Ottoman cuisine in essence comprises of Turkish eating habits (Fragner,  
8 1994; Savkay, 2000; Bilgin, 2014).

9 Even though vegetables entered the Turkish cuisine later on, the Ottoman cuisine was  
10 very rich in terms of vegetable dishes. Vegetables, which are important in the nourishment of  
11 the poor, were cheap in the capital during the season. Vegetables were consumed in  
12 abundance both by the public and the Palace. Among the vegetables purchased were spinach,  
13 cabbage, celery, beet, leek, chard, pursley, broad bean, pumpkin, carrot, cucumber, eggplant  
14 and vine leaves for sarma with meat. Chief among the Turkish cuisine inherited from the  
15 Ottomans are sarmas and dolmas (Yerasimos, 2002).

## 16 **Data Collection**

### 17 *Field Data Collection*

18 The study was conducted during ethnobotanical field studies Aegean region (Manisa),  
19 Western Anatolia (Izmir), Central Anatolia (Adana), Eastern Anatolia (Malatya) and South  
20 Anatolia (Antalya) regions and also via several ad hoc investigations by the authors between  
21 2011 and 2015. Informants were requested to mention all plants whose leaves were used as  
22 wrapping material for preparing homemade *sarma*. Informants showed fresh plants directly to  
23 the field, or parts of them, as well as dried or preserved in various ways leaves. Collected

1 herbarium specimen are stored in ethnobotanical vaucher collection of one of coauthors AN,  
2 Department of Botany, Sofia University, and filed study photos are added to the database of  
3 same collection. Ethical guidelines drafted by the American Anthropological Association  
4 (AAA, 2012) were followed in interviewing process and data documentation.

#### 5 *Literature Survey*

6 Data from the field studies were extended by, published ethnobotanical works for the study  
7 area and with the increased in recent years unpublished Master's and Ph.D. ethnobotanical  
8 theses, which are available online at Thesis Center, Council of Higher Education  
9 (<https://tez.yok.gov.tr/UlusalTezMerkezi/istatistikler.jsp>). They were summarized with  
10 folkloric references and gastronomic literature based on field investigations, papers published  
11 in international and national scholarly journals.

12 Taxonomic identification was conducted by the authors, and plant nomenclature  
13 followed the Flora Europaea (Tutin et al., 1964-1980), the Angiosperm Phylogeny Group III  
14 system (Stevens, 2012), and The Plant List database (TPL, 2013).

15

## 16 **Results and Discussion**

### 17 **Quantitative Results**

18 Seventy-three (73) plant taxa are recorded in this study. The detailed list of plants resulting  
19 from our observations and a review of the literature, is presented in Table 1. The plants  
20 belong to thirty-nine (39) genera and twenty-two (22) families, with a predominance of the  
21 Polygonaceae (16%), Asteraceae (12%), Malvaceae (11%), Amaranthaceae (8%), and  
22 Brassicaceae (7%) (Fig. 1). Only four plant genera are monocots: *Allium*, *Arum*, *Colocasia*

1 and *Smilax*. The largest number of taxa was recorded for the genera *Rumex* (11), *Salvia* (5),  
2 *Beta* and *Malva*, (4), *Alcea*, *Arum*, *Brassica*, *Morus* and *Plantago* (3). Among these taxa,  
3 herbaceous plants represented the majority of the recorded plants (63, 84.9%), whereas trees  
4 (8) and shrubs (2) were mostly from the Moraceae, Betulaceae, Rosaceae, Fabaceae and  
5 Malvaceae families and two species were represented by lianas (*Smilax* and *Vitis*). The list  
6 predominantly contained wild species, (51), followed by cultivated (20) and semi-  
7 domesticated species (2). Among the recorded species, only *Smilax excelsa*, a climbing plant,  
8 is an evergreen.

### 9 **Plant Diversity of *Sarma***

10 Fourteen species were found to be used for vegetable leaves for *sarma* in the Balkans, but not  
11 in Turkey. Some of these species are used in mountainous rural areas and early spring plants,  
12 such as *Primula veris* (Albania), *Allium ursinum* (Bulgaria) and some shrubs of *Rubus* and  
13 *Ribes* species (Bosnia and Herzegovina, Romania). Others are alternative cultivated plants,  
14 such as *Atriplex hortensis*, *A. rosea*, *Vicia faba*, *Brassica oleracea* var. *gongylodes* (Bulgaria),  
15 *Vitis labrusca* and *Solanum tuberosum* (Albania), and other species are native to marshes,  
16 fens, ditches and wet woodland, such as *Caltha palustris* (Romania). In Turkey, wild edible  
17 greens are predominatnly used, where leaves from cultivated plants tend to be used in other  
18 Balkan regions. Invasive and newly introduced species are little used in modern culinary  
19 *sarma* practices, although in Turkey, *Colocasia esculenta* is used, which is not used in other  
20 Balkan countries, and *Reynoutria japonica* is used in Romania (Dogan et al., 2015).

21 The use of the leaves of three endemic species was recorded: *Centaurea haradjianii*  
22 (South Anatolia), *Rumex gracilescens* (Central Anatolia), and *R. olympicus* (Northwestern  
23 Anatolia). These species are very variable in leaf morphology, and by this way were similar in

1 leaf morphology to another species of the same genus, which have been used traditionally.  
2 The use of these species is relatively rare, especially together with common wide used  
3 species. They are present as well-developed populations and their use as a food plant does not  
4 endanger their status. Taxonomic problems exist for *R. gracilescens* and *R. olympicus*,  
5 concerning their naming, according to The Plant List. These endemic species are included in  
6 the lists of rare and endangered species in The Red Data Book of Turkish Plants (Ekim et al.,  
7 2000): *C. haradjianii* (VU, vulnerable), *R. gracilescens* (LR/nt, lower risk, near threatened),  
8 and *R. olympicus* (DD, data deficient). According to our data on anthropogenic threats and to  
9 evaluate their importance to the former two species, protection measures might be necessary.  
10 No other recorded species in this study had the status of a Rare and protected species.

11         Among the cited plants, grapevine (fresh or in brine) and cabbage represent widely  
12 used species, together with beet, dock, sorrel, horseradish, lime tree, bean, and spinach (Fig.  
13 2). Most of the documented wild and cultivated plants are well known as edible plants, which  
14 are also used for preparing salad, soup or main meals and pies in local cuisines in the study  
15 area.

16         *Sarma* made from leek is part of the traditional cuisine only in some areas of Turkey,  
17 such as Western Anatolia. In contrast to other types of *sarma*, those prepared from leek  
18 (*Allium ampeloprasum*) are triangular in shape (Fig. 2). The common types of *sarma* in  
19 Turkey are mostly long and cigar-shaped. In addition to triangular leek *sarma*, rolled leek  
20 leaves can also be used to prepare leek *dolma* (Durlu-Ozkaya and Kizilkaya, 2009).

21         Ten of all the established plants are sold as edible greens on the open market: cabbage,  
22 grapevine, lime, beet, sorrel, common mallow, nettles, leeks and lettuce (Dogan et al., 2013;  
23 Dogan and Nedelcheva, 2015). Grapevine leaves (fresh or in brine are sold especially for



1 *sarma* preparation and they are grouped for easy sale and use and to preserve the shape and  
2 size of the leaf blade (Fig. 2). The plants used for *sarma* in open markets are mostly cultivated  
3 species. The majority of the wild edible greens were collected individually and are used  
4 locally in different regions.

5 The leaves of some of the recorded species are also used as medicinal plants for home  
6 remedies, mostly herbal teas. These species form more than 20% of the listed taxa and belong  
7 to the genera *Salvia*, *Tussilago*, *Urtica*, *Plantago*, *Primula*, *Rumex* and *Symphytum*.

#### 8 **Traditions vs modernity when choosing plants for *sarma* leaves**

9 *Colocasia esculenta* (taro, elephant ear or cocoyam) is a new root crop of the southern  
10 provinces of Turkey for its edible corms (the root vegetables). Taro is also used as an  
11 ornamental plant. *Colocasia esculenta* is a novel *sarma* plant, which has been introduced into  
12 the cuisine within the last decade, following its introduction into Turkey (Sen et al., 2001;  
13 Matthews, 2006). Fresh taro leaves are poisonous (attributed to the presence of a specific  
14 enzyme (protease) that is bound to crystals of calcium oxalate, in the form of sharp, needle-  
15 like raphides) and this toxicity is minimised by cooking or soaking for several hours before  
16 the leaves can be safely consumed. Taro leaves contain high amounts of Vitamin A and C and  
17 are a better source of protein than the plant's roots. The leaves have a large, heart-shaped  
18 blade, with a tender-firm and succulent texture. One of the problems in the use of taro leaves  
19 is their acidity; however, cultivars with a very low acidity are grown in Turkey, and thus, no  
20 special cooking techniques are required to reduce the acidity. In many recipes, the leaves are  
21 rolled tightly, tied in a knot, and then simmered in coconut, red chili, tamarind, coriander and  
22 garlic. In the Philippines, the petioles and blades of young leaves are commonly used to  
23 prepare pinangat (a leaf packet), or fresh young blades are wrapped and tied around fish or

1 shrimp paste, and are then cooked in coconut milk (Matthews et al., 2012). These leaf  
2 characteristics, probably together with the rapid exchange of information has led to the  
3 incorporation of this new plant into traditional Ottoman cuisine. This extends the knowledge  
4 of the use of taro leaves, since the use of the leaves was not previously recorded in the Eastern  
5 Mediterranean (Ramanatha et al., 2010; Matthews et al., 2012).

6 Modern science and the requirements for Food Safety questions the use of some plants  
7 for food. Recently, plants that contain pyrrolizidine alkaloids (PAs) have been brought into  
8 question. These are represented in this study by members of the Asteraceae, Boraginaceae and  
9 some Fabaceae. Data suggest that ingestion of PAs from tea and a dish of  
10 butterbur (*Petasites*) and coltsfoot (*Tussilago farfara*) according to a traditional recipe can  
11 lead to serious hepatic dysfunction and at a high dose, PAs can lead to fatal liver failure  
12 (EFSA, 2011). This poses challenges to the traditional use of these plants in consumables and  
13 requires more detailed information about their potential harm to be made available and an  
14 increase in the regulation of wild products on the market (Nedelcheva et al., 2015).

15 Some species are rich within the urban flora, including *Tilia* spp., *Morus* spp., *Cercis*  
16 *siliquastrum*, *Vitis* spp., *Pelargonium quercetorum* and *Colocasia esculenta*. Plants are  
17 perceived as sources of multivalent resources and represent a national way of thinking in  
18 terms of their use. On the other hand, the preservation and development of TK involves new  
19 considerations. Urban and industrial environments contain plants that grow in polluted air and  
20 soil, therefore, the collection of leaves from these environments is not safe, which is a problem  
21 that relates to both wild ruderal and weed species.

22 The collection, marketing and use of some plants today highlight issues related to the  
23 response of natural habitats to human activity. Some species occur in disturbed areas, such as

1 roadsides and pastures, but also in degraded forests. Because plants are widely distributed and  
2 grow in areas that are open to anthropogenic agents due to their ruderal nature, this poses a  
3 risk in terms of consumption. Considering that plants are widely used by local inhabitants as a  
4 fresh and dried food source and as medicine, the importance of washing the plant before use  
5 is clear. The study of the heavy metal content of *Malva sylvestris* sold as an edible green in  
6 the local markets of Izmir (Turkey) showed that these plants were mostly collected from low-  
7 risk areas (Unver et al., 2015); however, there remains a need for strict control and the current  
8 anthropogenic influences establish new rules for the use of traditionally used plants.

9 In some cases, toxic plants are used following the preliminary treatment of the  
10 leaves, including *Arum*, *Convolvulus*, *Tussilago* and *Smilax* species. The TK concerning their  
11 toxicity is reflected in detailed descriptions for their pre-treatment and methods of cooking  
12 (Dogan et al., 2015).

13 According to Table 1, the greatest diversity of *sarma* types are consumed in Western  
14 Anatolia (in Izmir and its surroundings, e.g., leaves of *Allium ampeloprasum*, *Beta vulgaris*,  
15 *Lactuca sativa*, *Morus rubra*, *Phaseolus vulgaris*, *Rumex obtusifolius*, and *Spinacia oleracea*)  
16 and in Eastern Anatolia, especially in Malatya and its surroundings (e.g., leaves of *B.*  
17 *vulgaris*, *Cydonia oblonga*, *L. sativa*, *P. vulgaris*, and *Prunus avium*).

#### 18 **Plant use categories**

19 Notably, the rhizomes, flowering branches, petioles and leaves of *Trachystemon orientalis*,  
20 which is mostly distributed throughout Northern Anatolia, are very commonly consumed as  
21 vegetables in different parts of the Black Sea region. The stems and rhizomes are fried or  
22 boiled in water with onions and eggs and the roots and the petioles are used for making  
23 pickles. In addition, its *sarma* is widely consumed by the local people (Ergen Akcin et al.,

1 2004; Dogan et al., 2015; Koca et al., 2015). In areas where it is naturally distributed, it is  
2 known under various names, including acı hodan, balıkotu, burğu, çiçeklimancar, doğu  
3 hodanı, galdirek, hodan, ıspıt, kaldırık, kaldırayak, kaldırak, kaldirek, kaldirik, somara,  
4 tomara, tomari and zılbit. However, *Borago officinalis* L. of the Boraginaceae family is also  
5 called “hodan”. Because of this similarity, the name of this plant is mentioned as a *sarma*  
6 plant on the internet. Another possible reason may be that in various unscientific sources  
7 (including internet web sites), *Trachystemon orientalis* (L.) G. Don. could be mistaken for its  
8 synonym *Borago orientalis* L. and mentioned as *Borago officinalis* L. (as accepted in the  
9 Flora Europaea). Although there are no reports of this plant being used for *sarma* in Turkey,  
10 there are many reports for the use of *T. orientalis* (Baytop, 1984; Simsek et al., 2002; Ergen  
11 Akcin et al., 2004; Kocyigit, 2005; Dogru Koca and Yildirimli, 2010; Dogan et al., 2015;  
12 Koca et al., 2015).

13 The horse chestnut, *Aesculus hippocastanum* L., is an ornamental tree species that is  
14 naturally distributed throughout the Balkans and is commonly planted in parks, gardens and  
15 roadsides, because of its beautiful flowers and foliage. On many websites related to this tree,  
16 its use as leaf *sarma* during Ottoman times is described, as well as its current use; however,  
17 no cook books or scientific reports confirm this.

### 18 ***Sarma and Dolma***

19 Only two plants from Turkey are used for preparing both *sarma* and *dolma*: leek and  
20 artichoke (*Cynara scolymus* L.). Artichoke *dolma* is very famous in Turkey, as opposed to  
21 artichoke *sarma*, which is mostly unknown. This *sarma* is typical mostly for the area of Izmir.

22 In addition to the leaf *sarmas* mentioned above, *dolmas* made with zucchini  
23 blossoms are commonly consumed in the Aegean region. Cretan migrants settled in this

1 region and zucchini blossom is sold in open markets of Izmir (Fig. 2). Similar to in regular  
2 *sarma*, these *dolmas* are also stuffed with cheese (Berik and Varlik, 2009; Hancerli, 2011;  
3 Altay and Karakan, 2012; Karaca et al., 2015). Due to the delicacy of the flowers, the  
4 preparation of zucchini blossom *dolmas* is comparatively more demanding.

5 *Melon dolma* occupied an important place in the Ottoman palace kitchen during the  
6 fifteenth and sixteenth centuries, although it is no longer a common meal in Turkish cuisine.  
7 Apple and quince *dolmas* are examples of fruit *dolmas* that exist.

8 Regional variations exist in the preparation of stuffing for *sarmas* and *dolmas* in  
9 Turkish cuisine. The most striking example is *Tokat sarma*, whose stuffing is prepared with  
10 dry broad (fava) beans (Akin and Lambraki, 2003).

11 Despite the importance of the plants that are used to prepare traditional *sarma*, only  
12 three species exist whose names reflect their use: *Arum dioscoridis* (*sarmalık*, *yılan bıçağı*,  
13 *yılan ekmeği*, *yılan pancarı*), *Onopordum illyricum* (*deli kenger*, *dolma kenkeri*, *eşek diken*)  
14 and *Salvia forskahlei* (*şalba*, *dolma yaprağı*, *müsellim*). These are not the plants that are most  
15 frequently used plants today, but each of them has more than one folk name.

16

## 17 **Conclusions**

18 Turkey hosts the greatest species diversity of edible greens that are used for *sarma* and this  
19 diversity represents the diversity found in the region and in the Balkans. The traditional  
20 botanical folk knowledge for preparing *sarma* is well preserved, although contemporary  
21 processes of information exchange and the movement of people impact on traditional  
22 practices and the introduction of new plant products. Knowledge of these processes and trends

1 is essential for the sustainable use and conservation of biodiversity and the control and use of  
2 safe foods and herbal products.

3

#### 4 **Authors' Contributions**

5 All authors YD, AN and AP contributed equally to this work.

6

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### **Figure Legends and Table Captions**

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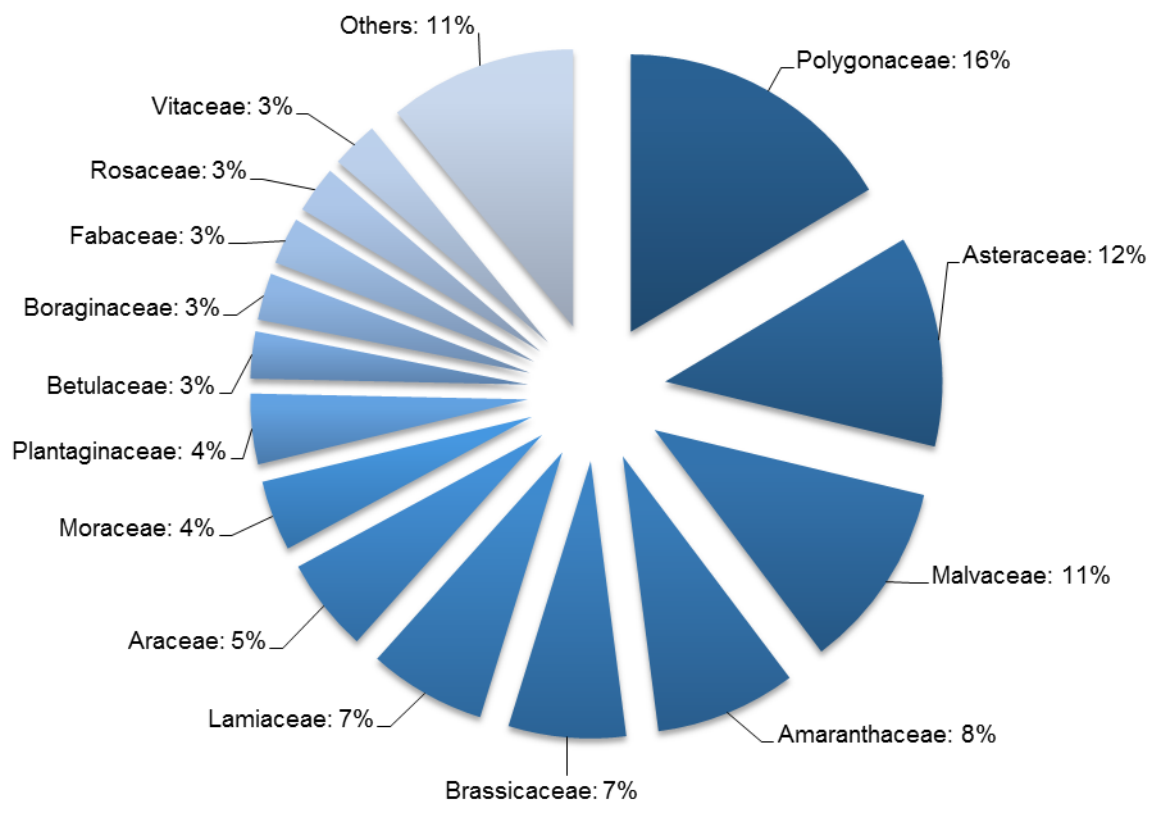
5 Fig. 1. Systematic structure of plant families used.

6 Fig. 2. Some *sarma* samples; leaves and flowers for *sarma* in an open market in Turkey. A:  
7 cabbage, B: leek, C: collards, D: grapevine, E: beat leaves, F: zucchini flowers, G: fresh  
8 grapevine leaves H: grapevine leaves in brine.

9 Table 1. Plants whose leaves are used for preparing *sarma* in Turkey.

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Fig. 1. Systematic structure of plant families used.



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Fig. 2. Some *sarma* samples; leaves and flowers for *sarma* in an open market in Turkey. A: cabbage, B: leek, C: collards, D: grapevine, E: beat leaves, F: zucchini flowers, G: fresh grapevine leaves H: grapevine leaves in brine.

1 Table 1: Plants, whose leaves are used for preparing *sarma* in Turkey

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Taxon	Family	English name	Local name(s)	Status	Area(s) of use	Source(s)
<i>Alcea flavovirens</i> (Boiss. & Buhse.) Iljin	Malvaceae	Yellow-Green Hollyhock	hero, hiro	W	East Anatolia	Kaval, 2011
<i>Alcea hohenackeri</i> (Boiss. & Huet.) Boiss.	Malvaceae	Hohenacker's Hollyhock	fatma gülü, gül hatmi, hero, hiro	W	East Anatolia	Arik, 2003
<i>Alcea kurdica</i> (Schlecht) Alef	Malvaceae	Kurdish Hollyhock	hero, heru	W	East Anatolia	Kaval, 2011; Mükemre, 2013
<i>Allium ampeloprasum</i> L.	Amaryllidaceae	Leek	pırasa	C	Izmir	Baytop 1999; PO
<i>Amaranthus viridis</i> L.	Amaranthaceae	Green Amaranth	delisirken, hoşguran, kızılca mancar, semlik	W	Şırnak	Gençay, 2007
<i>Arctium minus</i> (Hill) Bernh.	Asteraceae	Lesser Burdock	devetabanı, dulavratotu, galabah, kabalak	W	Erzurum	Baytop, 2007; Tuzlacı, 2011
<i>Arctium platylepis</i> (Boiss. & Bal.) Sosn. ex Grossh.	Asteraceae	Halemhört	baldikeni, devetabanı, garahort	W	Igdir	Tuzlacı, 2011
<i>Arum dioscoridis</i> Sm.	Araceae	Spotted Arum	sarmalık, yılan bıçağı, yılan ekmeği, yılan pancarı	W	South & South-Eastern Anatolia	Baytop, 2007; Güneş, 2010; Tuzlacı, 2011
<i>Arum maculatum</i> L.	Araceae	Snakeshead	yılan ekmeği, yılan yastığı	W	West & Central Anatolia	Dogan et al., 2004
<i>Arum rupicola</i> Boiss.	Araceae		yılan bıçağı, yılan yastığı	W	South Anatolia	Güneş, 2010
<i>Beta trigyna</i> Waldst. & Kit.	Amaranthaceae		mancar, süt mancar, efelek	C	Ankara	Simsek et al., 2004; Tuzlacı, 2011
<i>Beta vulgaris</i> L. ssp. <i>vulgaris</i> convar. <i>cicla</i>	Amaranthaceae	Beet/Chard	pazı	C	Duzce, Tokat, Malatya	Simsek et al., 2002; PO
<i>Beta vulgaris</i> L. ssp. <i>vulgaris</i> convar. <i>vulgaris</i> var. <i>Altissima</i> AMN 34/25	Amaranthaceae	Sugar Beet	şekerpancarı	C	Afyon	PO
<i>Beta vulgaris</i> L. ssp. <i>vulgaris</i> convar. <i>vulgaris</i> var. <i>Vulgari</i> AMN 34/27s	Amaranthaceae	Beetroot	pancar	C	Izmir, Malatya	PO
<i>Brassica oleracea</i> Acephala group Kale	Brassicaceae	Collards	kara lahana	C	Black Sea & Marmara Regions	Kızıllarslan, 2008; Doğru Koca and Yıldırımli, 2010; Kızıllarslan and Özhatay, 2012
<i>Brassica oleracea</i> Capitata Group	Brassicaceae	Cabbage	lahana	C	All over the country	PO
<i>Brassica rapa</i> L. var. <i>rapa</i>	Brassicaceae	Turnip	kırmızı çükündür	C	Duzce	Doğru Koca and Yıldırımli, 2010
<i>Campanula sclerotricha</i> Boiss.	Campanulaceae	Bellflower	büyük köklü, çançiçeği, nermedenk	W	Hakkari	Kaval, 2011
<i>Centaurea haradjianii</i> Wagenitz*	Asteraceae		kaputkulak	W	South Anatolia	Mart, 2006
<i>Cercis siliquastrum</i> L.	Fabaceae	Judas Tree	erguvan, boynuz, yemişen	W/C	Diverse areas of Turkey	Tuzlacı, 2011
<i>Cirsium arvense</i> (L.) Scop.	Asteraceae	Creeping Thistle	köygöçüren, köygöçerten	W	West & Central Anatolia	Dogan et al., 2004
<i>Colocasia esculenta</i> (L.) Schott AMN 34/14	Araceae	Taro	göleğez	C	Adana, Antalya	PO
<i>Convolvulus stachydifolius</i> Choisy	Convolvulaceae		sermaşık, sarmaşık	W	Sirnak	Gençay, 2007
<i>Corylus avellana</i> L.	Betulaceae	Hazelnut	findık	C	Duzce, Malatya	Doğru Koca and

AMN 34/22						Yıldırım, 2010; PO
<i>Corylus maxima</i> Mill. AMN 34/21	Betulaceae	Filbert	findık	C	Duzce, Malatya	Doğru Koca and Yıldırım, 2010; PO
<i>Cydonia oblonga</i> Mill.	Rosaceae	Quince	ayva	C	Malatya	PO
<i>Heracleum trachyloma</i> Fisch. & C.A. Mey.	Apiaceae	Downy cow-parsnip	baldırgan	W	Iğdir	Tuzlacı, 2011
<i>Lactuca sativa</i> L. AMN 34/33	Asteraceae	Lettuce	marul	C	West Anatolia, Malatya	PO
<i>Malva neglecta</i> Wallr.	Malvaceae	Dwarf Mallow	ebegümeçi, ebengümeç, ebemövmeci,	W	All over the country	Mükemre, 2013; PO
<i>Malva nicaeensis</i> All.	Malvaceae	French Mallow	develik, ebegümeçi	W	Canakkale, Mugla	Emre Bulut, 2008; Tuzlacı, 2011
<i>Malva parviflora</i> L.	Malvaceae	Cheeseweed Mallow	ebegümeçi, ilmik, kabalık	W	Mugla	Tuzlacı, 2011
<i>Malva sylvestris</i> L.	Malvaceae	Mallow	ebegümeçi, develik, gömeç	W	West Anatolia	Dogan et al., 2004; Emre Bulut, 2008; Tuzlacı, 2011
<i>Morus alba</i> L.	Moraceae	White Mulberry	akdut, dut, tuye	C	All over the country	Dogan et al., 2004; Tuzlacı, 2011; Alpaslan, 2012
<i>Morus nigra</i> L.	Moraceae	Black Mulberry	dut, karadut, tuye	C	All over the country	Dogan et al. 2004; Alpaslan, 2012
<i>Morus rubra</i> L.	Moraceae	Red Mulberry	mordut, kırmızı dut	C	West & Central Anatolia	Dogan et al., 2004
<i>Onopordum illyricum</i> L.	Asteraceae	Illyrian Thistle	deli kenger, dolma kenkeri, eşek diken	W	Mugla	Ertug, 2004; Tuzlacı, 2011
<i>Pelargonium quercetorum</i> Agnew	Geraniaceae	Turkish Pelargonium	tolk	W	Hakkari	Kaval, 2011
<i>Petasites hybridus</i> (L.) G. Gaertner, B. Meyer & Scherb.	Asteraceae	Butterbur	galdirel, kaldirek, kaldirek	W	Balikesir	Poyraz Kayabaşı, 2011
<i>Phaseolus vulgaris</i> L.	Fabaceae	Bean	fasülye	C	West & East Anatolia, Malatya	Dogan et al., 2004; PO
<i>Plantago lanceolata</i> L.	Plantaginaceae	Narrowleaf Plantain	sinirliot, damarotu, yaraotu	W	West & Central Anatolia	Simsek et al., 2002; Dogan et al., 2004; Tuzlacı, 2011
<i>Plantago major</i> L. ssp. <i>intermedia</i> (Gilib.) Lange	Plantaginaceae	Broadleaf Plantain	yedidamarotu, damarotu, kesikotu, sinirotu, yaraotu	W	Iğdir	Tuzlacı, 2011
<i>Plantago major</i> L. ssp. <i>major</i>	Plantaginaceae	Broadleaf Plantain	belgheviz, damarotu, kesikotu, sinirotu, yaraotu	W	East Anatolia, Kocaeli, Ordu, Samsun	Baytop, 2007; Kızıllarslan, 2008; Tuzlacı, 2011; Mükemre, 2013
<i>Primula vulgaris</i> Huds.	Primulaceae	Primrose	ak meneksen, çuha çiçeği	W	South Anatolia	Demirci, 2010; Güneş, 2010
<i>Prunus avium</i> L.	Rosaceae	Cherry	kiraz	C	Malatya, Sakarya	Koyuncu, 2005; PO
<i>Raphanus raphanistrum</i> L.	Brassicaceae	Wild Radish	turpotu	W	West & Central Anatolia, Kahramanmaraş	Dogan et al., 2004; Demirci, 2010
<i>Rheum ribes</i> L.	Polygonaceae	Syrian Rhubarb	işgın, govalak, uçkun	W	East Anatolia	Tuzlacı, 2011
<i>Rumex acetosa</i> L.	Polygonaceae	Sorrel	ekşi labada, ekşilküçük labada	W	West & Central Anatolia	Dogan et al., 2004
<i>Rumex acetosella</i> L.	Polygonaceae	Red Sorrel	ebem ekşisi, ekşikulak, kuzukulağı, tırşık	W	East Anatolia	Alpaslan, 2012
<i>Rumex alpinus</i> L.	Polygonaceae	Alpine Dock	dağ pazısı, işgın	W	East Anatolia, Afyon	Baytop, 2007; Tuzlacı, 2011; Alpaslan, 2012
<i>Rumex conglomeratus</i> Murray	Polygonaceae	Sharp Dock	labada, kuzukulağı, tırşo,	W	South, East & South-Eastern	Arık, 2003; Gençay, 2007; Poyraz Kayabaşı,



			tirşik		Anatolia, Balıkesir	2011; Tugay et al., 2012; Akaydın et al., 2013
<i>Rumex crispus</i> L.	Polygonaceae	Curly Dock	efelek, efelik, kıvrıkcık labada, tırşo, labada, tirşik	W	All over the country	Dogan et al., 2004; Koyuncu, 2005; Baytop, 2007; Gençay, 2007; Kargioglu et al., 2008; Sarper et al., 2009; Deniz et al., 2010; Yucel et al., 2010; Tuzlacı, 2011
<i>Rumex gracilescens</i> Rech.*	Polygonaceae		acımanca, efelek, göylek, güyrek	W	Ankara	Simsek et al., 2004; Elçi and Erik, 2006; Tuzlacı, 2011
<i>Rumex obtusifolius</i> L. AMN 34/17	Polygonaceae	Broad-Leaved Dock	yabani labada	W	West & Central Anatolia	Dogan et al., 2004; PO
<i>Rumex olympicus</i> Boiss.*	Polygonaceae		ebelek, ilabada	W	Bursa	Baytop, 2007
<i>Rumex patientia</i> L. AMN 34/30	Polygonaceae	Patience Dock	akıllı labada, at kulağı, efelek, evelik, göbde, güylek, labada	W	All over the country	Dogan et al., 2004; Simsek et al., 2004; Kargioglu et al., 2008; Vural, 2008; Yucel et al., 2010; Poyraz Kayabaşı, 2011; Dogan et al., 2013; Koca et al., 2015; PO
<i>Rumex pulcher</i> L.	Polygonaceae	Fiddle Dock	labada, ilabada, acı labada	W	Çanakkale, Kocaeli, Mugla	Emre Bulut, 2008; Kızırlarlan, 2008; Tuzlacı, 2011
<i>Rumex tuberosus</i> L.	Polygonaceae	Swollen Sorrel	efelek, kuzukıkırdağı	W	East Anatolia, Eskişehir	Abay and Kılıç, 2001; Yucel et al., 2010; Kaval, 2011; Mükemre, 2013
<i>Salvia brachyantha</i> (Bordz.) Pobed.	Lamiaceae		kazan şalbası, gazangulpu, kazankulpu	W	Iğdir	Tuzlacı, 2011
<i>Salvia forskahlei</i> L.	Lamiaceae	Forskhal's Sage	şalba, dolma yaprağı, müsellim	W	Kastamonu	Tuzlacı, 2011; Aras, 2013
<i>Salvia pocolata</i> Náb.	Lamiaceae		bareş, öküzpörçüğü, ezmangag	W	East Anatolia	Kaval, 2011; Mükemre, 2013
<i>Salvia sclarea</i> L.	Lamiaceae	Clary Sage	tüylü adaçayı, misk adaçayı, pune, ayıkulağı	W	East Anatolia	Alpaslan, 2012
<i>Salvia staminea</i> Montbr. & Aucher ex Benth.	Lamiaceae	Iranian Sage	rozetli ada çayı, kazankulpu	W	Iğdir	Tuzlacı, 2011
<i>Silybum marianum</i> (L.) Gaertn.	Asteraceae	Milk Thistle	devedikeni, kenger, başkavkas	W	Mugla	Tuzlacı, 2011
<i>Sinapis arvensis</i> L.	Brassicaceae	Field Mustard	hardalotu, acırğa, eşek turbu	W	Tokat	Simsek et al., 2002; Tuzlacı, 2011
<i>Smilax excelsa</i> L.	Smilacaceae	Smilax	melevcen	W	Black Sea Region	Aras, 2013
<i>Spinacia oleracea</i> L. AMN 34/28	Amaranthaceae	Spinach	ıspanak	C	West Anatolia	PO
<i>Symphytum kurdicum</i> Boiis. & Hausskn.	Boraginaceae	Kurdish Comfrey	karakafesotu, ezmangag	W	Hakkari	Kaval, 2011
<i>Tilia argentea</i> Desf. ex DC.	Malvaceae	Silver Lime	gümüşi ihlamur	W/C	Istanbul	Tuzlacı, 2011; PO
<i>Trachystemon orientalis</i> (L.) D. Don	Boraginaceae	Abraham- Isaac-Jacob	galdirik, hodan, ispit, kaldırık, kaldurak otu	W	Istanbul, Yalova	Simsek et al., 2002; Koçyiğit, 2005; Doğru Koca and Yıldırımli, 2010; Tuzlacı, 2011; Koca et al., 2015; PO
<i>Tussilago farfara</i> L.	Asteraceae	Coltsfoot	öksürükotu, akkız, kabalak	W	West & Central Anatolia,	Dogan et al., 2004; Baytop, 2007; Tuzlacı,

					Kastamonu	2011
<i>Urtica dioica</i> L.	Urticaceae	Nettle	ısıran	W	South-Eastern Anatolia	Balos, 2007
<i>Vitis sylvestris</i> Gmelin	Vitaceae	Wild Grapevine	çivek, deli asma, deli üzüm, kuşüzümü	W	Yalova	Kocyiğit and Ozhatay, 2008-2009; Tuzlacı, 2011
<i>Vitis vinifera</i> L.	Vitaceae	Grapevine	asma, tiri, jur	C	All over the country	Koçyiğit, 2005; Demirci, 2010; Kaval, 2011; Kızıllarlan and Özhatay, 2012

1 \*: Endemic, C: Cultivated; W: Wild; PO: Personal observation