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Reassessment of conservation status of the genus *Salvia* (Lamiaceae) in Turkey II

Ahmet KAHRAMAN[1,2,*], Safi BAGHERPOUR[3], Ersin KARABACAK[4], Musa DOĞAN[3], Hakan Mete DOĞAN[5], İsmet UYSAL[4], Ferhat CELEP[6]

[1]Department of Biology, Faculty of Science, Atatürk University, 25240 Erzurum - TURKEY

[2]Department of Biology, Faculty of Arts and Sciences, Uşak University, 64200 Uşak - TURKEY

[3]Department of Biological Sciences, Middle East Technical University, 06800 Ankara - TURKEY

[4]Department of Biology, Çanakkale Onsekiz Mart University, 17020 Çanakkale - TURKEY

[5]Geographic Information Systems and Remote Sensing Unit of Soil Science Department, Gaziosmanpaşa University, Taşlıçiftlik, 60240 Tokat - TURKEY

[6]Department of Biology, Faculty of Arts and Sciences, Nevşehir University, 50300 Nevşehir - TURKEY

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Abstract: The current conservation status of the *Salvia* L. (sage) taxa of the family Lamiaceae distributed in the East, South-East, Central, North Anatolian, and Marmara geographic regions of Turkey was reassessed at regional, national, and global levels using IUCN Red List categories and criteria. In accordance with the present taxonomic revision of the genus since 2005, the study area seems to cover 79 taxa, 36 of which are endemic and 4 of which are rare nonendemic; the remaining 39 taxa are widely distributed. The rate of endemism is 46% in the area. Based on new field observations of populations and distribution data, taxa were classified into the following threat categories at the global scale: Critically Endangered (CR) (5 taxa), Endangered (EN) (8 taxa), Vulnerable (VU) (11 taxa), Near Threatened (NT) (12 taxa), and Least Concern (LC) (43 taxa). The most threatened species at the global scale are *S. anatolica*, *S. ballsiana*, *S. freyniana*, *S. odontochlamys*, and *S. pseudeuphratica*. The threatened taxa are under pressure from intensive human activities such as overgrazing, construction (e.g., road construction), land clearing (e.g., agricultural activities), and urbanisation. The threatened endemic taxa are concentrated in 3 main areas. The first area includes Sivas, Divriği, Gürün, Pınarbaşı, and Kemaliye. The second area includes Ankara, Beypazarı, Polatlı, and Sivrihisar. The third area includes Yozgat, Akdağmadeni, Nevşehir, and Kayseri. Some significant measures are recommended here for the conservation and management of the high number of endemic taxa under threat in the research area.

Key words: Conservation, IUCN Red List, Lamiaceae, *Salvia*, Turkey

Türkiye'de yayılış gösteren *Salvia* (Lamiaceae) cinsinin koruma statüsünün yeniden değerlendirilmesi II

Özet: Türkiye'nin Doğu, Güneydoğu, İç, Kuzey Anadolu ve Marmara bölgelerinde yayılış gösteren Lamiaceae familyasına ait *Salvia* L. (adaçayı) taksonlarının güncel koruma statüleri IUCN Kırmızı Liste kategorileri ve kriterlerine göre bölgesel, ulusal ve evrensel ölçekte tekrar değerlendirilmiştir. 2005 yılından bu yana cins üzerine yaptığımız

* E-mail: kahramanahmet64@gmail.com

güncel taksonomik revizyon çalışmasına göre, çalışma alanında 79 takson bulunmaktadır. Bu taksonların 36 tanesi endemik, 5'i nadir endemik olmayan ve geriye kalan 39 takson geniş yayılışlıdır. Alandaki endemizm oranı % 46'dır. Populasyonlar ve dağılım alanları üzerine yapılan yeni arazi gözlemleri dikkate alınarak, taksonlar evrensel ölçekte şu tehlike kategorilerine göre sınıflanırılır: Kritik Derecede Tehlikede (5 takson), Tehlikede (8 takson), Hassas (11 takson), Yakında Tehdit Altına Girebilir (12 takson) ve Düşük Seviyede Endişe Verici (43 takson). Evrensel ölçekte en çok tehlike altında bulunan türler; *S. anatolica*, *S. ballsiana*, *S. freyniana*, *S. odontochlamys* ve *S. pseudeuphratica*'dır. Tehlike altındaki taksonlar yoğun insan faaliyetlerinin baskısı altındadır. Bunlar aşırı otlatma, yol yapımı gibi inşaat çalışmaları, tarımsal aktivitelere bağlı arazi açma faaliyetleri ve kentleşme gibi. Tehlike altındaki endemik taksonlar üç ana bölgede yoğunlaşmıştır. 1. Bölge; Sivas, Divriği, Gürün, Pınarbaşı ve Kemaliye'yi içine alır. 2. Bölge; Ankara, Beypazarı, Polatlı ve Sivrihisar'ı içine alır. 3. Bölge; Yozgat, Akdağmadeni, Nevşehir ve Kayseri'dir. Çalışma alanında bulunan tehdit altındaki endemik taksonların korunması için bazı önlemler tavsiye edilir.

Anahtar sözcükler: Koruma, IUCN Kırmızı Liste, Lamiaceae, *Salvia*, Türkiye

Introduction

Destruction and fragmentation of habitats are the principal threats to biodiversity. Due to this destruction and fragmentation, many plant species today occur in small and isolated populations, which, for a number of reasons, are expected to face extinction (Matthies et al., 2004). As a result of rapid population increase, many of the natural habitats in Turkey have been fragmented and reduced in size or degraded. Establishing monitoring programs and building quantitative databases for preservation programs is crucial to achieving future success in maintaining biodiversity in Turkey (Kaya & Raynal, 2001).

The assessment of conservation status of plant species is one of the most significant tools in biodiversity conservation. Red data lists can play a crucial role by focusing attention on species most in need of conservation action (Balanca et al., 1998; Broughton & McAdam, 2002). The World Conservation Union (IUCN) Red List categories and criteria were preliminary constructed to assess the threatened status of species or lower taxa on a global scale. However, many conservation efforts are conducted on national scales, and there is consequently a demand for red lists on subglobal scales (Gärdenfors, 2001). For the purposes of regional conservation assessments, there are significant reasons to assess species' extinction risk and publish red lists within specific geographically defined areas (IUCN, 2003).

Turkey has nearly 12,000 natural vascular plant taxa, almost 30% of which are endemic. Endemic plants comprise 18.6% of total plant diversity in Spain, 14.9% in Greece, 2.9% in France, and 0.1% in Poland (Türe & Böcük, 2008). Thus, Turkey is one of the richest centres in the world for plant diversity and endemism. This is largely due to its climatic variation and geomorphological and soil diversity. Turkey is also the meeting ground of 3 different phytogeographical regions: Irano-Turanian, Mediterranean, and Euro-Siberian (Davis, 1975; Türe et al., 2005). Since each phytogeographical region varies in terms of ecological features, knowledge of the habitat conditions in the phytogeographical regions gives insight into the ecological requirements of plants. The Irano-Turanian and Mediterranean phytogeographical regions have more endemic taxa than the Euro-Siberian phytogeographical region in Turkey. The high representation of Irano-Turanian elements is due to the conversion of the Anatolian steppes in the Irano-Turanian region into farm fields (Türe & Böcük, 2008).

Salvia L. (tribe Mentheae: subtribe Salviinae), the largest genus of the family Lamiaceae, consists of approximately 1000 species and displays remarkable diversity in growth forms, secondary compounds, floral morphology, and pollination biology. The genus is found predominantly in 3 regions of the world; there are at least 500 species in Central and South America, 200 species in western Asia, and 100 species in eastern Asia (Walker & Sytsma, 2007). *Salvia* species possess only 2 stamens, each with a connective that is elongated, while most genera of Mentheae have 4 stamens (Walker et al., 2004). They are also characterised by modified lever-like stamens that play a central role in the process of pollen transfer (Claßen-Bockhoff et al., 2004).

It was long assumed that the unusual pollination and stamen structure of *Salvia* had evolved only once and that *Salvia* was thus monophyletic. However, recent molecular phylogenetic analyses have indicated that *Salvia* is polyphyletic, with 3 major lineages. There are 5 other related genera intercalated within it, *Rosmarinus*, *Perovskia*, *Meriandra*, *Dorystaechas*, and *Zhumeria*, and the staminal lever mechanism evolved 3 times independently, each time with a distinct morphology (Walker et al., 2004; Walker & Sytsma, 2007).

The last comprehensive treatment of *Salvia* species in Turkey was that of Hedge (1982b), who recognised 86 species with 2 subspecies, 2 varieties, and 1 doubtful species. Since then, 6 new species (Huber-Morath, 1982; Vural & Adıgüzel, 1996; Dönmez, 2001; Hamzaoğlu et al., 2005; Ilçim et al., 2009; Celep & Doğan, 2010), 3 new records (Behçet & Avlamaz, 2009; Celep et al., 2009b; Kahraman et al., 2009a), and 2 species reevaluated as valid species (Kahraman et al., 2010c) have been described from Turkey. The number of species now reaches 97, of which 51 are endemic, showing that Turkey is a major centre of diversity for the genus in Asia (Kahraman et al., 2011). Distribution of the genus in neighbouring countries is as follows: 75 species in the former USSR (Pobedimova, 1954), 70 in *Flora Iranica* (Hedge, 1982a), 36 in Europe (Hedge, 1972), and 21 in *Flora Palaestina* (Zohary, 1966).

As part of the revision study of Turkish *Salvia*, since 2005 the authors have carried out extensive field studies and collected a large number of specimens. The studies have revealed 2 new species (Ilçim et al., 2009; Celep & Doğan, 2010) and 2 new records (Celep et al., 2009b; Kahraman et al., 2009a), 2 species have been reevaluated as valid species (Kahraman et al., 2010c), and 2 new varieties have emerged (Celep et al., 2009a; Celep et al., 2011a). In addition, *S. aucheri* Benth. var. *canescens* Boiss. & Heldr. has been raised to subspecies rank (Celep et al., 2011b). The authors have also examined morphology, anatomy, palynology, and trichome and nutlet micromorphology of some species of Turkish *Salvia* (Kahraman et al., 2009b, 2009c; Kahraman & Doğan, 2010; Kahraman et al., 2010a, 2010b, 2010d; Büyükkartal et al., 2011; Kahraman et al., 2011; Özler et al., 2011).

Referring to the IUCN Red List, the threatened categories of endemic and rare nonendemic plants in Turkey were first assessed by Ekim et al. (1989). At the national scale, the Turkish Endemic Plants Project of 1995-1998 was carried out in order to reevaluate the conservation status and distribution of the rare and endemic Turkish plant taxa and produce a new red data list. In light of the data obtained, the Turkish Red Data Book (Ekim et al., 2000) was prepared using the 1994 Red List categories and criteria (IUCN, 1994); a total of 33 *Salvia* taxa were listed under different threat categories. However, our new field observations and current knowledge of the distribution, population sizes, and growing environments reveal that the previously assigned threat categories of the taxa need further clarification owing to the lack of detailed field and herbarium studies. Therefore, the conservation status of *Salvia* in the Mediterranean and Aegean geographic regions of Turkey was assessed as a preliminary part of a comprehensive survey (Celep et al., 2010). In this paper, we present a comprehensive assessment of the conservation status of the *Salvia* taxa found in the remaining geographic regions of Turkey using the 2001 IUCN Red List categories and criteria (IUCN, 2001) to summarise current knowledge on their distribution, to highlight the principle threats to their survival, and to recommend priorities and strategies for conservation. In this study, the conservation status of the 39 taxa included in the work of Celep et al. (2010) is also reevaluated on a regional scale.

Materials and methods

The study area covers approximately 589,085 km^2 and includes the East, South-East, Central, North Anatolian, and Marmara geographic regions of Turkey (Figure 1). According to Davis' grid square system (1965), the area is located within the A1-A10, B1-B10, and C3-C10 grid squares (Figure 1). It falls within the Irano-Turanian, Mediterranean, and Euro-Siberian phytogeographical regions. The altitude of the area ranges from 0 m to 5137 m (Ağrı Mountain).

Data were mainly obtained from field studies undertaken between 2005 and 2010 as a part of the taxonomic revision of Turkish *Salvia*. During the extensive field studies, the type and other known localities of the *Salvia* taxa, as well as a number of other potential distribution sites, were visited. Data

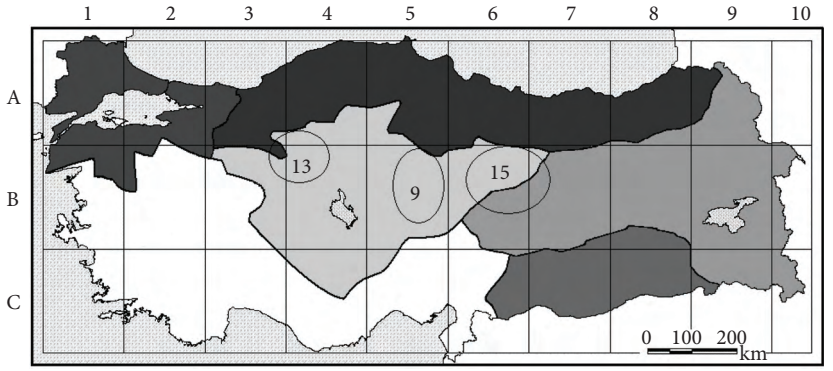

Figure 1. The 3 richest regions in terms of the endemic *Salvia* taxa in the study area, shaded. These regions are indicated by circles. : Central Anatolia, : East Anatolia, : South-East Anatolia, : North Anatolia, and : the Marmara region of Turkey.

on distribution and habitat, population sizes, the number of mature individuals, GPS coordinates, phenological and ecological features, and threat factors were recorded in the field. Many herbarium specimens housed in various national herbaria (abbreviations from http://sciweb.nybg.og/science2/Index Herbariorum.asp: AEF, AIBU, ANK, CBB, FUH, GAZI, HUB, ISTE, ISTF, ISTO, KNYA, and VANF) and international herbaria (B, BM, E, G, K, LE, MO, and W) were also examined in order to determine the recorded *Salvia* taxa. Additionally, all available literature (Boissier, 1879; Post, 1933; Pobedimova, 1954; Hedge, 1972, 1982a, 1982b; Mouterde, 1983) was reviewed.

Based on current surveys, the threat categories of 79 taxa collected from about 1000 different populations were revised and reassessed according to version 3.1 of the IUCN Red List categories and criteria (IUCN, 2001) and with reference to Gärdenfors (2001) and Gärdenfors et al. (2001). The proportion (%) of the global population of the taxa within the area was also estimated. Details of the threats are determined for each taxon, and comments are made in accordance with Broughton & McAdam (2002).

The specimens collected were dried according to standard herbarium techniques (Davis & Heywood, 1973) and then deposited at the Plant Systematics Laboratory, Department of Biological Sciences, Middle East Technical University, Ankara, Turkey. The type citation and distribution data of the endemic taxa in the study area are provided in the appendix.

Results and discussion

Based on the current taxonomic revision of *Salvia* in Turkey, the results reveal that the research area includes 79 taxa, 36 (46%) of which are endemic and 4 (5%) of which are rare nonendemic; the other 39 taxa (49%) are widely distributed both regionally and globally (Table 1).

The geographical distribution of the taxa was analysed. East Anatolia has 51 taxa, 22 (43%) of which are endemic; South-East Anatolia has 24 taxa, 2 (8%) of which are endemic; Central Anatolia has 42 taxa, 24 (57%) of which are endemic; North Anatolia has 39 taxa, 11 (28%) of which are endemic; and the Marmara geographic region has 19 taxa, 2 of which are endemic. The endemic taxa are concentrated in 3 main areas within the study area. The first area covers Sivas, Divriği, Gürün, Pınarbaşı, and Kemaliye and includes 15 endemic taxa. The second area covers Ankara, Beypazarı, Polatlı, and Sivrihisar and includes 13 endemic taxa. The third area covers Yozgat, Akdağmadeni, Nevşehir, and Kayseri and includes 9 endemic taxa. The richest areas for the endemic taxa are shown in Figure 1.

According to the grid square system used in *Flora of Turkey* (Hedge, 1982b), the B7 square has the highest number of taxa (38), and the B2 square has the lowest number of taxa (1). The B7 square has the greatest number of endemic taxa (17), but there are no endemic taxa in the A1, B1, B2, B10, C3, C7, C8, C9, or C10 squares. The B9 square has the highest

Table 1. The taxa distributed in the study area, their distribution data, IUCN threat categories with criteria, and an estimated proportion (%) of the global population. Details of the taxa known only within the area, endemism, and phytogeographic regions are also provided. **Column 1:** Taxa, **Column 2:** Distribution in the study area according to Davis's grid square system (1965), **Column 3:** Threat categories according to the Turkish Red Data Book (Ekim et al., 2000), **Column 4:** Recommended threat categories for regional scale, **Column 5:** Recommended threat categories for national scale, **Column 6:** Recommended threat categories for global scale, **Column 7:** An estimate of the proportion (%) of the global population occurring within the region, **Column 8:** IUCN Red List Criteria (2001). +: endemic, *: taxa known only within the study area in Turkey, #: threat categories of taxa evaluated previously at national and global scale by Celep et al. (2010), **euro-sib.:** Euro-Siberian element, **ir.-tur.:** Irano-Turanian element, **medit.:** Mediterranean element, **unk. or multi.:** unknown or multiregional. The taxa are listed in alphabetical order.

	1	2	3	4	5	6	7	8
1	+, ir.-tur. *S. absconditiflora*	A3-7; B3-8	LC	NT	NT#	NT#	80-85	-
2	unk. or multi. *S. aethiopis*	A1(E, A), 2(E, A), 3-9; B2-10; C4	-	LC	LC#	LC#	?	widely distributed
3	*, euro-sib. *S. amplexicaulis*	A1(E, A), 2(E, A)	-	LC	LC	LC	?	widely distributed
4	+, *, ir.-tur. *S. anatolica*	B7	CR	CR	CR	CR	100	B1ab(i,ii,iv); C2a(ii)
5	medit. *S. argentea*	A1(A), 2(A), 4, 5: B1	-	LC	LC#	LC#	?	widely distributed
6	*, ir.-tur. *S. atropatana*	B9, 10; C9, 10	-	LC	LC	LC	?	widely distributed
7	+, *, ir.-tur. *S. aytachii*	A3; B3, 4	VU	VU	VU	VU	100	B1ab(i,ii,iv)
8	+, *, ir.-tur. *S. ballsiana*	B7; C6	DD	CR	CR	CR	100	B1ab(i,ii,iv); C2a(ii)
9	+, ir.-tur. *S. blepharochlaena*	B4-6	NT	VU	VU#	VU#	80-90	B1ab(i,ii,iv)
10	*, ir.-tur. *S. brachyantha*	A8, 9; B8, 9; C7	-	LC	LC	LC	?	widely distributed
11	ir.-tur. *S. bracteata*	A1(E), 2(A), 4-8; B3-8; C6-8	-	LC	LC#	LC#	?	widely distributed
12	+, ir.-tur. *S. cadmica*	A3, 4, 6; B3, 4	LC	NT	NT#	NT#	50-60	-
13	+, ir.-tur. *S. caespitosa*	A6; B6, 7	LC	NT	NT#	NT#	80-90	-
14	ir.-tur. *S. candidissima* subsp. *candidissima*	A3-8; B4, 6-9; C3, 5, 6, 8-10	-	LC	LC#	LC#	?	widely distributed
	ir.-tur. *S. candidissima* subsp. *occidentalis*	A4, 5; B4, 5	-	LC	LC#	LC#	?	widely distributed
15	ir.-tur. *S. ceratophylla*	A3-5, 8, 9; B3-10; C5-8, 10	-	LC	LC#	LC#	?	widely distributed
16	+, *, ir.-tur. *S. cerino-pruinosa*	B7	-	EN	EN	EN	100	B1ab(i,ii,iv)
17	+, medit. *S. cilicica*	B6	VU	CR	VU#	VU#	5-10	B1ab(i,ii,iv)
18	+, ir.-tur. *S. cyanescens*	A2(A), 3-7; B3-7; C4	LC	NT	NT#	NT#	85-90	-
19	+, ir.-tur. *S. dichroantha*	A3-5; B3-7; C4	LC	NT	NT#	NT#	80-90	-
20	+, *, ir.-tur. *S. divaricata*	A8; B6, 7	LC	NT	NT	NT	100	-
21	+, *, ir.-tur. *S. ekimiana*	B5	-	EN	EN	EN	100	B1ab(i,ii,iv)
22	+, *, ir.-tur. *S. eriophora*	B6	VU	EN	EN	EN	100	B1ab(i,ii,iv)
23	+, *, ir.-tur. *S. euphratica var. euphratica*	B6, 7	NT	NT	NT	NT	100	-
	+, *, ir.-tur. *S. euphratica var. leiocalycina*	B6, 7	NT	NT	NT	NT	100	-
24	*, euro-sib. *S. forskahlei*	A1(E), 2(E, A), 3-9	-	LC	LC	LC	?	widely distributed
25	+, *, ir.-tur. *S. freyniana*	B5	DD	CR	CR	CR	100	B1ab(i,ii,iv); C2a(ii)
26	ir.-tur. *S. frigida*	A4, 6; B3-9	-	LC	LC#	LC#	?	widely distributed
27	medit. *S. fruticosa*	A1(E, A)	VU	LC	LC#	LC#	?	widely distributed
28	euro-sib. *S. glutinosa*	A1(E), 2(A), 3-9	-	LC	LC#	LC#	?	widely distributed
29	+, *, ir.-tur. *S. halophila*	B4; C4	VU	EN	EN	EN	100	B1ab(i,ii,iv)
30	+, *, ir.-tur. *S. hedgeana*	B7	CR	EN	EN	EN	100	B1ab(i,ii,iv)
31	+, ir.-tur. *S. heldreichiana*	B4; C5	LC	VU	NT#	NT#	30-40	-
32	+, *, ir.-tur. *S. huberi*	A8, 9	NT	NT	NT	NT	100	-
33	+, ir.-tur. *S. hypargeia*	A3-5, 7; B4-7	LC	NT	NT#	NT#	80-90	-
34	*, ir.-tur. *S. hydrangea*	A9; B9, 10	-	LC	LC	LC	?	widely distributed

Table 1. (Continued).

35	ir.-tur.*S. indica*	C9, 10	-	EN	VU#	LC#	?	B1ab(i,ii,iv)
36	+, *, ir.-tur.*S. kronenburgii*	B9	VU	VU	VU	VU	100	B1ab(i,ii,iv)
37	*, ir.-tur.*S. kurdica*	C9	VU	EN	EN	LC	?	B1ab(i,ii,iv)
38	*, ir.-tur. *S. limbata*	A8, 9; B8-10; C10	-	LC	LC	LC	?	widely distributed
39	+, *, ir.-tur.*S. longipedicellata*	B6-9	NT	VU	VU	VU	100	B1ab(i,ii,iv)
40	*, ir.-tur.*S. macrochlamys*	B7-9; C8-10	-	LC	LC	LC	?	widely distributed
41	*, ir.-tur.*S. macrosiphon*	C8	-	EN	EN	LC	5-10	B1ab(i,ii,iv)
42	ir.-tur.*S. microstegia*	A6, 7, 9; B5-9; C7, 9, 10	-	LC	LC#	LC#	?	widely distributed
43	+, ir.-tur.*S. modesta*	B5	VU	VU	VU#	VU#	60-70	B1ab(i,ii,iv)
44	*, ir.-tur.*S. montbretii*	C6-8	-	LC	LC	LC	?	widely distributed
45	ir.-tur.*S. multicaulis*	A6-9; B6-9; C6-10	-	LC	LC#	LC#	?	widely distributed
46	medit.*S. napifolia*	A1(E), 2(E, A)	-	LC	LC#	LC#	?	widely distributed
47	*, unk. or multi.*S. nemorosa*	A7-9; B8-10; C9, 10	-	LC	LC	LC	?	widely distributed
48	*, euro-sib.*S. nutans*	A1(E)	VU	EN	EN	LC	?	B1ab(i,ii,iv)
49	+, *, ir.-tur.*S. odontochlamys*	B9	EN	CR	CR	CR	100	B1ab(i,ii,iv); C2a(ii)
50	*, ir.-tur.*S. pachystachys*	A7-9; B7, 9, 10	-	LC	LC	LC	?	widely distributed
51	ir.-tur.*S. palaestina*	B6-8; C6-9	-	LC	LC#	LC#	?	widely distributed
52	+, ir.-tur.*S. pilifera*	B7; C6	LC	VU	VU#	VU#	70-80	B1ab(i,ii,iv)
53	medit.*S. pinnata*	A1(E), 2(E, A), 5; B5; C3, 6, 9	-	LC	LC#	LC#	?	widely distributed
54	*, ir.-tur.*S. poculata*	A8; B7-9; C9, 10	-	LC	LC	LC	?	widely distributed
55	+, *, ir.-tur.*S. pseudeuphratica*	B7	-	CR	CR	CR	100	B1ab(i,ii,iv); C2a(ii)
56	+, ir.-tur.*S. recognita*	A4, 5; B4, 5, 7	LC	VU	VU#	VU#	80-90	B1ab(i,ii,iv)
57	+, *, ir.-tur.*S. reeseana*	A3, 6	VU	EN	EN	EN	100	B1ab(i,ii,iv)
58	+, *, ir.-tur.*S. rosifolia*	A7-9; B7-9	LC	NT	NT	NT	100	-
59	ir.-tur.*S. russellii*	A1(E), 3-5; B4-9; C6-9	-	LC	LC#	LC#	?	widely distributed
60	unk. or multi.*S. sclarea*	A2(E, A), 3-9; B3-9; C6, 7, 9, 10	-	LC	LC#	LC#	?	widely distributed
61	*, ir.-tur.*S. spinosa*	C6-9	-	LC	LC	LC	?	widely distributed
62	*, ir.-tur.*S. staminea*	A7-9; B7-10; C10	-	LC	LC	LC		
68	ir.-tur.*S. suffruticosa*	A4; B4, 6-9; C7, 8	-	LC	LC#	LC#	?	widely distributed
64	ir.-tur.*S. syriaca*	A3-9; B4-9; C4, 6-9	-	LC	LC#	LC#	?	widely distributed
65	+, ir.-tur.*S. tchihatcheffii*	A3, 4; B3, 4	NT	VU	VU#	VU#	80-90	B1ab(i,ii,iv)
66	+, *, euro-sib.*S. tobeyi*	A4; B4	VU	EN	EN	EN	100	B1ab(i,ii,iv)
67	medit.*S. tomentosa*	A2(E, A), 3-7; B1, 3, 5, 7	-	LC	LC#	LC#	?	widely distributed
68	*, ir.-tur.*S. trichoclada*	B7-9; C8-10	-	LC	LC	LC	?	widely distributed
69	medit.*S. verbenaca*	A1(E, A), 2(E, A), 3-6; B1	-	LC	LC#	LC#	?	widely distributed
70	+, *, ir.-tur.*S. vermifolia*	B6	VU	EN	EN	EN	100	B1ab(i,ii,iv)
71	*, euro-sib.*S. verticillata* ssp. *verticillata*	A2(E, A), 5, 7-9; B8, 9; C9	-	LC	LC	LC	?	widely distributed
	ir.-tur.*S. verticillata* ssp. *amasiaca*	A1(E), 2(E, A), 3-9, B3-10; C9, 10	-	LC	LC#	LC#	?	widely distributed
72	ir.-tur.*S. virgata*	A1(E, A), 2(E, A), 3-9; B3-10; C4, 9	-	LC	LC#	LC#	?	widely distributed
73	medit.*S. viridis*	A1(E, A), 2(E, A), 3-9; B3, 4, 7; C6-9	-	LC	LC#	LC#	?	widely distributed
74	+, ir.-tur.*S. wiedemannii*	A3, 4; B3, 4	LC	VU	VU#	VU#	80-85	B1ab(i,ii,iv)
75	*, ir.-tur.*S. xanthocheila*	A9; B8, 9; C9	-	LC	LC	LC	?	widely distributed
76	+, ir.-tur.*S. yosgadensis*	B3-5	LC	VU	VU#	VU#	80-85	B1ab(i,ii,iv)

number of nonendemic taxa (24), while the B2 square has the lowest number of nonendemic taxa (1). The number of endemic and nonendemic taxa is given for each grid square (Table 1 and Figure 2). Distribution of *Salvia* taxa within the squares based on the 2001 IUCN Red List categories at regional, national, and global scales is also shown in Figure 3.

Distribution was assessed according to IUCN definitions: Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), and Least Concern (LC). The distribution of the threatened taxa according to regional (the study area), national, and global scales is as follows: at the regional scale, 6 taxa (7.60%) CR, 12 taxa (15.92%) EN, 11 taxa (13.92%) VU, 11 taxa (13.92%) NT, and 39 taxa (49.37%) LC; at the national scale, 5 taxa (6.33%) CR, 11 taxa (13.92%) EN, 12 taxa (15.19%) VU, 12 taxa (15.19%) NT, and 39 taxa (49.37%) LC; at the global scale, 5 taxa (6.33%) CR, 8 taxa (10.13%) EN, 11 taxa (13.92%) VU, 12 taxa (15.19%) NT, and 43 taxa (54.43%) LC (Table 1 and Figure 4).

Because it had not been collected since 1935, *S. ballsiana* was previously categorised as Data Deficiency (DD) in the Turkish Red Data Book (Ekim et al., 2000). We visited its type locality during 4 years of field surveys, and no specimens were found despite many expeditions to its distribution area. This might be due to the extinction of the species in this area. In 2008, our explorations revealed the presence of one population of the species in another location near Gerger (Adıyaman). The novel population was found in natural openings of *Quercus* scrubs. It was quite localised, since it occupied an area of 1050 and 1160 m^2. According to IUCN (2001) categories and criteria at the national level, the species is evaluated as CR based on the B1ab(i, ii, iv) and C2a(ii) criteria (Table 1). The main threat to this species is habitat destruction caused by overgrazing (Table 2). *S. freyniana* was assessed as DD by Ekim et al. (2000), as it had not been collected since 1890. We found it once again near the type locality in 2006. Due to its small local population size, narrow distribution area, and habitat specificity, it is evaluated as CR (Table 1). Known only from the type locality, *S. odontochlamys* was treated as EN in the Turkish Red Data Book (Ekim et al., 2000). According to the recent field surveys, however, this species should be evaluated as CR because of a smaller population size and narrower geographic ranges (Table 1). *S. anatolica* and *S. pseudeuphratica* are also categorised as CR (Table 1). The principal threats to the future survival of these species are overgrazing, road construction, and fire (Table 2).

S. cerino-pruinosa Rech.f., *S. ekimiana* Celep & Doğan, *S. eriophora* Boiss. & Kotschy, *S. halophila* Hedge, *S. hedgeana Dönmez, S. kurdica* Boiss. & Hohen. ex Benth., *S. macrosiphon* Boiss., *S. nutans* L., *S. reeseana* Hedge & Hub.-Mor., *S tobeyi* Hedge, and *S. vermifolia* Hedge & Hub.-Mor. cover an area of occupancy of less than 500 km^2 and are known at no more than 5 locations. Additionally, they are under threat from a wide variety of human activities, including overgrazing, agricultural practices, construction, and urbanisation (Table 2). Therefore, they are evaluated as EN at the national level based on B2ab(i, ii, iv) criteria (Table 1). A total of 12 taxa are classified as VU based on B2ab(i, ii, iv) since they cover area of occupancy less than 2000 km^2 and are

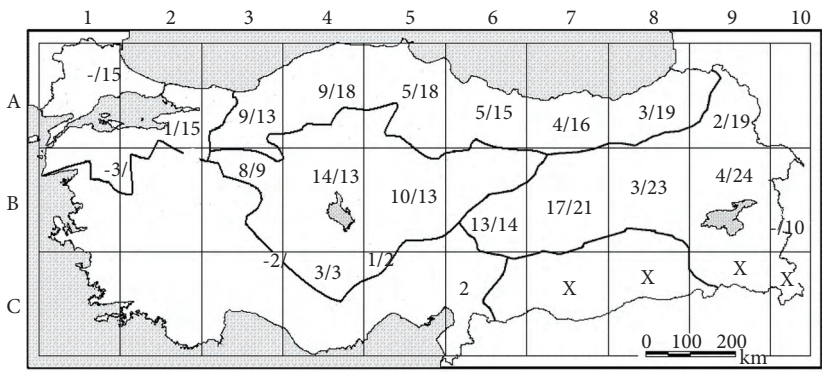

Figure 2. The number of the *Salvia* taxa within each square. Endemics/nonendemics.

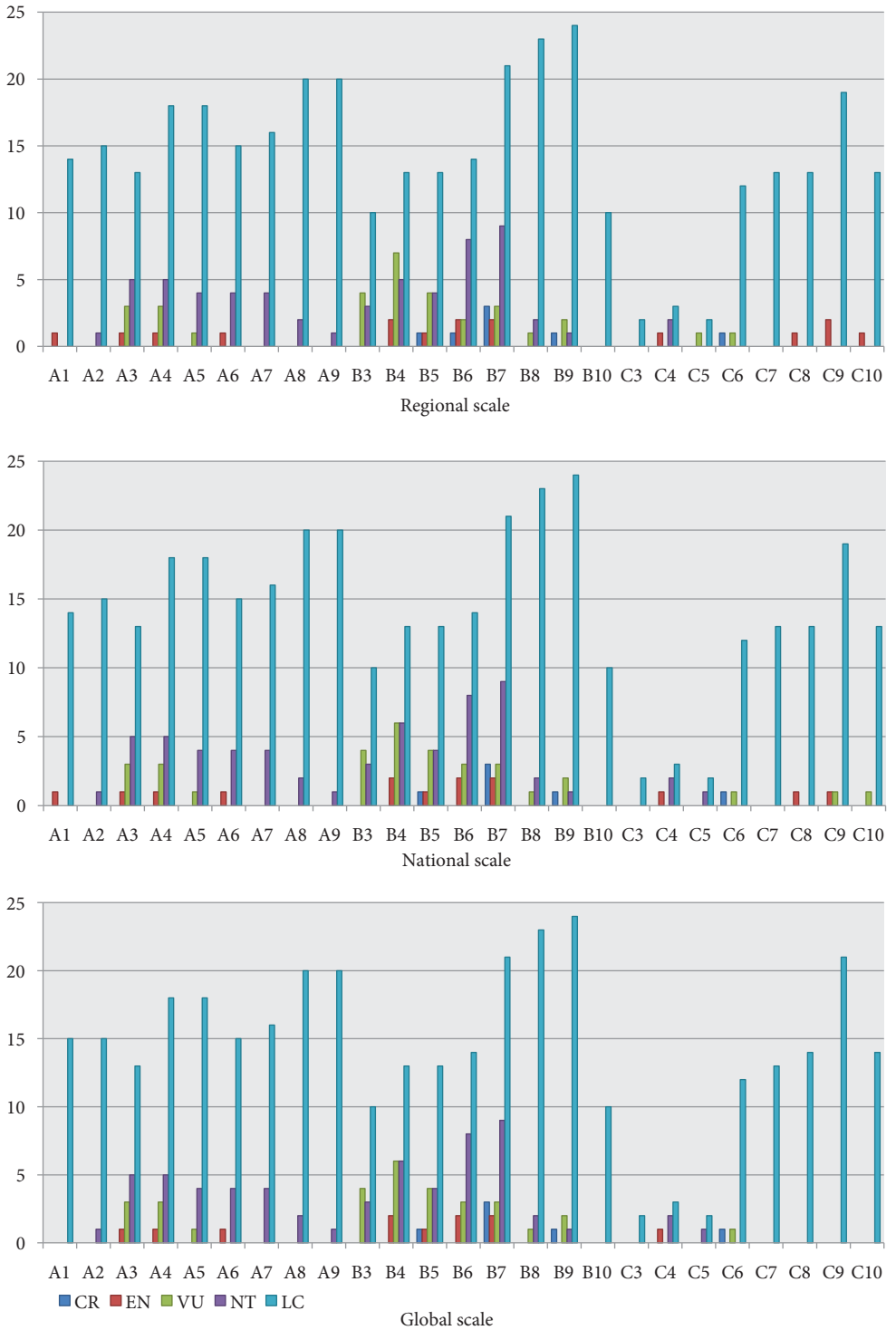

Figure 3. Distribution of the *Salvia* taxa in grid squares according to the 2001 IUCN Red List categories at regional, national, and global scales.

Table 2. The main threats and significant comments on the taxa. **Column 1:** Taxa; **Column 2:** Overgrazing; **Column 3:** Building of roads, dams, and other structures; **Column 4:** Land clearing and fire; **Column 5:** Urbanisation and tourism; **Column 6:** Comments. +: endemic, *: taxa known only within the study area in Turkey. The taxa are listed in alphabetical order.

	1	2	3	4	5	6
1	+*S. absconditiflora*		+	+	+	In the study area, mainly distributed in Central Anatolia. Leaves are used as herbal tea.
2	*S. aethiopis*		+	+		Relatively widespread and abundant wherever suitable habitat exists. It is a distinctive species with candalabriform inflorescences, sturdy stems, and lanate indumentum.
3	**S. amplexicaulis*		+			Widespread and common in Thrace and known from a few gatherings in the Asian part of the Marmara region, although it grows at lower altitudinal ranges (50-130 m).
4	+,**S. anatolica*	+	+			Very local species recorded only from 2 localities. It grows on calcareous slopes, in open *Quercus* scrubs, and in slightly moist areas.
5	*S. argentea*	+	+			Widespread and common wherever suitable habitat exists.
6	**S. atropatana*	+	+			Widespread and common in East Anatolia as isolated populations.
7	+,**S. aytachii*		+	+		Recorded 7 times in Central Anatolia. Likely to be at risk from road construction and land clearing.
8	+,**S. ballsiana*	+				The species was not found in the type location in spite of many expeditions. Recently, it was recorded from another location as a very small population. The newly rediscovered population may decline further as a result of overgrazing pressure.
9	+*S. blepharochlaena*	+	+			In the study area, known from large populations in Central Anatolia and a very small population in East Anatolia. It grows on serpentine and limestone slopes.
10	**S. brachyantha*		+	+		Widespread and common in East Anatolia; populations in South-East and North Anatolia occur at a lower density.
11	*S. bracteata*		+	+		Relatively widespread and common throughout the studied regions of Turkey. It is rather close to *S. trichoclada* but with a minor difference. *S. bracteata* is characterised by stems densely covered with very long spreading eglandular hairs and larger fruiting calyces.
12	+*S. cadmica*	+	+			In the study area, known from 9 collections and records. It is very close to *S. smyrnaea* distributed in the Aegean region of Turkey, but differs by calyx structure.
13	+*S. caespitosa*	+	+			In the study area, confined to Central and East Anatolia. It grows on rocky limestone and calcareous slopes.
14	*S. candidissima* subsp. *candidissima*	+	+			Relatively widespread and common wherever suitable habitat exists.
	S. candidissima subsp. *occidentalis*	+	+			Relatively widespread and common wherever suitable habitat exists.
15	*S. ceratophylla*		+	+		Relatively widespread and common wherever suitable habitat exists. It is a distinctive species due to pinnatifid leaves with spreading linear segments.
16	+,**S. cerino-pruinosa*		+	+		Only recorded from 4 small isolated populations in Divriği (Sivas), Pertek (Tunceli), and the northern part of Elazığ. It grows on road slopes, field sides, and marly banks.
17	+*S. cilicica*	+		+		Only recorded from one small population in the study area. It is mainly distributed in the eastern Mediterranean region of Turkey. It grows on limestone slopes and is characterised by orbicular leaves.
18	+*S. cyanescens*	+	+	+		Recorded from all the studied regions except for South-East Anatolia. It is also rarely distributed in East Anatolia and Marmara.
19	+*S. dichroantha*	+	+	+		In the study area, mainly distributed in Central and North Anatolia and rarely in East Anatolia.
20	+,**S. divaricata*	+	+			Mainly distributed around Erzincan Province. It is similar to *S. aucheri* from the Mediterranean region of Turkey, but differs by very long pedicels.
21	+,**S. ekimiana*	+				Restricted to the type location and a few locations nearby. It grows in open *Pinus* forest and alpine steppe.
22	+,**S. eriophora*	+	+			Local species recorded only from the type location in between Pınarbaşı and Gürün. It grows in rocky limestone areas. It is distantly related to *S. brachyantha*, but differs by violet blue paniculate inflorescence, smaller corollas, and arachnoid leaves.

Table 2. (Continued).

23	[+,˚]*S. euphratica var. euphratica*		+		Only known from some isolated populations around Malatya, Sivas, and Erzincan. It differs from var. *leiocalycina* by dense indumentum on calyces and inflorescence axes.
	[+,˚]*S. euphratica var. leiocalycina*		+		Only known from some isolated populations around Malatya, Sivas, and Erzincan. It is characterised by glabrous and glaucous inflorescence axes and calyces.
24	[˚]*S. forskahlei*		+	+	Widespread and common in North Anatolia and Marmara. It is a distinctive species by markedly bifid corolla upper lips.
25	[+,˚]*S. freyniana*	+	+		Extremely local and scarce species known only from type location. It differs from the closest *S. wiedemanii* by herbaceous habit, larger campanulate calyces, and serrulate leaflets.
26	*S. frigida*	+	+		Relatively widespread and common wherever suitable habitat exists.
27	*S. fruticosa*		+	+	Widespread and common in the Aegean and Mediterranean regions of Turkey, although recorded from a few localities at the coastal edge of the Marmara region.
28	*S. glutinosa*		+	+	In the study area, mainly distributed in North Anatolia and currently only one known extant population in Ardahan in East Anatolia.
29	[+,˚]*S. halophila*			+	Only recorded from a few isolated populations. It is the only endemic species growing in salt steppe around Salt Lake (Tuz Gölü). It differs from the closest *S. virgata* by thick leaves with subentire margins.
30	[+,˚]*S. hedgeana*	+	+		Local species recorded only from 2 small populations on limestone slopes near Divriği (Sivas). Its population is larger between Divriği and Mursal than that of the type locality.
31	[+]*S. heldreichiana*[x]		+		In the study area, recorded from 2 isolated populations in Central Anatolia.
32	[+,˚]*S. huberi*		+	+	Known from some populations in the North-East Anatolia and only one small population in East Anatolia. It differs from the closest *S. rosifolia* by narrower terminal leaf segments and shorter calyces, corollas and tubes, shorter pedicels, and verticillasters with fewer flowers.
33	[+]*S. hypargeia*		+		In the study area, mainly distributed in Central and East Anatolia and rarely in North Anatolia. It differs from the closest *S. montbretii* by smaller leaves, bracts, calyces, truncate upper calyx lips, and distinct geographic distribution.
34	[˚]*S. hydrangea*		+		Restricted to East Anatolia. A large population is currently known from the foot of Mount Ağrı.
35	*S. indica*[·]	+	+		In the study area, restricted to East and South-East Anatolia, where it is only known from 4 small isolated populations. It is a distinctive species on account of lilac upper and dark violet lower corolla lips spotted with purple.
36	[+,˚]*S. kronenburgii*	+	+	+	Only known from a few isolated localities around Van Province. It differs from the closest *S. euphratica* by white corolla and pale yellowish-green calyces and bracts.
37	[˚]*S. kurdica*	+			Only known from one small population at the foot of Cudi Mountain in Silopi (Şırnak). The type was collected from Iraq in 1841. It is a distinctive species with cordate leaves and short axillary inflorescences.
38	[˚]*S. limbata*	+	+		In the study area (except for Central Anatolia and Marmara), relatively widespread and common wherever suitable habitat exists.
39	[+,˚]*S. longipedicellata*		+	+	Populations in Central and North Anatolia are smaller than those in East Anatolia. It is close to *S. chionantha* growing in the Mediterranean region of Turkey, but differs by broad leaves, longer pedicels, and smaller calyces and corollas.
40	[˚]*S. macrochlamys*		+		Relatively widespread and common wherever suitable habitat exists. It is a very distinctive species with very large membranous bracts, 2-flowered verticillasters, and indumentums structure.
41	[˚]*S. macrosiphon*			+	Only recorded from one small population near Çınar (Diyarbakır). Agricultural intensification is a major factor limiting distribution. It differs from the closest *S. spinosa* by fewer indumentums, narrower leaves and calyces, less indurate and spiny fruiting calyces, and longer corolla tubes.
42	*S. microstegia*	+	+		Relatively widespread and abundant wherever suitable habitat exists.

Table 2. (Continued).

43	*S. modesta*	+	+		In the study area, recorded only from 2 records in Kayseri province in Central Anatolia. Overgrazing and road construction are the main threats affecting the small population.
44	˚*S. montbretii*		+	+	Widespread and common in South-East Anatolia.
45	*S. multicaulis*		+		Relatively widespread and abundant wherever suitable habitat exists.
46	*S. napifolia*		+		Widespread and common in the Marmara region.
47	˚*S. nemorosa*		+	+	Mainly distributed in East Anatolia and rarely in North Anatolia as small populations.
48	˚*S. nutans*	+			Only recorded from a few small populations in Kırklareli and Edirne provinces in Marmara. It is a distinctive species by nodding inflorescences and widely gaping corolla lips.
49	+,˚*S. odontochlamys*	+			Very local species known only from the type location. It is very similar to *S. poculata* growing in the same area, but differs by tubular-campanulate calyces and larger and densely white canascent bracts.
50	˚*S. pachystachys*		+		Mainly distributed in East Anatolia and rarely in North Anatolia.
51	*S. palaestina*		+	+	Relatively widespread and common in East and South-East Anatolia.
52	+*S. pilifera*	+	+		Only known from 5 isolated localities in South-East Anatolia. It is also distributed in the eastern Mediterranean region of Turkey.
53	*S. pinnata*		+	+	Relatively widespread and abundant wherever suitable habitat exists.
54	˚*S. poculata*	+	+		Mainly distributed in East Anatolia and rarely in South-East and North Anatolia as small populations.
55	+,˚*S. pseudeuphratica*	+	+	+	Local and scarce species recorded from 3 restricted localities near Keban (Elazığ). It grows mainly on calcareous rocks and stony slopes and rarely on roadsides.
56	+*S. recognita*	+	+		In the study area, the species is known from several larger populations in Central Anatolia and a very small population in East Anatolia.
57	+,˚*S. reeseana*	+			Only recorded twice. It differs from the closest *S. bracteata* and *S. trichoclada* by entirely short crisp eglandular hairs.
58	+,˚*S. rosifolia*		+		Restricted to East and North-East Anatolia.
59	*S. russellii*		+	+	Relatively widespread and common throughout the studied regions of Turkey. It is similar to *S. verticillata* due to inflorescence axis features, but differs by habit, narrowly linear-oblong leaves, and acuminate (not mucronate) calyx teeth.
60	*S. sclarea*		+		Relatively widespread and common throughout the studied regions of Turkey.
61	˚*S. spinosa*			+	Widespread and common in South-East Anatolia.
62	˚*S. staminea*	+	+		Mainly distributed in East Anatolia and rarely in North Anatolia as small populations. It is characterised by much exserted stamens.
63	*S. suffruticosa*		+	+	Relatively widespread and abundant wherever suitable habitat exists. It is characterised by large yellow corollas and almost glabrous stems. Some populations in East Anatolia show hybridisation with those of *S. bracteata*.
64	*S. syriaca*		+	+	Relatively widespread and abundant wherever suitable habitat exists.
65	+*S. tchihatcheffii*	+	+		Recorded from several isolated populations in the study area. It is characterised by spike-like inflorescence and puberulent-ciliate calyces.
66	+,˚*S. tobeyi*	+		+	Only recorded 4 isolated populations. It grows in subalpine meadows and on grassy slopes.
67	*S. tomentosa*	+	+		Relatively widespread and abundant wherever suitable habitat exists. In East Anatolia only 1 record from Elazığ Province.
68	˚*S. trichoclada*		+		Widespread and common in East and South-East Anatolia.
69	*S. verbenaca*		+		Relatively widespread and abundant wherever suitable habitat exists.

Table 2. (Continued).

70	+,*S. *vermifolia*	+			Only recorded from 2 isolated populations in Sivas. It grows on igneous and serpentine slopes. It differs from the closest *S. candidissima* complex by linear leaves.
71	*S. *verticillata* ssp. *verticillata*	+	+		Relatively widespread and abundant wherever suitable habitat exists.
	*S. *verticillata* ssp. *amasiaca*	+	+		Relatively widespread and abundant wherever suitable habitat exists.
72	*S. *virgata*		+	+	Relatively widespread and abundant wherever suitable habitat exists.
73	*S. *viridis*		+		Relatively widespread and abundant wherever suitable habitat exists. It is the only annual species in Turkey.
74	+S. *wiedemannii*		+	+	In the study area, recorded from 6 collections and records in Central Anatolia. It is close to *S. pisidica* in the western Mediterranean region of Turkey, but differs by entire leaflet margins.
75	*S. *xanthocheila*		+		+ Known from some large populations in East Anatolia.
76	+S. *yosgadensis*	+	+		In the study area, recorded from 8 records and collections in Central Anatolia. It differs from the closest *S. frigida* by eglandular hairs covering all aerial parts.

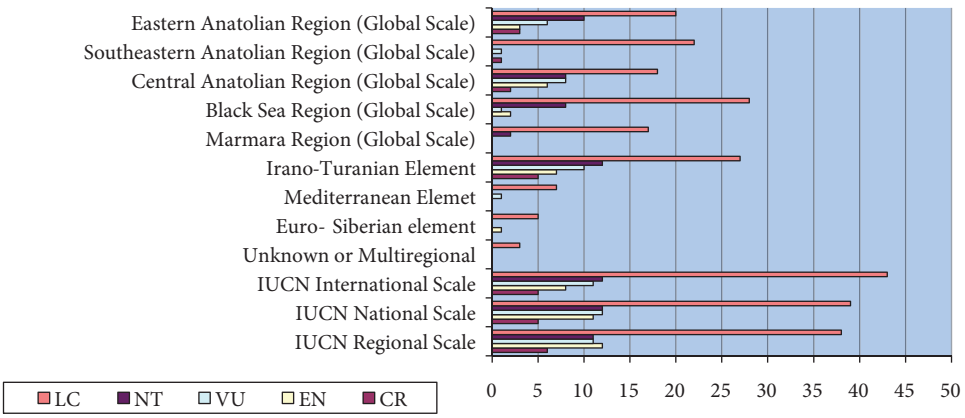

Figure 4. Distribution of the *Salvia* taxa according to the 2001 IUCN Red List categories at regional, national, and global scales, with phytogeographic elements and geographic regions.

known at no more than 10 locations (Table 1). They are also subject to serious threats such as construction, overgrazing, and land clearance (Table 2). There are 12 taxa evaluated as NT, since they may be qualified as threatened in the near future due to the threats given in Table 2. The remaining 39 nonendemic taxa are LC as they are widespread or abundant (Table 1).

As the distribution of the threatened taxa according to geographic region is considered, they are classified into the following threat categories at the global scale: in East Anatolia, 3 taxa CR, 3 taxa EN, 5 taxa VU, 10 taxa NT, and 30 taxa LC; in South-East Anatolia, 1 taxon CR, 1 taxon VU, and 22 taxa LC; in Central Anatolia, 2 taxa CR, 6 taxa EN, 8 taxa VU, 8 taxa NT, and 18 taxa LC; in North Anatolia, 2 taxa EN, 1 taxon VU, 8 taxa NT, and 28 taxa LC; and in the Marmara region, 2 taxa NT, and 17 taxa LC (Figure 4).

The distribution of taxa according to phytogeographical regions is as follows at the global scale: 62 taxa (78%) Irano-Turanian elements (5 taxa CR, 7 taxa EN, 10 taxa VU, 12 taxon NT, and 27 taxa LC), 8 taxa (10%) Mediterranean elements (1 taxon VU and 7 taxa LC), 6 taxa (8%) Euro-Siberian elements (1 taxon EN and 5 taxa LC), and 3 taxa (4%) unknown or multiregional elements (LC) (Table 1, Figure 4). Irano-Turanian elements are mainly found at higher altitudes than Mediterranean and Euro-Siberian elements. *S. cilicica* Boiss. & Kotschy, *S. fruticosa* Mill.,

and *S. napifolia* Jacq. are Mediterranean elements. *S. cilicica* grows in East Anatolia, whereas *S. fruticosa* and *S. napifolia* are distributed in the Marmara region. *S. amplexicaulis* Lam. and *S. nutans* L. are Euro-Siberian elements growing only in the Marmara region.

A total of 21 endemic and 19 nonendemic taxa are distributed only in the study area (Table 1). Figures 5-14 show their distribution maps and locations based on the recent taxonomic revision and herbarium materials.

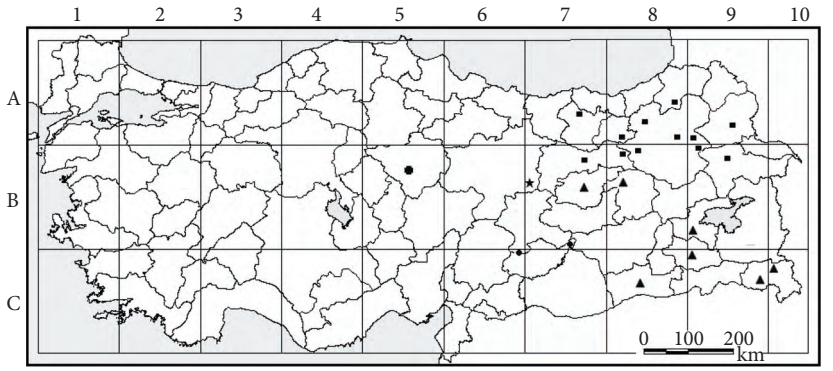

Figure 5. Distribution map of (■) *S. rosifolia*, (●) *S. ballsiana*, (★) *S. hedgeana*, (⬟) *S. freyniana*, and (▲) *S. macrochlamys*.

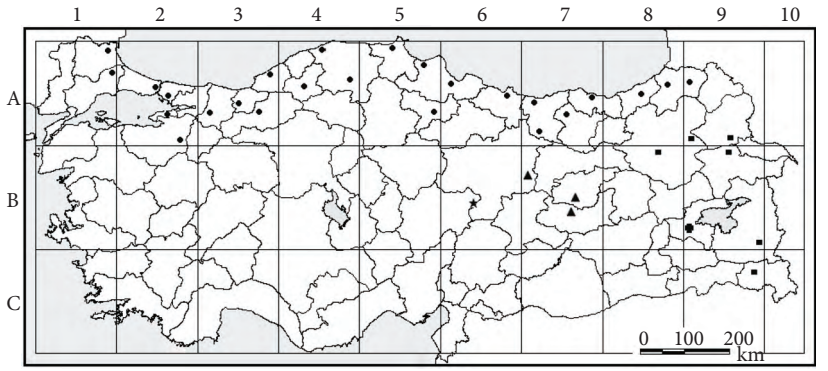

Figure 6. Distribution map of (■) *S. xanthocheila*, (●) *S. forskahlei*, (★) *S. eriophora*, (⬟) *S. odontochlamys*, and (▲) *S. cerino-pruinosa*.

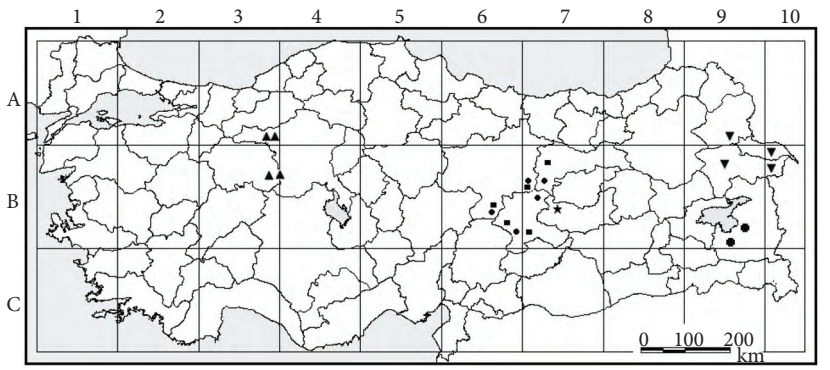

Figure 7. Distribution map of (■) *S. euphratica* var. *euphratica*, (●) *S. euphratica* var. *leiocalycina*, (★) *S. pseudeuphratica*, (⬟) *S. kronenburgii*, (▲) *S. aytachii*, and (▼) *S. hydrangea*.

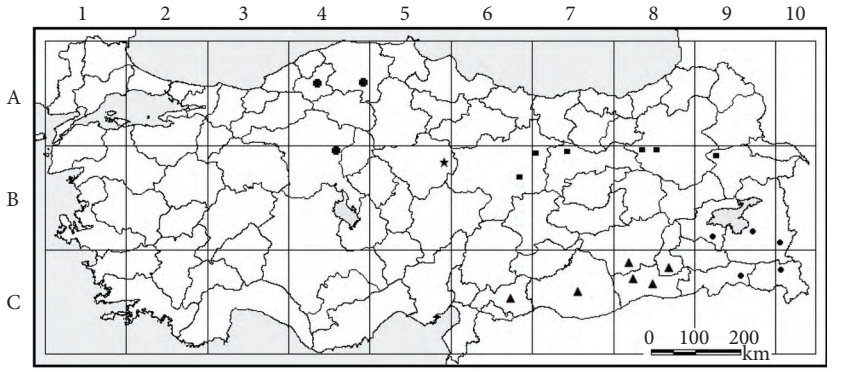

Figure 8. Distribution map of (■) *S. longipedicellata*, (●) *S. atropatana*, (★) *S. ekimiana*, (⬟) *S. tobeyi*, and (▲) *S. montbretii*.

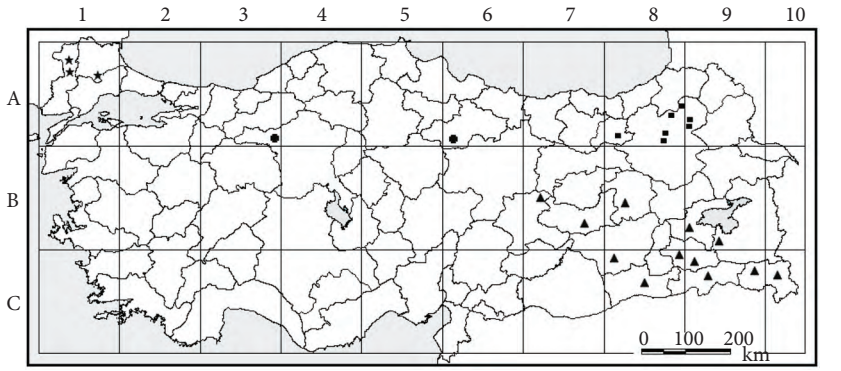

Figure 9. Distribution map of (■) *S. huberi*, (★) *S. nutans*, (⬟) *S. reeseana*, and (▲) *S. trichoclada*.

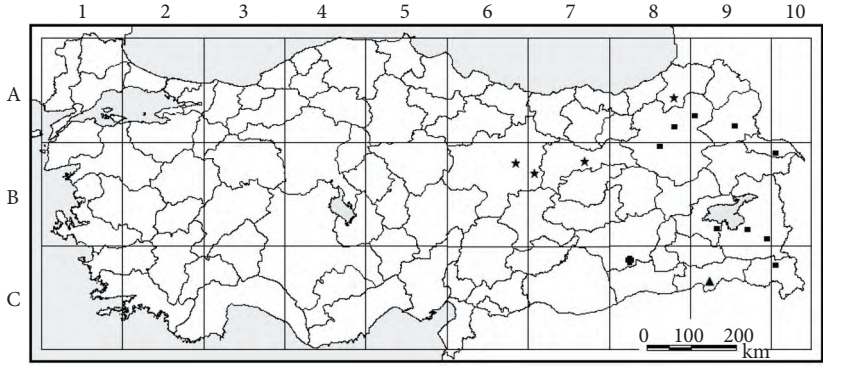

Figure 10. Distribution map of (■) *S. limbata*, (★) *S. divaricata,* (⬟) *S. macrosiphon*, and (▲) *S. kurdica*.

In comparison with neighbouring countries (Post, 1933; Pobedimova, 1954; Zohary, 1966; Hedge, 1972, 1982a; Mouterde, 1983) Turkey seems to have a higher number of *Salvia*. According to the present study, the research area contains 79 taxa, 36 of which are endemic. This is 77% of all the *Salvia* taxa in Turkey. Thus, there is a need to conserve such diversity, and the significance of conserving the full extent of

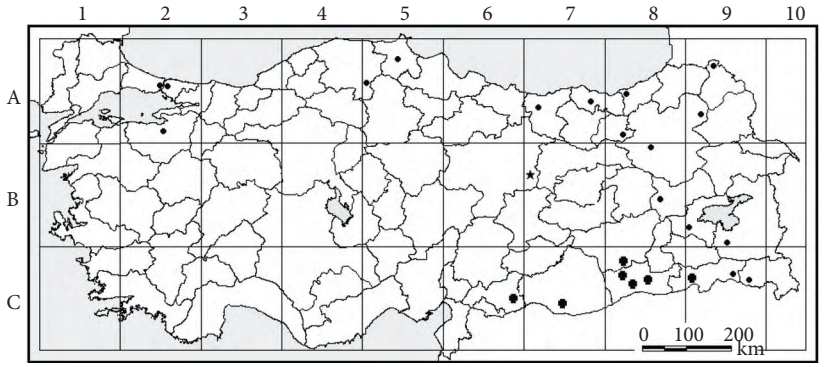

Figure 11. Distribution map of (●) *S. verticillata* var. *veticillata*, (★) *S. anatolica*, and (⬟) *S. spinosa*.

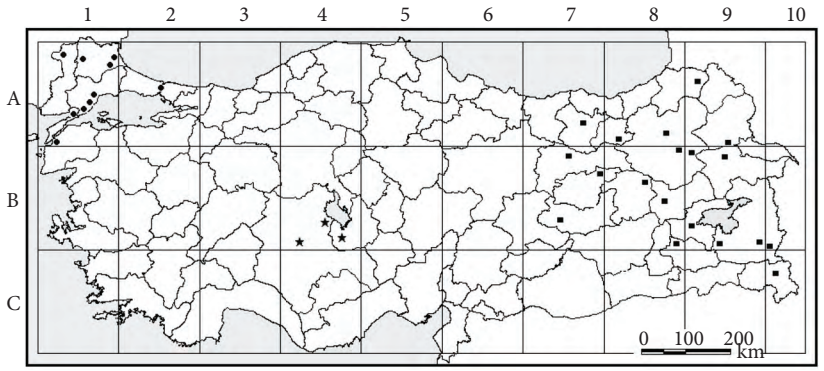

Figure 12. Distribution map of (■) *S. staminea*, (●) *S. amplexicaulis*, and (★) *S. halophila*.

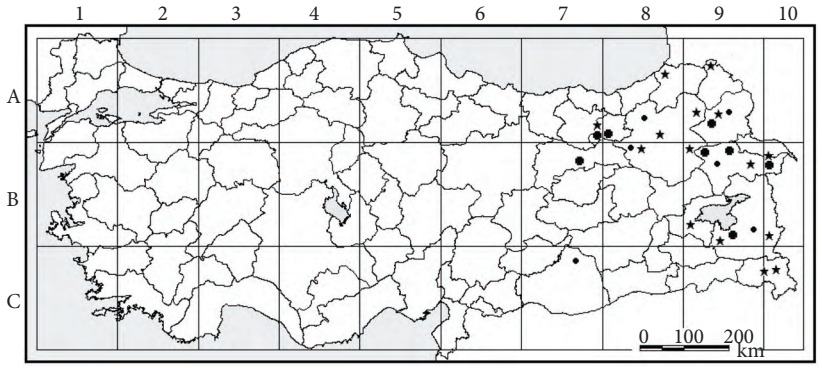

Figure 13. Distribution map of (■) *S. brachyantha*, (★) *S. nemorosa*, and (⬟) *S. pachystachys*.

natural ranges of the taxa is reflected in the IUCN threat criteria. According to our field observations, which were aimed at determining population size and possible threats, 40 taxa were classified into CR, EN, VU, or NT threat categories at the national level. There are 19 threatened endemic taxa restricted to only 1 geographic region (Central, East, or South-East Anatolia). Some taxa are relatively local and rare endemics, such as *S. anatolica*, *S. ballsiana*, *S. freyniana*, *S. odontochlamys*, and *S. pseudeuphratica*. The remaining 39 taxa are widespread and abundant wherever suitable habitat exists.

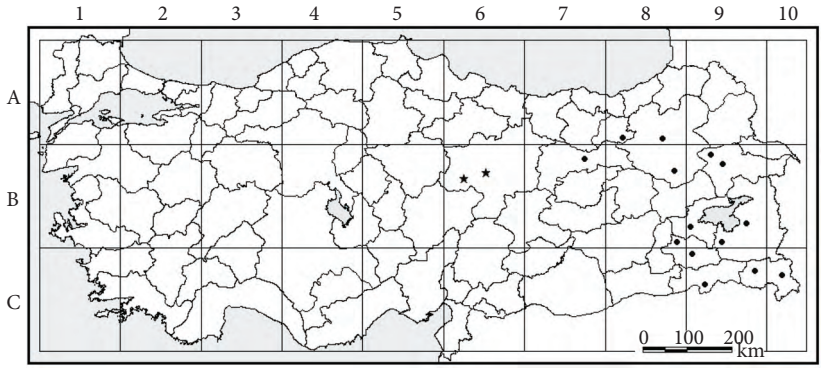

Figure 14. Distribution map of (●) *S. poculata* and (★) *S. vermifolia*.

Celep et al. (2010) showed that the Mediterranean and Aegean geographic regions of Turkey had 60 taxa, 32 of which were endemic and 5 of which were nonendemic rare; the remaining 23 taxa were widely distributed. A total of 18 endemic and 4 nonendemic taxa were found to be distributed only in the study area. Included in the study area were 39 taxa (15 endemics and 24 nonendemics) also investigated in the present study. The threat categories of 14 endemic and 2 nonendemic species show differences at the regional scale. *S. cilicica* was treated as VU in the previous study, but we evaluated it as CR since it was found at only one location and had a small population size. In our study, 7 species (*S. blepharochlaena*, *S. modesta*, *S. pilifera*, *S. recognita*, *S. tchihatcheffii*, *S. wiedemannii*, and *S. yosgadensis*) were assigned to VU instead of EN. Moreover, 6 species (*S. cadmica*, *S. caespitosa*, *S. absconditiflora*, *S. cyanescens*, *S. dicroantha*, and *S. hypargeia*) were evaluated as NT instead of VU. Finally, 2 nonendemic species (*S. glutinosa* and *S. russellii*) were also treated as LC instead of VU.

Overgrazing, construction (e.g., roads and dams), land clearing (e.g., agricultural practices), fire, urbanisation, and tourism are the main factors threatening the survival of the greatest number of *Salvia* taxa in the study area. They are either affected by a single threat or by a combination of several types. The threats, along with some comments for each taxon, are included in Table 2. Without necessary measures undertaken in a timely manner to lessen the effects of threats to plant conservation, plant diversity may decrease; some of the most threatened taxa, particularly those with small populations and restricted distribution, will most likely become extinct in the near future. Therefore, we recommend the following important measures: 1) the most threatened taxa should be monitored regularly; 2) special conservation programmes should be established for the areas richest in terms of the number of endemic taxa and ecologically sensitive areas; 3) the areas should immediately be modelled and managed with geographical information systems (GIS); 4) recovery programmes should be implemented for the establishment of new populations of the most threatened taxa; 5) habitat destruction due to human impact, especially overgrazing, construction, and agricultural activities, should be controlled; 6) damaged habitats should be rehabilitated or restored; 7) the most seriously threatened taxa should be cultivated in protected areas such as national parks and botanical gardens; and 8) the awareness of both the public and government should be increased in order to better protect and manage the threatened taxa.

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Appendix

S. absconditiflora Greuter & Burdet

Type: Turkey. B5/6: in Cappadocia orientali, Montbret 2282 (W!), *Aucher* 1531 (P).

A3 Zonguldak: Ereğli, Bulgar Mountain, 25.vi.1953, *H.Birand* 2725 *& M.Zohary* (ANK!); Ankara: Beypazarı, 1125 m, 4.vi.2005, *S.Bagherpour* 106; **A4** Çankırı: Çankırı-Ilgaz road, Akçavakıf village, 815 m, 13.vi.2007, *E.Karabacak* 5396 & *E.Cabi*; Ankara: Kızılcahamam to Çeltikçi, *Bozakman* & *Fitz* 902; **A5** Çorum: Iskilip, Kozviran, 1050 m, *M.Kılınç* 3723 (ANK!); **A6** Sivas: Koyulhisar, S. of Ordu, 1000 m, *Mathew & Tomlinson* 4391; **A7** Sivas: E. of Suşehri, v.1959, *Davis* 248 (E!); **B3** Eskişehir: Sivrihisar to Beylikdüzü 10 km to Beylikdüzü 39°37′053″N, 31°09′018″E, 888 m, 31.v.2006, *S.Bagherpour* 232; **B4** Ankara: Middle East Technical University, 39°10′122″N, 34°16′059″E, 1504 m, 20.v.2008, *S.Bagherpour* 438; Ankara: Beynam forest, 39°40′032″N, 32°54′403″E, 1487 m, 4.vii.2007, *S.Bagherpour* 130; Ankara: Haymana to Polatlı, 35 km to Polatlı, 39°28′205″N, 32°27′888″E, 1004 m, 14.v.2007, *S.Bagherpour* 392; Kırıkkale: Kırıkkale to Kırşehir, 5 km after Keskin, 40°04′027″N, 32°35′782″E, 1002 m, 10.vi.2008, *S.Bagherpour* 464; **B5** Yozgat: Saraykent to Akdağmadeni, 39°40′598″N, 35°47′259″E, 1328 m, 12.vii.2005, *S.Bagherpour* 173; Nevşehir: Nevşehir to Ürgüp, 8 km to Ürgüp, 38°36′555″N, 34°49′573″E, 1318 m, 29.v.2008, *S.Bagherpour* 442; **B6** Malatya: 1 km from Darende to Malatya, 38°30′32″N, 37°31′24″E, 1011 m, 16.v.2006, *A.Kahraman* 1107; Sivas: 5 km from Sivas to Yıldızeli, 39°43′738″N, 36°53′392″E, 1284 m, 5.vi.2006, *S.Bagherpour* 283; **B7** Sivas: foot of Dumlucadağ, 39°21′41″N, 38°03′16″E, 1500-1575 m, 18.v.2006, *A.Kahraman* 1166; **B8** Erzincan: Erzurum to Erzincan, near Tercan, 39°46′211″N, 40°24′437″E, 1447 m, 14.vii.2007, *A.Kahraman* 1477A.

S. anatolica Hamzaoğlu & A.Duran

Type: Turkey. B7 Sivas: 22 km from Divriği to Kemaliye, 1580 m, 30.v.2003, *A.Duran* 6159, *E.Hamzaoğlu & M.Sağıroğlu* (holo. KNYA, iso. GAZI! ANK! HUB!, hb. Yildirimli).

B7 Sivas: İliç to Divriği, 39°29′487″N, 38°06′830″E, 1350 m, 15.vii.2007, *A.Kahraman* 1482; Sivas: Kemaliye to Divriği, 39°31′286″N, 38°09′536″E, 1544 m, 2.vi.2008, *A.Kahraman* 1526; ibid., 6.vi.2006, *A.Kahraman & S.Bagherpour* 304.

S. aytachii Vural & Adıgüzel

Type: Turkey. B3 Ankara: Polatlı-Sivrihisar, 18 km from Polatlı, Acıkır, 840 m, 6.vi.1990, *Z.Aytaç* 3071, *H.Duman & N.Adıgüzel* (holo. GAZ!, iso. ANK!).

A3 Ankara: c. 10 km W of Beypazarı, Çayırhane, 40°06′705″N, 31°45′943″E, 623 m, 4.vi.2005, *S.Bagherpour* 109; Ankara: 2 km from Çayırhane to Beypazarı, 40°06′347″N, 31°43′359″E, 513 m, 4.vi.2005, *S.Bagherpour* 115; Ankara: Ayaş-Beypazarı, 10 km to Beypazarı, 650 m, 4.v.1986, *M.Vural* 4123 (GAZI!); Ankara: 5 km west of Beypazarı, 750 m, 8.v.1994, *T.Ekim* 9404

(GAZI!); **B3**: Eskişehir: 25 km from Polatlı to Sivrihisar, 870 m, *H.Duman* 5007 *& F.A.Karavelioğulları* (GAZI!); **B3/4** Ankara: Polatlı to Sivrihisar, 751 m, 10.v.2008, *S.Bagherpour* 412.

S. ballsiana (Rech.f.) Hedge

Type: Turkey. C6 Malatya: Karanik Dere, Erkenek to Geulbashe (Gölbaşı), Malatya, 1220 m, non-lime screes, 20.v.1935 *Balls* 2325 (holo. S, iso. ANK ! E! K!).

B7 Adıyaman: E. of Adıyaman, Gerger, above Kaşyazı village, near Dokuzdere, 38°03′277″N, 39°04′695″E, 1050-1160 m, 18.v.2008, *A.Kahraman* 1505 *& F.Celep*.

S. blepharochlaena Hedge *& Hub.-Mor.*

Type: Turkey. B6 Sivas: d. Kangal, Tecer-Gürün, Gipsschutt, 37 km nördlich Tecer, 1570 m, 27.vi.1955, *A.Huber-Morath* 13048 (holo. G!, iso. E!).

B4 Kırşehir: 5 km E of Sofular, 1500 m, *Sorger* 64-20-l; **B5** Nevşehir: Karlık to Yeşilöz, 38°33′195″N, 34°59′481″E, 1304 m, 29.v.2008, *S.Bagherpour* 447; **B6** Kayseri: Sarız to Pınarbaşı, near Aşağı Beyçayırı, 38°38′25″N, 36°26′28″E, 1650 m, 20.vii.2006, *A.Kahraman* 1355; ibid., 17.vi.2008, *A.Kahraman* 1492A; Sivas: 18 km from Kangal to Gürün, 1564 m, 16.vi.2007, *E.Karabacak* 5501 *&* E. Cabi; Sivas: Şarkışla, Alaman village, 1450-1500 m, 7.vi.1980, *T.Ekim* 4962 (E!).

***S. cadmica* Boiss.**

Lectotype: Turkey. C2 Denizli: in Cadmo orientalis (Honaz Da.) supra Colossam (Honaz), vi.1842, *Boissier* (holo G!, iso W!).

A3 Bolu: Seben, Karakiriş Mountain, Fitoz waterfall, 1040 m, 5.v.1999, *N.Aksoy* 1097 (AIBU!, ISTO!); **A4** Ankara: Ayaş Mountain, 1500 m, *Y.Akman* 6636 (ANK!); **A6** Samsun: Ladik, Sultan Mountains, *H.Birand* 2258 *& M.Zohary* (ANK!); **B3** Eskişehir: Sündiken Mountains, 1400 m, 5.vi.1971, *T.Ekim* 631 (E!); Eskişehir: Haymana-Sivrihisar, 13 km before Sivrihisar, 1120 m, 30.v.1956, *H.Demiriz* 2973 (E!); Konya: Sultan Mountain, 1100 m, 14.vi.1899, *Bornm.* 5427 (E!); Bilecik: Karaköy, 21.v.1950, *Heilbronn & Attila* (ISTF!); **B4** Ankara: Elmadağ, 1800-1900 m, 9.vi.2005, *F.Celep* 915; Ankara: Beynam forest, 6.vi.1961, *K.Karamaoğlu* 75 (ANK!).

S. caespitosa Montbret *&* Aucher ex Benth.

Type: Type. B6 Sivas: in Monte Sarutchitchek (Sariçiçek) in Cappadocia orientali, *Montbret* [2015] (iso. W!).

A6 Sivas: 36 km N of Sivas, 2000 m, *Sorger* 69-53-13; **B6** Sivas: Pınarbaşı to Gürün, near Güneşli village, 38°49′947″N, 42°03′517″E, 1869 m, 6.vii.2007, *A.Kahraman* 1404; Sivas: around Yağdonduran pass, 1650-1850 m, 8.vii.2006, *A.Kahraman* 1248; ibid., 15.vi.2006, *E.Karabacak* 5159; Sivas: Ulaş, Kurtlukaya to Boğazdere village, 39°23′142″N, 36°55′898″E, 1405 m, 20.vii.2006, *F.Celep & S.Bagherpour* 523; Kayseri: 3 km from Sarız to Pınarbaşı, 38°30′01″N, 36°29′53″E, 1700-1800 m, 8.vi.2006, *A.Kahraman* 1233; Kayseri: Pınarbaşı, E. of Şirvan Dağı, Keklikpınarı village, 38°42′824″N, 36°24′624″E, 1609 m, 11.vi.2008, *S.Bagherpour* 431; Kahraman Maraş: Nurihak Mountain to Elbistan, 2400 m, 17.vi.1960, *Stainton & Henderson* 5630 (E!); **B7** Sivas: Arapkir to Divriği, Sarıçiçek village, 1772 m, 25.vii.2008, *A.Kahraman* 1587; Malatya: Arapkir, J. Dörfler 916 (E!); Erzincan: Hochadur Mountain (Sernek Mountain nr Gemergop), *Sint.* 1890:2676.

S. cerino-pruinosa Rech.f.

Type: Turkey. Kharput, Karatasch, in declivibus supra Pekenik, Sintenis 698 (W!).

B7 Sivas: Divriği to Kemaliye, near Çobandurağı village, 1050-1100 m, 6.vi.2006, *A.Kahraman* 1188; Sivas: Divriği to Kemaliye, 30 km to Gümüşçeşme, 850-900 m, 6.vi.2006, *A.Kahraman* 1189; Elazığ: 20 km from Elazığ to Pertek, 850-915 m, 3.vi.2008, *A.Kahraman* 1530; Tunceli: between Elazığ and Tunceli, before 23 km from Tunceli, 910 m, 10.vi.1981, *E.Tuzlacı* 46666 (ISTE!).

S. cilicica Boiss. *&* Kotschy

Type: Turkey. C5 Niğde: in schistosis vinetorum pagi Anadscha Tauri Cilicici, in calcareis ad fluvium Bosantetchai (Pozanti Çay) in via inter Tarsous et Caesaream (Kayseri), 1220 m, 1855, *Balansa* 546 (holo. G!).

B6 Kahraman Maraş: Göksun, Ericek to Yeşilköy, 2-3 to Yeşilköy, 38°00′721″N, 36°44′568″E, 1411 m, 5.vii.2007, *A.Kahraman* 1390.

S. cyanescens Boiss. *&* Balansa

Type: Turkey. C5 Nigde: in collibus secus fluvium Kamechly Tchai (Kameçli çay) ad basin fluvii Masmeneu Dagh Cappadociae inter Tarsous et Caesaream, 14.vi.1856, *Balansa* 233 (holo. G!).

A2 Bursa: near Bursa, 7.vi.1929, H. Wolff (ANK!); **A3** Bolu: above Göynük, 912 m, 9.7.2006, *E.Karabacak* 4807, İ.Uysal *& G.Akaydın*; Bolu: Mudurnu, 802 m, 9.vii.2006, *E.Karabacak* 4818, *G.Akaydın & İ.Uysal*; **A4** Çankırı: Eldivan to Şabanözü, 40°28′682″N, 33°31′971″E, 1136 m, 5.vii.2005, *S.Bagherpour* 147; Kırıkkale: Koçubaba, near Bağlar, 1200 m, 14.vii.1990, *A.A.Dönmez* 2693 (GAZI!); **A5** Kastamonu: Tosya, Gavur Mountain, 1175 m, 14.vii.2007, *E.Karabacak* 5448 *& E.Cabi*; Çorum: Bayat, Aşağıpala village, 1200 m, 16.vii.1977, *M.Kılınç* 6524 (ANK!); Amasya: Amasya, 25.vi.1892, *Freyn* 1026 (E!); **A6** Samsun: Ladik, Sultan Mountain, 28.vi.1953, *H.Birand* 2290 *& M.Zohary* (ANK!); Sivas: Yıldız Mountain, Çırçır, 1400 m, 14.viii.1967, *Tobey* 2335 (E!); **A7** Gümüşane: Erzincan-Kelkit road, 1750 m, 1.viii.1957, *Davis* 31923 (ANK!); **B3** Eskişehir: Ankara to Sivrihisar, c. 40 km from Polatlı, 1000 m, *Dudley* (*Davis* 36014); **B4** Ankara: Elmadağ, 39°55′346″N, 33°15′826″E, 1084 m, 5.vii.2005, *S.Bagherpour* 135; Ankara: Ankara to Aksaray, near Şereflikoçhisar, 39°00′927″N, 33°27′092″ E, 1192 m, 3.vi.2006, *S.Bagherpour* 263; **B5** Yozgat: Akdağmadeni to Yıldızeli, 39°49′217″N, 36°19′432″E, 1323 m, 12.vii.2005, *S.Bagherpour* 175; Nevşehir: Zelve, 1050 m, 22.vi.1989, M. Vural et al. 5396 (GAZI!); **B6** Sivas: Sivas to Yıldızeli, 16.vii.2007, *A.Kahraman* 1488; **B7** Sivas: Suşehri-Zara road, above Suşehri, 2000 m, 26.viii.1957, *Davis* 32700 (ANK!).

S. dichroantha Stapf

Type: not indicated Turkey. C2 Muğla: inter Baschibunar (Başpınar) et Gurdef (Girdev), 19.vii.1882, *Luschan* (holo. WU, photo E!).

A3 Bolu: Göynük, Göynük-Mudanya road, 5 km after Hacıayan pass, 913 m, 9.vii.2006, *E.Karabacak* 4811; Ankara: Nallıhan, Karakiriş Mountain, near Belenözü village, 1175 m, 19.vii.1999, *N.Aksoy* 2038 (AIBU!, ISTO!); **A4** Bolu: Gerede to Aktaş, 1150 m, 16.viii.1976, *O.Ketenoğlu* 350 (ANK!); **A4/5** Kastamonu: Kastamonu to Taşköprü, Hirahasan village, 22.viii.1956, Özen (E!); **A5** Amasya: Merzifon, near Saraycık village, 872 m, 10.vii.2006, *E.Karabacak* 4878, *G.Akaydın &* İ.Uysal; Kastamonu: Yaralıgöz Mountain, 1360 m, 27.vii.1990, *E.Yurdakulol* 3091 (ANK!); **B3** Eskişehir: Polatlı to Sivrihisar, 39°32′576″N, 31°42′501″E, 816 m, 30.v.2008, *S.Bagherpour* 451; Konya: Ilgın, 2 km east of Zaferiye village, near Bulasan, 38°17′533″N, 32°00′983″E, 27.vii.2005, *S.Bagherpour* 215; **B4** Konya: Cihanbeyli, 38°38′117″N, 32°55′858″E, 884 m, 23.vii.2005, *S.Bagherpour* 202; **B5** Niğde: Aksaray to Sultan Saray, 1200 m, D. 32809; **B6** Sivas: Kangal to Gürün, 38°53′400″N, 37°16′068″E, 1765 m, 16.vii.2007, *A.Kahraman* 1487; Sivas: Zara, near Adamfakı village, 39°52′280″N, 37°56′995″E, 1650 m. *S.Bagherpour* 517; Kayseri: Sarız, Yukarı Kırkısrak village, 38°26′414″N, 36°40′968″E, 1680 m, 23.vii.2008, *A.Kahraman* 1582; **B7** Elazığ: Elazığ, 28.x.1964, *F.Sayi* (E!); **C4** Konya: 12 km west of Konya, *Davis* 16128.

S. divaricata Montbret & Aucher ex Benth.

Type: Turkey. B7?: in Cappadocia orientali [ad Euphratem], *Aucher* [1528] (holo. G!).

A8 Çoruh: Gorgotachan, S. of Artvin, 19.vii.1911, *Woronow* 920 (type of *S. trigonocalyx*) (E!, K!); **B6** Sivas: 26 km north of Sivas-Zara-Divriği road, 1412 m, 11.vii.2006, *E.Karabacak* 4909, *G.Akaydın &* İ.Uysal (CBB!); **B7** Sivas: 26 km from Divriği to Kemaliye, 39°31′14″N, 38°09′40″E, 1535 m, 9.vii.2006, *A.Kahraman* 1260; Erzincan: Mercan Mountains, 39°38′064″N, 39°30′637″E, 1528 m, 26.vii.2008, *A.Kahraman* 1595.

S. ekimiana Celep & Doğan

Type: Turkey. B5 Yozgat: above Akdağmadeni, Aktaş region, 39°35′157″N, 35°50′014″E, 1700-2000 m, 16.vi.2007 *F.Celep* 1214 (holo. ANK!, iso. E!, K!, GAZI!).

S. eriophora Boiss. & Kotschy

Type: Turkey. C5 Adana/Niğde: ab Jool Baatch (Yol Bahçe) ad radices montis Allahdagh (Ala Da.) Ciliciae, 1525 m, 3.vi.1859, *Kotschy* 229 (G!, iso. BM!, W!, K!).

B6 Kayseri/Sivas: near Güneşli village, 38°52′054″N, 36°51′744″E, 1878 m, 17.v.2008, *A.Kahraman* 1495; Kayseri/Sivas: Pınarbaşı to Gürün, 45-50 km to Gürün, 1870 m, 18.v.2007, *A.Kahraman* 1363.

S. euphratica Montberet & Aucher ex Benth.

var. ***euphratica***

Syntype: Turkey. B6/7 Malatya: in Cappadocia orientali, *Aucher* 1516 (holo. G!).

B6 Malatya: 1-1.5 km from Darende to Malatya, 1000-1030 m, 16.v.2006, *A.Kahraman* 1098; Sivas: Gürün to Kangal, 1455 m, 1.vi.2008, *A.Kahraman* 1510B; **B7** Malatya: Beydağı Mountain, between Gündüzbey and Kozluk, 1400 m, 16.v.2006, *A.Kahraman* 1116; Sivas: between Karasarbeli pass to Kayaburun village, 1505 m, 6.vi.2006, *A.Kahraman* 1155A; Erzincan: *İliç to Refahiye, before 3 km from Kuzkışla village, 1344 m, 25.vii.2008, A.Kahraman* 1592B.

var. *leiocalycina* (Rech.f.) Hedge

Syntype: Turkey. B7 Erzincan: Egin (Kemaliye), Salachlü (Salihli), in siccis montium, 25.vi.1890, *Sintenis* 1890: 2753 p.p. (holo. W!, iso LD, WU).

B6 Malatya: 64 km from Darende to Malatya, near Develi village, 1325 m, 7.vi.2006, *A.Kahraman* 1216; Sivas: 9 km from Gürün to Gökpınar, 1544 m, 1.vi.2008, *A.Kahraman* 1511A; **B7** Malatya: Arapkir to Divriği, near Çiğnir village, 1268 m, 25.vii.2008, *A.Kahraman* 1585(A); Sivas: Divriği to Kemaliye, near Demirdağ bridge, 1020 m, 6.vi.2006, *A.Kahraman* 1172; Erzincan: Kemaliye, near Gümüşçeşme village, river, 1120 m, 13.vii.2005, *F.Celep* 883A.

S. freyniana Bornm.

Type: Turkey. B5 Kayseri/Yozgat: inter Caesaream (Kayseri) et Yosgad (inter pagos Köprüköi et Keller), 900-1100 m, 23.vi.1890, *Bornmüller* 1730 (iso. BM!, G!, K!, LD, W!, Z).

B5 Yozgat: S. of Yozgat, Yozgat to Boğazlıyan, near Yenipazar, Kaşkışla village, 39°30′553″N, 35°06′970″E, 1100-1200 m, 4.vi.2006, *A.Kahraman & S.Bagherpour* 277.

S. halophila Hedge

Type: Turkey. B4 Niğde: 2 km E of Sultanhanı, between Aksaray and Konya, south of the Tuz Gölü, 950 m, salt marsh (now dry), 31.viii.1957, *Davis & Hedge, D.* 32815 (holo. E! iso. BM!, K!).

B4 Konya: Cihanbeyli, Gölyazı, 38°32′244″N, 33°23′323″E, 910 m, 23.vii.2005, *S.Bagherpour* 203; Aksaray: Sultanhanı to Aksaray, 35 km to Aksaray, 38°15′197″N, 33°34′712″E, 915 m, 23.vii.2005, *S.Bagherpour* 204; **C4** Konya: Konya to Kadınhanı, *Davis* 14771.

S. hedgeana Dönmez

Type: Turkey. B7 Sivas: Divriği, Dumlucadağ, Karasar pass, above Kayaburun village, 1600 m, steppe, 15.vi.1995, *AAD* 4579, slide no: *AD* 1390, *AD* 1391 (holo HUB! iso E!).

B7 Sivas: Divriği, Karasar pass, above Kayaburun village, 39°16′53″N, 38°00′00″E, 1460 m, 6.vi.2006, *A.Kahraman* 1159; Divriği to Mursal, 39°15′889″N, 38°00′466″E, 1217 m, 2.vi.2008, *A.Kahraman* 1521A.

S. heldreichiana Boiss. ex Bentham

Syntypes: Turkey. C5 İçel: in monte Tauro prope Gülek Boghas, Kotschy 437 (G!); B4 Konya: in collibus aridis Lycaoniae ad Karaman, *Heldreich* (G!).

B4 Ankara: Kırıkkale, 1040 m, *E.Yurdakul* 2346 (ANK!); **C5** Niğde: 20 km from Ulukışla, 12.vi.1937, *Reese*.

S. huberi Hedge

Type: Turkey. A8 Erzurum: Yusufeli - Erzurum road, soil slopes, corolla pinkish mauve, 1100 m, 9.vii.1960, *Stainton & Henderson* 6104 (holo. E! iso. K!).

A8 Erzurum: 41 km from Erzurum to Tortum, 40°13′341″N, 41°28′545″E, 2121 m, 14.vii.2006, *A.Kahraman* 1474; Balıklı to Öğüt, 40°38′32″N, 41°36′50″E, 1425-1455 m, 11.vii.2006, *A.Kahraman*

1295; Erzurum; 7 km from Tortum to Oltu, 1500-1700 m, 17.vii.1990, *Z.Aytaç* 3147 (GAZI!); Erzurum: 15 km from Olur to Yusufeli, near Buzluca village, 930 m, 2.vii.2002, *A.A.Dönmez* 11073 (HUB!, GAZI!); Bayburt: Bayburt-Maden road 12. km, 1615 m, step, yamaçlar, 12.vii.2006, *E.Karabacak* 4979, *G.Akaydın &* İ.Uysal; **A9** Erzurum: Oltu-Narman road, near Şehitler village, 40°35′959″N, 42°03′923″E, 1375 m, 14.vii.2007, *A.Kahraman* 1472; Erzurum, Oltu, near Dutluca village, 1285 m, 2.vii.2002, *A.A.Dönmez 11058* (HUB!).

S. hypargeia Fisch. & Mey.

Type: Turkey. B4 Kırşehir: inter Karadjeli (İsahocalı) et Gaman (Kaman), 900 m, 1849, *Tchihatcheff* (holo. P).

A3 Ankara: Kızılcahamam, near Çamlıdere, 40°26′627″N, 32°24′992″E, 1124 m, 2.vii.2005, *S.Bagherpour* 160; Zonguldak: Ereğli, N. slopes of Bulgar Mountain, 25.vi.1953, *H.Birand* 2721 *& M.Zohary* (ANK!); **A4** Kastamonu: İhsangazi, Dağyolu to Akkirpi village, 1139 m, 13.vi.2007, *E.Karabacak* 5425 *& E.Cabi*; Karabük: Keltepe, Kayabaşı, 1200 m, 12.vii.1984, *M.Demirörs* 1551 (ANK!); Çankırı: Ilgaz, 1000 m, Bornmueller 1929:13503; **A5** Kastamonu: Tosya, Gavur Mountain, 1117 m, 14.vi.2007, *E.Karabacak* 5441 *& E.Cabi*; **A7** Gümüşhane: Maden-Bayburt road 5 km, taşlı yamaçlar, 5.vii.1969, *H.Demiriz* 24045 (ISTF!); **B4** Ankara: Ayaş pass, 40°05′125″N, 32°26′470″E, 1189 m, 4.vi.2005, *S.Bagherpour* 119; **B5** Aksaray: Kızılkaya village, near Lalelik, 1200 m, 23.v.1994, *F.Ertuğ* 40 (GAZI!); Kayseri: Alidağ, 1200-1300 m, 22.vi.1983, M. Koyuncu 6055 (AEF!); Nevşehir: Ürgüp to Ortahisar, 1120 m, 20.vii.1989, *M.Vural et al.* 5278 (GAZI!); Niğde: Mucur, *Davis* 21824; **B6** Sivas: 9 km from Gürün to Gökpınar, 38°39′51″N, 37°18′05″E 1525 m, 7.vi.2006, *A.Kahraman* 1228; Kayseri: Pınarbaşı to Sarız, 3-4 km to Sarız, 38°30′01″N, 36°26′53″E, 1692 m, 8.vi.2006, *A.Kahraman* 1234; Kahraman Maraş: near Afşin, 38°14′814″N, 36°51′472″E, 1442 m, 5.vii.2007, *A.Kahraman* 1392; Malatya: 64 km from Darende to Malatya, near Develi village, 38°22′59″N, 37°55′25″E, 1326 m, 7.vi.2006, *A.Kahraman* 1215; **B7** Sivas: Divriği to Kemaliye, near Demirdağ Bridge, 39°25′29″N, 38°06′27″E, 1017 m, 6.vi.2008, *A.Kahraman* 1173; Erzincan: Çiğdemli village, 39°35′30″N, 38°44′09″E, 1268 m, 9.vii.2006, *A.Kahraman* 1268; Malatya: Arapkir, *Sint.* 1889:858; Elazığ: Keban Maden, *Sint.* 1889:844; Tunceli: 10 km N of Pertek, 1800 m, *It. Leyd.* 1959:1572.

S. kronenburgii Rech.f.

Type: Turkey: B9 Van: Wan, auf vulkanischem Boden, 2500 m, 27. vi.1899, *Kronenburg* 167 (holo. WU).

B9 Van: Van to Gürpınar, near Kurubaş pass, 2120 m, 11.vii.2007, *A.Kahraman* 1454; Van: 5 km from Köşebaşı village to Van, 1975 m, 8.vi.2008, *A.Kahraman* 1575; Van: Çatak, 2 km north of Micinger suyu, 1900 m, 25.vii.1954, *Davis & Polunin* 23234 (ANK!).

S. longipedicellata Hedge

Type: Turkey. B8 Erzurum: between Ilıca and Tercan, near the turning to Aşkale, 1850 m, 10.vii.1957, *Davis & Hedge*, *D.* 30875 (holo. E! iso. ANK! BM! K!).

B6 Sivas: Zara to Kangal, 3 km to Külekli, 39°21′624″N, 37°39′978″E, 1484 m, 20.vii.2008, *S.Bagherpour* 528; **B7** Sivas: İmranlı to Zara, near Adamfakı village, 39°52′280″N, 37°56′995″E, 1650 m, 20.vii.2008, *S.Bagherpour* 519; Erzincan: 2 km from Refahiye to Erzincan, 1540 m, 9.vii.1979, *B.Çubukçu, E.Tuzlacı & M.Saraçoğlu* 42564 (ISTE!); **B8** Erzurum: near Erzurum, 40°04′487″N, 42°07′471″E, 1779 m, 29.vii.2008, *A.Kahraman* 1608; Erzurum: near Aşkale, 39°58′729″N, 40°33′729″E, 1742 m, 29.vii.2008, *A.Kahraman* 1609! **B9** Ağrı: 60 km from Ağrı to Horasan, 2081 m, 12.vii.2007, *A.Kahraman* 1459.

S. modesta Boiss.

Type: Turkey. B5 Kayseri: in Cappadociae regione subalpina rnontis Argaei (Erciyas Da.) in valle Kamechly Tchai (Çomakli çay), 1700 m, 16.vi.1856, *Balansa* 242 (holo. G!).

B5 Kayseri: Erciyes Mountain, 1800 m, 17.vi.1964, *M.Zohary & Plitm.* 17600-7 (E!).

S. odontochlamys Hedge

Type: Turkey. B9 Bitlis: Kambos Mountain, above Hürmüz, 2100 m, 30.vi.1954, *Davis & O. Polunin, D.* 23385 (holo. K!).

B9 Bitlis: Kambos Mountain, above Hürmüz, 38°19′408″N, 41°58′079″E, 2280 m, 9.vi.2008, *A.Kahraman* 1579H.

S. pilifera Montbret & Aucher ex Benth.

Syntypes: Turkey. C6 Adiyaman: ad Akdağ in Tauro orientali [nr Besni, 1834], *Aucher* [1927, 1952] (G!).

B7 Adıyaman: E. of Adıyaman, Gerger, above Kaşyazı village, 38°03′244″N, 39°04′695″E, 1159 m, 18.v.2008, *A.Kahraman* 1504; Malatya: 5 km E of Malatya, 1320 m, *Hub.-Mor.* 8973; **C6** Adıyaman: Gölbaşı, N.E. of Harmanlı, 37°51′328″N, 37°45′478″E, 946 m, 3.v.2008, *F.Celep* 1420; Gaziantep: Sof Mountain, 1450-1500 m, 24.vi.1978, *T.Ekim* 3729 (ANK!).

S. pseudeuphratica Rech.f.

Type: Turkey. B7 Elazığ: Keban-Maden, in declivibus saxosis, 20.vi.1889 (*Sintenis* no. 817, Typus in hb. Mus. Wien, E!).

B7 Elazığ: 5 km from Keban to Elazığ, 850-900 m, 7.vi.2006, *A.Kahraman* 1200; Elazığ: 1.5-2 km from Keban to Elazığ, 750-800 m, 24.v.2007, *A.Kahraman* 1384; Elazığ: 3-4 km from Keban to Elazığ, 800-860 m, 24.v.2007, *A.Kahraman* 1385.

S. recognita Fisch. & Mey.

Type: Turkey. B5 Kayseri: Ali-Dagh, prope Kaiseriam (Kayseri), 1849, *Tchihatcheff* (holo. P).

A4 Ankara: Kalecik to Akyurt, 40°08′724″N, 33°21′351″E, 1052 m, 7.vii.2005, *S.Bagherpour* 154; Çankırı: Eldivan-Ankara road, Eldivan Dam, 40°31′331″N, 33°27′093″E, 1199 m, 1.vi.2006, *S.Bagherpour* 257; **A5** Çorum: İskilip, Gökçebel, 1.vi.1988, *F.Görücü* 59913 (ISTE!); **B4** Ankara: Ankara, 900 m, *Balls* 2372; **B5** Kayseri: 6 km N of Develi, Çomaklı village, 38°27′985″N, 35°31′552″E, 1740 m, 22.vii.2006, *S.Bagherpour* 380; Nevşehir: Ürgüp, 1300 m, *Stainton* 8466; **B7** Tunceli: above Selepur, 1500

m, 23.vii.1957, *Davis* 31607 (ANK!, E!, K!).

S. reeseana Hedge & *Hub.-Mor.*

Type: Turkey. A6 Tokat: 15 km südlich von Tokat am Wegbnach Artova-Sivas, c. 1400 m, 14.vi.1939, *H.Reese* (holo. Hb. *Hub.-Mor.*!).

A3 Ankara: Beypazarı, Elma beli, 700 m, 27.v.1971, *Y.Akman* 957 (ANK!).

S. rosifolia Sm.

Type: Turkey. in Armenia legit Tournefort ('Salvia armenia foliis alatis crenatis minoribus odores mari', holo. BM!, iso. *P-Tourn.* 1121).

A7 Gümüşhane: Zigana pass, 27.vii.1949, *A.Heillbronn & M.Başarman* 8196 (ISTF!); Bayburt: 5 km from Maden to Bayburt, 5.vii.1969. *H.Demiriz* 24045 (ISTF!). **A8** Erzurum: Narman-Pasinler road, near Yanıktaş village, 1682 m, 14.vii.2006, *E.Karabacak* 5098, İ.Uysal & G.Akaydın; Erzurum: İspir, Numanpaşa pass, 1650 m, 28.vii.1991, *A.Güner 9817, T.Ekim, M.Koyuncu & H.Karaca* (GAZI!, HUB!); Artvin: Yusufeli to Olur, near Sakartepe-Bulanık bridge, 750-900 m, 17.v.2004, *H.Duman 9422 & Z.Aytaç* (GAZI!); Bayburt: Aşkale-Bayburt road, 2 km before Aşağıkop village, 1941 m, 9.vii.2007, *E.Karabacak 5625 & E.Cabi*; **A9** Kars: 28 km from Kağızman to Kars, 40°16′875″N, 42°57′084″E, 1834 m, 13.vii.2007, *A.Kahraman* 1471; Erzurum: Horasan, 1600 m, 8.vi.1957, *Davis* 29366 (ANK!); **B7** Erzincan: Yaylabaşı, 1300-1400 m, 27.v.1995, *A.A.Dönmez* 6012 (HUB!); **B8** Erzurum: Ilıca-Tercan road, 1900 m, 10.vii.1957, *Davis* 30850 (ANK!); Erzurum: Ağrı to Horasan, 1800 m, Lamond 2589; Erzincan: Tercan to Erzurum, 1800 m, *Hub.-Mor.* 15296; **B9** Ağrı: Karaköse, Aktaş village, *T.Baytop* 4795 (1STE!).

S. tchihatcheffii (Fisch. & Mey.) Boiss.

Type: Turkey: B4 Ankara: in vallibus herbosis sylvaticis montis, Kure-dagh (Galatia), 950 m, *Tchihatcheff s.n.* (G!).

A3 Eskişehir: Mayıslar, 400 m, *T.Ekim* 201. **A4** Ankara: Middle East Technical University (METU), 39°51′586″N, 32°47′481″E, 972 m, 24.v.2005, *S.Bagherpour* 102; Çankırı: Çakmaklı stream, 800 m, vi.1929, *Bornm.* 13490 (BM!); **B3** Eskişehir: Eskişehir to Kütahya, 880 m, 13.vi.1954, *H.Demiriz* l780 (E!); **B4** Ankara: Haymana, Karayavşan village, 850, 8.vi.1983, *Y.Akman* 13230 (ANK!).

S. tobeyi Hedge

Type: Turkey. A4 Kastamonu: Guiardagh (Gavur Da., c. 7 km NW of Tosya), in pascuis subalpinis, 13.vi.1892, *Sintenis* 3913 (holo. LD iso. B, E!, W!, Z).

A4 Kastamonu: Ilgaz Mountain, 35 km S of Kastamonu, Ilgaz Haceti hill, 2100 m, 28.vi.1971, *Edmondson* 520 (E!); Karabük, Keltepe, 1800-2000, 24.vi.2009, *F.Celep* 1759; **B4** Ankara: Elmadağ, above Yeşildere, İdris Mountain, 1400-1700 m, 20.v.2010, *S.Bagherpour* 537 & H. Çıldır.

S. vermifolia Hedge & *Hub.-Mor.*

Type: Turkey. B6 Sivas: Sivas-Ulaş, Hügel, Eruptivgestein 27 km südlich Sivas, 1450 m, 27.vi.1955, *A.Huber-Morath & Ch.Simon, Hub.-Mor. 13040* (holo. E! iso. Hb. *Hub.-Mor.*!).

B6 Sivas: Ulaş, Kurtlukaya to Boğazdere village, 39°23′142″N, 36°55′898″E, 1495 m, 20.vii.2008, *S.Bagherpour* 521; Sivas: 5-6 km from Şarkışla to Altınyayla, 1332 m, 3.vii.2009, *F.Celep* 1475.

S. wiedemannii Boiss.

Type: Turkey: A3 Ankara: prope Kadikioi, *Wiedemann* [340] (holo. G!).

A3 Ankara: Beypazarı, 40°10′289″N, 31°51′520″E, 741 m, 31.v.2006, *S.Bagherpour* 237; **A4** Ankara: 13 km E of Beypazarı, 700 m, *Soger* 73-42-9; **B3** Eskişehir: 20 km from Alpu to Mihallıçık, 39°49′102″N, 31°09′677″E, 849 m, 11.v.2008, *S.Bagherpour* 418; Eskişehir: Sivrihisar, 10 km to Beylikova, 39°37′053″N, 31°09′018″E, 888 m, 31.v.2006, *S.Bagherpour* 231; **B4** Ankara: 21 km from Polatlı to Ankara, 39°34′541″N, 31°55′304″E, 751 m, 10.v.2008, *S.Bagherpour* 413.

S. yosgadensis Freyn & Bornm.

Type: Turkey. B5 Kayseri/Yozgat: inter Caesaream (Kayseri) et Yosgad (Yozgat), 1400 m, 23.vi.1890, *Bornmüller* 2175 (holo. B).

A4 Ankara: 29 km from Polatlı to Sivrihisar, 39°33′845″N, 31°48′664″E, 880 m, 30.v.2008, *S.Bagherpour* 449; **B3** Eskişehir: 11 km E of Eskişehir, 800 m, *Sorger* 64-11-22; **B4** Aksaray: Hasan Mountain, Helvadere, 38°10′259″N, 34°10′742″E, 1635 m, 3.vi.2006, *S.Bagherpour* 265; Ankara: Ankara to Konya, 1100 m, *E.Tuzlacı* 39873 (ISTE!); Konya: Sarayönü to Cihanbeyli, 870 m, *Hub.-Mor.* 14215; **B5** Yozgat: Büyükyaptı village, 39°56′675″N, 33°54′914″E, 884 m, 4.vi.2006, *S.Bagherpour* 266; Nevşehir: Nevşehir to Gülşehir, 12 km to Gülşehir, 38°44′155″N, 34°40′299″E, 938 m, 29.v.2008, *S.Bagherpour* 441.