

Journal of Scientific Perspectives

Volume 3, Issue 1, Year 2019, pp. 69-84

E - ISSN: 2587-3008

URL: <http://ratingacademy.com.tr/ojs/index.php/jsp>

DOI: 10.26900/jsp.3.008

Research Article

**RARE AND ENDEMIC TAXA OF LAMIACEAE IN TURKEY AND
THEIR THREAT CATEGORIES***

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Received: 6 January 2019; Accepted: 26 January 2019

ABSTRACT

Lamiaceae (Labiatae) is the third largest family in Turkey. It is represented by 48 genera and 782 taxa (603 species, 179 subspecies and varieties) in the country, 346 taxa (271 species, 75 subspecies and varieties) of which are endemic. Endemism ratio is ca. % 44. The largest genera in the country based on the taxon number are Stachys L. (118 taxa), Salvia L. (107 taxa), Sideritis L. (54 taxa), Phlomis L. (53 taxa), Teucrium L. (49 taxa), Thymus L. (47 taxa). Endangered genera according to IUCN criteria; Salvia L. (43 taxa), Stachys L. (19 taxa) Thymus L. (16 taxa), Sideritis L. (14 taxa), Teucrium L. (10 taxa), Lamium L. (8 taxa), Phlomis L. and Scutellaria L. (7 taxa), Micromeria Benth and Nepeta L. (6 taxa), Ajuga L. and Origanum L. (5 taxa), Marrubium L. (4 taxa), Acinos Miller, Satureja L. and Calamintha Miller (2 taxa), Ballota L., Dorystaechas Boiss. & Heldr. ex Benth, Cyclotrichium (Boiss.) Manden. & Scheng. and Lophanthus Adans. (1 taxon). Lamiaceae has 160 taxa endangered in Turkey of which are categories; 43 taxa critically endangered, 59 taxa endangered and 58 taxa vulnerable. Phytogeographic distribution of rare and endemic Turkish Lamiaceae taxa are 79 taxa in the Mediterranean, 63 taxa in the Irano-Turanien, 5 taxa in the Euro-Siberian phytogeographic region, and 11 taxa in unknown or multiregional phytogeographical elements. This study was carried out to draw attention to the endangered and vulnerable taxa in Lamiaceae family and to indicate which phytogeographic regions these taxa are more widely distributed.

Keywords: Lamiaceae, Threat categories, Turkey.

1. INTRODUCTION

Turkey is among the richest countries in the World in terms of plant diversity. With around 11.707 flowering plant species, the flora is the richest of any country in Europe, North Africa and Middle East. (Davis 1982, Davis et al. 1988, Güner et al. 2000, Güner 2012).

Wild Flowering Plants in Turkey (Güner 2012)

* The first version of this paper is presented in the "2nd International Conference on Awareness" held in Kepez/Çanakkale on December 13-15, 2018.

<u>Family</u>	<u>Genera</u>	<u>Species</u>	<u>Subspecies</u>	<u>Varietes</u>	<u>Total infrageneric taxa</u>
167	1320	9996	1989	867	11707

The main reasons for this wealth are as follow;

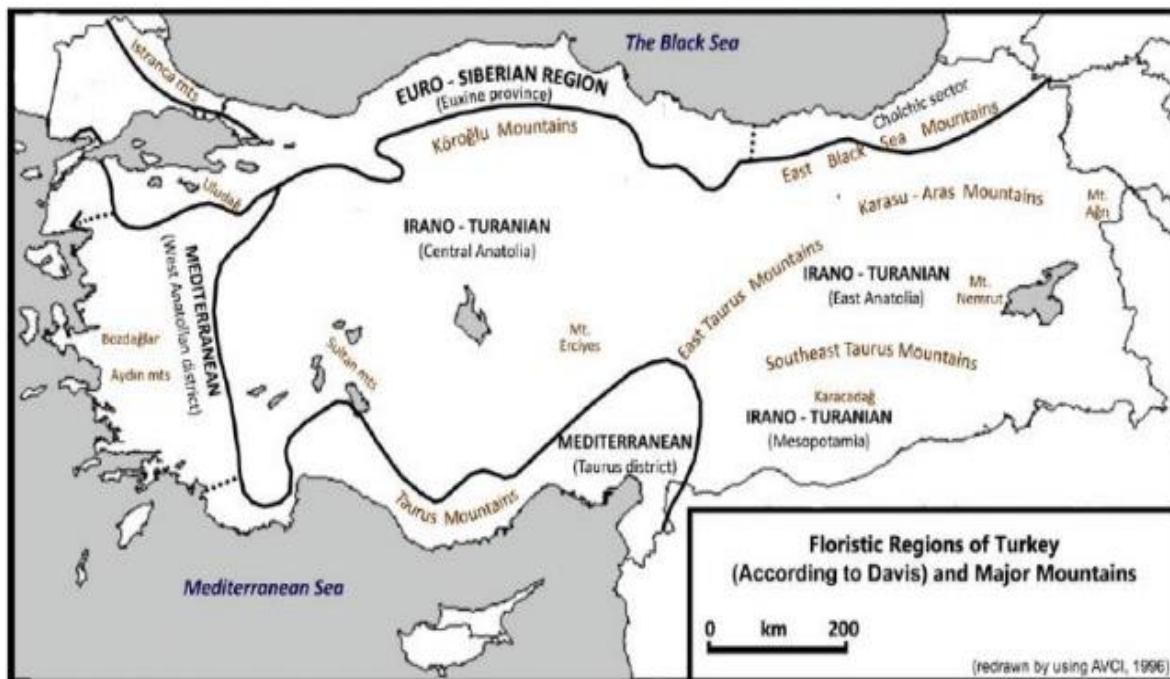
- A variety of climates
- Topographical diversity with marked changes in ecological factors over short distance
- Geological and geomorphic variation
- A range of aquatic environments such as seas,lakes and rivers
- Altitude variations from sea level to 5000 (Ekim and Güner 2000).

The situation of the country at the junction of three major phytogeographical regions:

- Mediterranean
- Irano-Turanian
- Euro-Siberian

There are the number of major mountain ranges in Anatolia which constitute effective barriers and these have further encouraged a greater diversity of species. Additionally, during many historical periods, Anatolia has served as a passage way between the continents of Europe, Asia and Africa, resulting in dispersal of a wide variety of plants and animals (Anonim 1996). All these factors combined have provided many opportunities for the plants to evolve and differentiate creating the present wealth of species now estimated to be over 11.707 taxa, about one third of which are endemic (3649 taxa) (Güner 2012). Lamiaceae is the third largest family in Turkey. The family has 48 genera and 782 taxa, 346 taxa of which are endemic (ca. 44 %) in the country (Celep and Dirmenci 2017).

Figure 1. Phytogeographic regions of Turkey (Davis, 1965; modified byAvcı, 1996).



The purpose of this study are to obtain the threatened category of endemic and rare taxa of Lamiaceae family in Turkey and to indicate which phytogeographic regions these taxa are more widely distributed.

2. MATERIAL AND METHODS

Data were obtained by scanning Flora of Turkey, Red Data Books, The List of Turkey Plants (Vascular Plants), check-lists, publications and observations (Davis 1982, Davis et al. 1988, Güner et al. 2000, Tarımcılar 1998, Aytaç and Aksoy 2000, Ekim et al. 2000, Dönmez 2001, Dirmenci 2003, Akçiçek and Vural 2007, Alan 2009, Ekim 2009, Fırat and Dirmenci 2009, Bacherpour 2010, Torlak et al. 2010, Bulut and Yılmaz 2010, Celep and Doğan 2010, İpek and Gürbüz 2010, Yılmaz et al. 2010, Bacherpour et al. 2011, Çiçek and Ketenoğlu 2011, Güner 2012, Tel 2012, Özçelik 2012, Çiçek and Yaprak 2013, Celep et al. 2015, Dinç and Doğu 2016, Özusu and Öztekin 2008, Dirmenci et al. 2010, Dirmenci et al. 2011, Öztürk et al. 2011, Güner and Akçiçek 2014, Vural et al. 2015, Akçiçek et al. 2016, Celep 2017, Celep and Dirmenci 2017, Özhatay et al. 2017, Yurteri et al. 2017).

3. RESULTS AND DISCUSSION

There are 782 Lamiaceae taxa in Turkey, 346 which are endemic (44.2 % endemic ratio). According to species number, there are 603 Lamiaceae species, 179 subspecies and varieties in Turkey. The largest genera in the country based on the taxon number are *Stachys* L.(118 taxa), *Salvia* L.(107 taxa), *Sideritis* L.(54 taxa), *Phlomis* L.(53 taxa), *Teucrium* L. (49 taxa), *Thymus* L.(47 taxa). The largest 15 genera based on taxon number in Turkey are given in Table 1 (Celep and Dirmenci 2017).

Table 1. The largest 15 genera based on taxon number in Turkish Lamiaceae

Genera	Taxon number	Species number	Endemic taxa end. ra. %	Endemic species end. ra. %
<i>Stachys</i>	118	90	53 (45%)	43 (48%)
<i>Salvia</i>	107	100	58 (54%)	53 (53%)
<i>Sideritis</i>	54	45	40 (74%)	36 (80 %)
<i>Phlomis</i>	53	33	30 (57%)	16 (48%)
<i>Teucrium</i>	49	36	17 (35%)	15 (42%)
<i>Thymus</i>	47	42	20 (43%)	20 (48%)
<i>Nepeta</i>	46	39	20 (43%)	17 (44%)
<i>Scutellaria</i>	39	17	17 (44%)	6 (35%)
<i>Origanum</i>	31	27	18 (58%)	18 (67%)
<i>Marrubium</i>	27	21	17 (63%)	11 (52%)
<i>Lamium</i>	26	15	5 (19%)	4 (27%)
<i>Clinopodium</i>	25	16	7 (24%)	3 (19%)
<i>Ajuga</i>	23	13	7 (30%)	6 (46%)
<i>Ballota</i>	18	12	11 (61%)	8 (67%)
<i>Satureja</i>	17	16	6 (35%)	5 (31%)

Sideritis Drymosiphon, *Marrubium*, *Ballota*, *Origanum*, *Phlomis*, *Salvia* have a large number endemic taxa and species. Their endemism ratio is over 54 % in Turkey. There are two monotypic genera in Turkey as *Dorystaechas* (endemic) ve *Pentapleura* (non-endemic). *Lophantus* has also only one species in Turkey, it is not monotypic genus. Fifteen genera with the highest endemism ratio are given in Table 2 (Celep and Dirmenci 2017).

Table 2. Fifteen genera with the highest endemism ratio in Lamiaceae in Turkey

	Genera	Endemism ratio based on taxa number%	Endemism ratio based on species number %
1	<i>Dorystaechas</i>	100	100
2	<i>Lophanthus</i>	100	100
3	<i>Sideritis</i>	74	80
4	<i>Drymosiphon</i>	67	75
5	<i>Marrubium</i>	63	52
6	<i>Ballota</i>	61	67
7	<i>Origanum</i>	58	67
8	<i>Phlomis</i>	57	48
9	<i>Salvia</i>	54	53
10	<i>Stachys</i>	45	48
11	<i>Scutellaria</i>	44	35
12	<i>Thymus</i>	43	48
13	<i>Nepeta</i>	43	44
14	<i>Teucrium</i>	35	42
15	<i>Satureja</i>	35	31

Result of endangered family of Lamiaceae according to IUCN threat categories are 20 genera in Turkey. These genera; *Salvia* L.(43 taxa), *Stachys* L.(19 taxa), *Thymus* L. (16 taxa), *Sideritis* L.(14 taxa), *Teucrium* L. (10 taxa), *Lamium* L.(8 taxa), *Phlomis* L. ve *Scutellaria* L. (7 taxa), *Micromeria* Bentham ve *Nepeta* L. (6 taxa), *Ajuga* L. ve *Origanum* L. (5 taxa), *Marrubium* L. (4 taxa), *Acinos* Miller, *Satureja* L. ve *Calamintha* Miller (2 taxa), *Ballota* L., *Dorystaechas* Boiss. & Heldr. ex Bentham, *Cyclotrichium* (Boiss.)Manden. & Scheng. ve *Lopanthus* Adans.(1 taxon) (Table 3).

Table 3. Endangered Lamiaceae genera according to IUCN threat categories in Turkey

Genera	CR (critically endangered)	EN (endangered)	VU (vulnerable)
<i>Salvia</i> (43 taxa)	13	15	15
<i>Stachys</i> (19 taxa)	3	10	6
<i>Thymus</i> (16 taxa)	7	4	5
<i>Sideritis</i> (14 taxa)	2	3	9
<i>Teucrium</i> (10 taxa)	4	3	3
<i>Lamium</i> (8 taxa)	2	3	3
<i>Phlomis</i> (7 taxa)	1	2	4
<i>Scutellaria</i> (7 taxa)	1	3	3
<i>Micromeria</i> (6 taxa)	2	2	2
<i>Nepeta</i> (6 taxa)	3	2	1
<i>Ajuga</i> (5 taxa)	-	4	1
<i>Origanum</i> (5 taxa)	1	3	2
<i>Marrubium</i> (4 taxa)	1	2	1
<i>Acinos</i> (2 taxa)	-	2	-
<i>Satureja</i> (2 taxa)	2	-	-
<i>Calamintha</i> (2 taxa)	-	1	1
<i>Ballota</i> (1 taxa)	-	-	1
<i>Dorystaechas</i> (1 taxa)	-	-	1
<i>Cylotrichium</i> (1 taxa)	-	-	1
<i>Lopanthus</i> (1 taxa)	1	-	-

Endangered and vulnerable family of Lamiaceae according to IUCN threat categories are 160 taxa in country (Appendix, Table 1).

CR (critically endangered) 43 (42 endemic / 1 non-endemic)

EN (endangered) 59 (57 endemic / 2 non-endemic)

VU (vulnerable) 58 (52 endemic / 6 non-endemic)

Threat categories of the largest five genera in the country based on the taxon number are;

Salvia (43 taxa) / 13 CR (critically endangered) / 15 EN (endangered) / 15 VU (vulnerable)

Stachys (19 taxa) / 3 CR (critically endangered) / 10 EN (endangered) / 6 VU (vulnerable)

Thymus (16 taxa) / 7 CR (critically endangered) / 4 EN (endangered) / 5 VU (vulnerable)

Sideritis (14 taxa) / 2 CR (critically endangered) / 3 EN (endangered) / 9 VU (vulnerable)

Teucrium (10 taxa) / 4 CR (critically endangered) / 3 EN (endangered) / 3 VU (vulnerable)

Figure 2. A. *Salvia aytachii* Vural&Adıgüzel
B. *Salvia kronenburgii* Rech. fil. (Nasip Demirkuş)
C. *Salvia fruticosa* Mill. (Ester Inbar)
D. *Stachys distans* Bentham var. *cilicica* Bhattacharjee & Hub.-Mor.
E. *Stachys bayburtensis* Bhattacharjee & Hub.-Mor.
F. *Thymus cariensis* Hub.-Mor. & Jalas

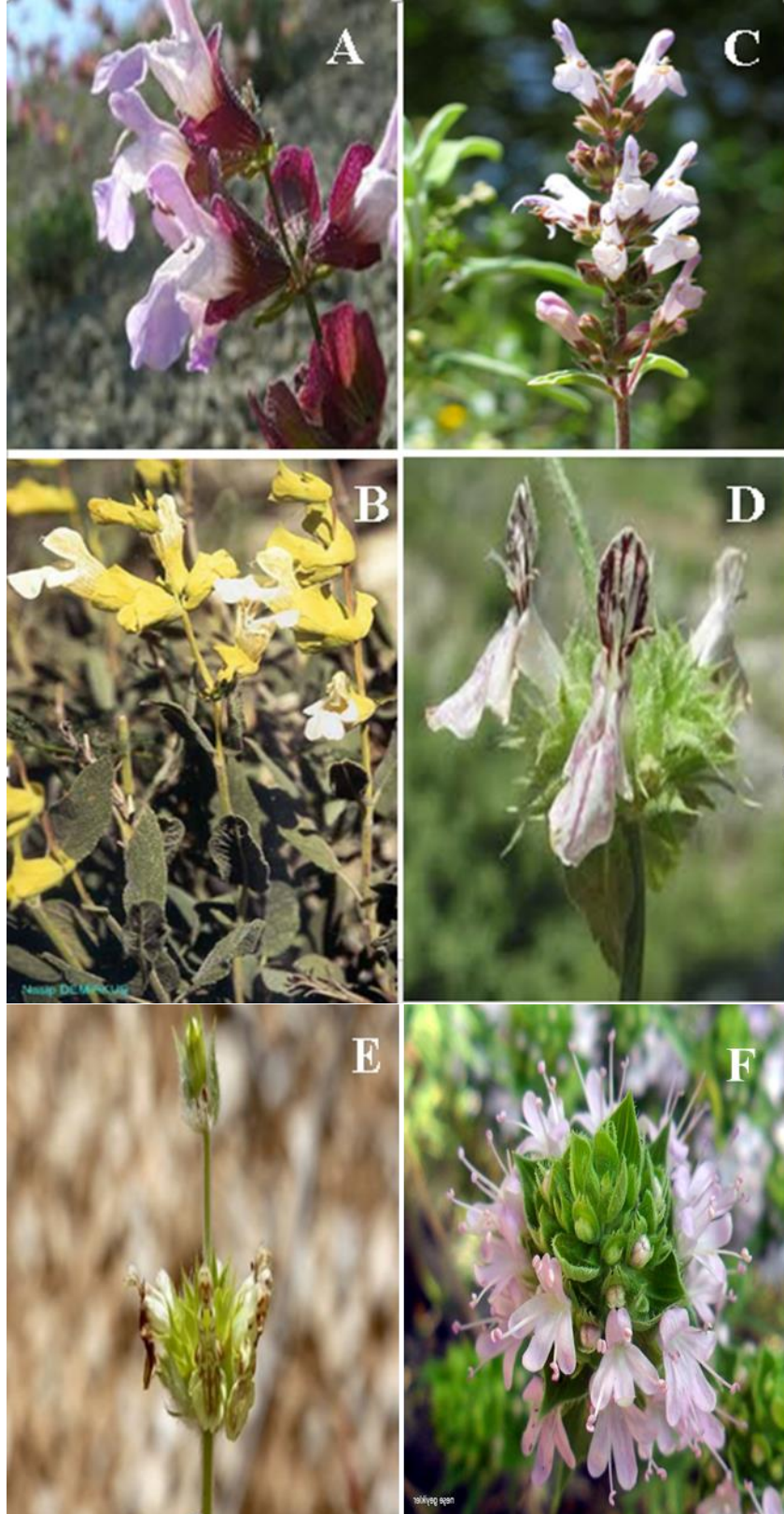
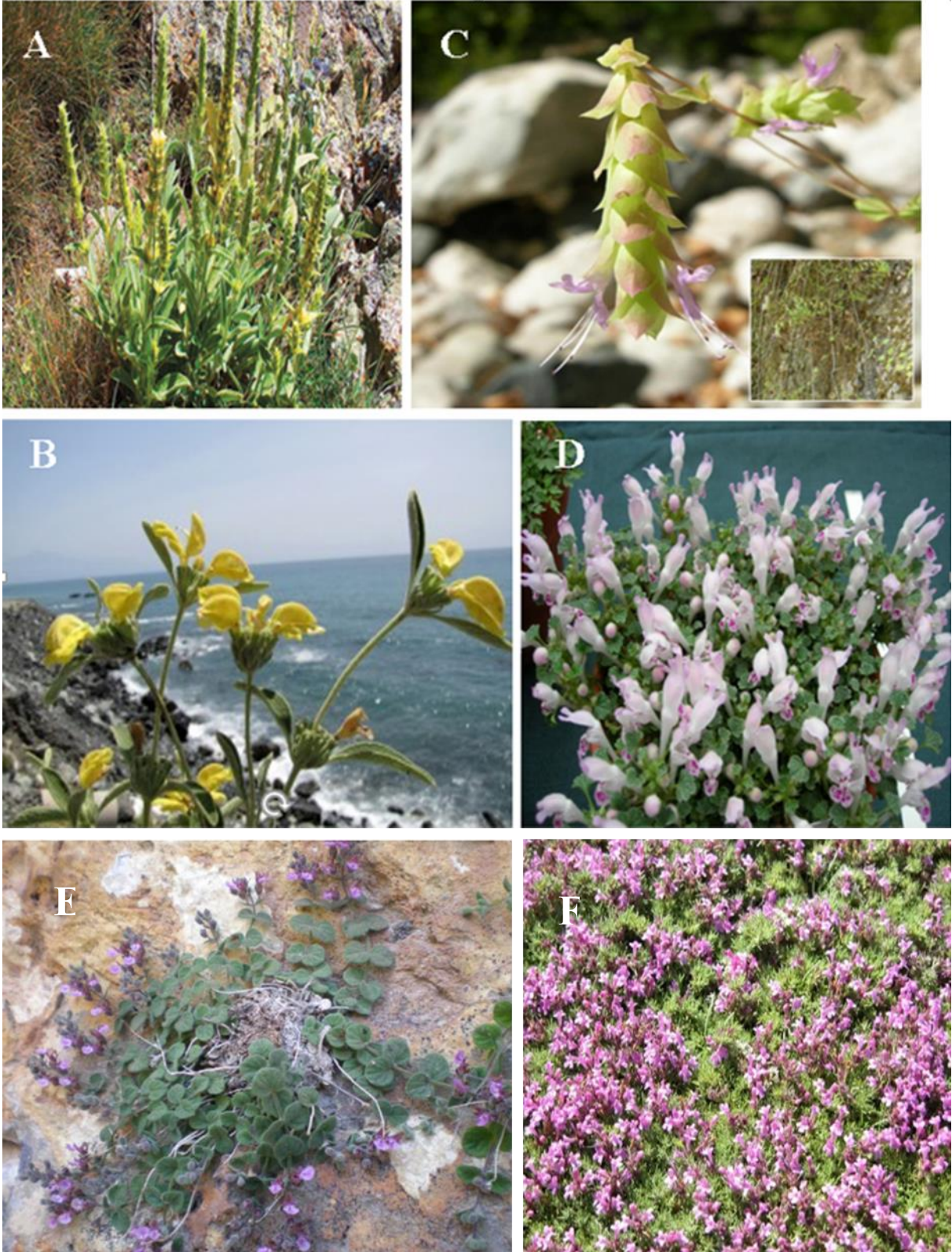


Figure 3. A. *Sideritis akmanii* Z. Aytaç, M. Ekici & A. Dönmez
B. *Phlomis amanica* Vierh.
C. *Origanum solymicum* P.H. Davis
D. *Lamium microphyllum* Boiss.
E. *Teucrium cavernarum* P.H. Davis
F. *Thymus pulvinatus* Celak.



Phytogeographic distribution of Turkish Lamiaceae taxa are 293 taxa in the Mediterranean (% 37.4), 267 taxa in the Irano-Turanian (%36.7), 90 taxa in the Euro-Siberian (% 11.5) phytogeographic region, and 112 taxa in Unknown or Multiregional (%14.3) phytogeographical elements (Celep and Dirmenci 2017) .

Endangered endemic and rare taxa of Lamiaceae genera are phytogeographic region in Turkey (Table 4).

Mediterranean elements 79 taxa, 74 endemic / 5 non-endemic

İrano-Turanian elements 63 taxa, 58 endemic /5 non-endemic

Euro-Siberian elements 6 taxa, 5 endemic / 1 non-endemic

Unknown or Multiregional elements 11 taxa, 11 endemic

Table 4. Phytogeographic distribution of endangered Lamiaceae genera based on taxon number and Endemism status

Genera (Taxon number)	Irano-Turanian el.	Mediterranean el.	Euro-Siberian el.	Unknown or Multiregional	Endemic
<i>Salvia</i> (43)	18	19	1	5	37
<i>Stachys</i> (19)	10	7	-	2	18
<i>Thymus</i> (16)	6	6	-	4	14
<i>Sideritis</i> (14)	2	12	-	-	14
<i>Teucrium</i> (10)	3	7	-	-	9
<i>Lamium</i> (8)	1	4	3	-	7
<i>Phlomis</i> (7)	4	3	-	-	7
<i>Scutellaria</i> (7)	4	3	-	-	7
<i>Micromeria</i> (6)	1	4	1	-	6
<i>Nepeta</i> (6)	2	4	-	-	6
<i>Ajuga</i> (5)	3	2	-	-	5
<i>Origanum</i> (5)	1	4	-	-	5
<i>Marrubium</i> (4)	2	1	1	-	4
<i>Acinos</i> (2)	-	2	-	-	2
<i>Satureja</i> (2)	1	1	-	-	2
<i>Calamintha</i> (2)	1	1	-	-	2
<i>Ballota</i> (1)	1	-	-	-	1
<i>Dorystaechas</i> (1)	-	1	-	-	1
<i>Cylotrichium</i> (1)	1	-	-	-	1
<i>Lopanthus</i> (1)	1	-	-	-	1

In conclusion, according to IUCN threat categories, 160 endemic and rare taxa of Lamiaceae are endangered in Turkey. 43 taxa (26.87%) are critically endangered (CR) and 59 taxa (36.87%) endangered (EN). Total 102 taxa (63.75%) are endangered and critically

endangered. 58 taxa (36.25%) are vulnerable. Phylogeographic distribution of endemic and rare Turkish Lamiaceae taxa are 79 taxa (49.37 %), in the Mediterranean, 63 taxa (39.37 %) in the Irano-Turanien, 5 taxa (3.12%) in the Euro-Siberian phylogeographic region, and 11 taxa (6.8%) in unknown or multiregional phylogeographical elements.

REFERENCES

- AKÇIÇEK E., VURAL M., 2007, Kumular Dağı (Afyonkarahisar)' nın Endemik ve Nadir Bitkileri, Balıkesir Üniversitesi Fen Bilimleri Dergisi, 9 (2), 78-86.
- AKÇIÇEK E., FIRAT M., GÜNER Ö., 2016, *Stachys hakkariensis* (Lamiaceae), A New Species from Eastern Anatolia (Turkey) Belonging to *Stachys* sect. *Olisia*, Phytotaxa, 257 (2), 167-173.
- ALAN S., OCAK A., 2009, Taxonomical and Morphological Studies on The Genus *Calamintha* Miller (Lamiaceae) in Turkey, Biodicon, 2 (2), 125-143.
- ANONİM 1996, Türkiye Bitki Genetik Çeşitliliğinin Yerinde (Insitu) Korunması Ulusal Planı, Çevre Bakanlığı, Tarım ve Köy İşleri Bakanlığı, Orman Bakanlığı, Ankara.
- AYTAÇ Z., AKSOY A., 2000, A New *Sideritis* Species (Labiatae) from Turkey, Flora Mediterranea, 10, 181-184.
- BACHERPOUR S., 2010, Taxonomic Studies on The Genus *Salvia* L. (Labiatae) in Central Anatolia, Turkey, Doktora Tezi, Middle East Technical University The Graduate School of Natural and Applied Sciences.
- BACHERPOUR S., CELEP F., KAHRAMAN A., DOĞAN M., 2011, *Salvia brachyantha* subs. *tankutiana* (Lamiaceae), A New Subspecies from Central Anatolia, Turkish Journal of Botany, 35, 343-350.
- BULUT Z., YILMAZ H., 2010, The Current Situation of Threatened Endemic Flora in Turkey: Kemaliye (Erzincan) Case, Pak. Journal of Botany, 42 (2); 711-719.
- CELEP F., DOĞAN M., 2010, *Salvia ekimiana* (Lamiaceae), A New Species from Turkey, Ann. Bot. Fennici, 47, 63-66.
- CELEP F., DİRMENCİ T., GÜNER Ö., 2015, *Salvia hasankeyfence* (Lamiaceae), A New Species from Hasankeyf (Batman, South-eastern Turkey), Phytotaxa, 227 (3), 289-294.
- CELEP F., 2017, *Lamium bilgilii* (Lamiaceae), A New Species from South-western Turkey (Burdur-Muğla), Phytotaxa, 312 (2), 263-270.
- CELEP F., DİRMENCİ T., 2017, Systematic and Biogeographic Overview of Lamiaceae in Turkey, Naturel Volatiles & Essential Oils, 4 (4), 14-27.
- ÇIÇEK M., KETENOĞLU O., 2011, *Scutellaria anatolica* A New Species from Turkey, Ann. Bot. Fennici, 48, 276-279.
- ÇIÇEK M., YAPRAK A. E., 2013, *Scutellaria yildirimlii* (Lamiaceae), A New Species from Turkey, Phytotaxa, 138 (1), 53-58.
- DAVIS P.H., 1982, Flora of Turkey and The East Aegean Islands, Vol. 7., Edinburg at the University Press, UK., 0- 85224- 396 -0.
- DAVIS P.H., MILL R.R., TAN K., 1988, Flora of Turkey and The East Aegean Islands, Vol. 10.,(Supplement 1), Edinburg at the University Press, UK., 0- 85224- 559- 9.
- DİNÇ M., DOĞU S., 2016, *Teucrium pruniosum* var. *aksarayense* var. nov. (Lamiaceae) from Central Anatolia, Modern Phytomorphology, 9, 13-17.
- DİRMENCİ T., 2003, Türkiye'de Yetişen *Nepeta* L. (Lamiaceae) Türleri Üzerinde Taksonomik Araştırmalar, Doktora Tezi, Balıkesir Üniversitesi Fen Bilimleri Enstitüsü Biyoloji Eğitimi Anabilim Dalı.

- DİRMENCİ T., YILDIZ B., HEDGE I. C., FIRAT M., 2010, *Lophanthus* (Lamiaceae) in Turkey: A new Generic Record and A new Species, Turkish Journal Of Botany, 34, 123-129.
- DİRMENCİ T., YILDIZ B., AKÇİÇEK E., MARTİN E., DÜNDAR E., 2011, *Stachys vuralii* (Lamiaceae), A New Species from North Anatolia, Turkey, Ann. Bot. Fennici, 48, 401-408.
- DÖNMEZ A.A., 2001, A New Turkish Species of *Salvia* L. (Lamiaceae), Botanical Journal of Linnean Society, 137, 413-416.
- EKİM T., GÜNER A., 2000, The Floristic Richness of Turkey, Bentham-Moxon Trust, Blackwell Publishers, Oxford, UK., Malden, USA.
- EKİM T., KOYUNCU M., VURAL M., DUMAN H., AYTAÇ Z., ADIGÜZEL N., 2000, Türkiye Bitkileri Kırmızı Kitabı, Türkiye Tabiatını Koruma Derneği, Van Yüzüncü Yıl Üniversitesi, Barışcan Ofset, Ankara, Türkiye, 975- 93611- 0- 8.
- EKİM T., 2009, Türkiye'nin Nadir Endemikleri, Türkiye İş Bankası Kültür Yayınları, Sertifika no 11213, Özgün Ofset, İstanbul, Türkiye, 978-9944-88-648-2.
- FIRAT M., DİRMENCİ T., 2009, *Clinopodium hakkaricum* (Lamiaceae), A New Species from Turkey, Ann. Bot. Fennici, 46, 451-455.
- GÜNER A., ÖZHATAY N., EKİM T., BAŞER K.H.C., 2000, Flora of Turkey and The East Aegean Islands, Vol. 11. (Supplement 2), Edinburg at the University Press, UK., 0- 0 - 7486- 1409- 5.
- GÜNER A., 2012, Türkiye Bitkileri Listesi (Damarlı Bitkiler), Flora Araştırmaları Derneği, Nezahat Gökyiğit Botanik Bahçesi Yayınları Flora Dizisi 1, Nemaş Matbaacılık, İstanbul, Türkiye, 978-605-60425-7-7.
- GÜNER Ö., AKÇİÇEK E., 2014, Ulus Dağı' nın (Balıkesir-Türkiye) Endemik ve Nadir Bitkileri, Bağ Bahçe Bilim Dergisi, 1 (3), 32-38.
- İPEK A., GÜRBÜZ B., 2010, Türkiye Florasında Bulunan *Salvia* Türleri ve Tehlike Durumları, Tarla Bitkileri Merkez Araştırma Enstitüsü Dergisi, 19 (1-2), 30-35.
- ÖZÇELİK H., 2012, The Endemic Plant Taxa of The Köprülü Kanyon National Park and Its Surroundings (Antalya-Isparta), 16 (3), 279-296.
- ÖZHATAY N., KÜLTÜR Ş., GÜRDAL B., 2017, Check- list of Additional Taxa to the Supplement Flora of Turkey VIII, 2017, İstanbul Journal of Pharmacy, 47 (1), 30-44.
- ÖZTÜRK M., UYSAL İ., KARABACAK E., ÇELİK S., 2011, Plant Species Microendemism, Rarity and Conservation of Pseudo-alpine Zone of Kazdağı (Mt. Ida) National Park- Turkey, Procedia Social and Behavioral Science, 19, 778-786.
- ÖZUSLU E., ÖZTEKİN M., 2008, A New Localization for *Teucrium paederotooides* Boiss. et Hausskn. (Lamiaceae), Biodicon, 1(2), 86-90.
- TARIMCILAR G., 1998, Karadeniz' de Yayılışı olan *Mentha* L. Türleri Üzerinde Korolojik, Morfolojik, Anatomik, Sitolojik, Ekolojik ve Kimyasal Araştırmalar, Doktora Tezi, Uludağ Üniversitesi Fen Bilimleri Enstitüsü, Biyoloji Anabilim Dalı, Bursa.
- TEL A. Z., 2012, Bazı Endemik Bitkilerin Kütahya'daki (Türkiye) Yayılış Alanları ve Yeni IUCN Tehlike Kategorilerine Göre Yeniden Değerlendirilmesi, Artvin Çoruh Üniversitesi Orman Fakültesi Dergisi, 13 (1), 88-108

- TORLAK H., VURAL M., AYTAÇ Z., 2010, Endemic Plants of Turkey, Ministry of Culture and Tourism, Pelin Ofset, Ankara, Türkiye, 978-975-17-3595-9.
- VURAL M., DUMAN H., DİRMENCİ T., ÖZCAN T., 2015, A New Species of *Teucrium* sect. *Stachyobotrys* (Lamiaceae) from the South of Turkey, Turkish Journal of Botany, 39, 318-324.
- YILMAZ Ö., DAŞKIN R., KAYNAK G., 2010, *Stachys pseudobombycina* sp. nov. (Lamiaceae) from South Anatolia, Turkey, Nordic Journal of Botany, 28, 341-343.
- YURTERİ E., ÖZCAN A., SEYİS F., KEVSEROĞLU K., 2017, Characterization of some Lamiaceae Species Distributed in The Rize Province, Turkey, International Journal of Plant Breeding and Crop Science, 4 (3), 300-307.

Appendix I.

Table 1. Endangered Lamiaceae taxa according to IUCN threat categories in Turkey and Endemism status

Taxa	Endemism	Threat categories
<i>Acinos troodi</i> (Post) Leblebici subsp. <i>grandiflorus</i> Hartvig & Strid	E	EN
<i>Acinos troodi</i> (Post) Leblebici subsp. <i>vardaranus</i> Leblebici	E	EN
<i>Ajuga davisiana</i> Kit Tan & Yıldız	E	EN
<i>Ajuga postii</i> Briq.	E	VU
<i>Ajuga relictata</i> P.H. Davis	E	EN
<i>Ajuga vestita</i> Boiss.	E	EN
<i>Ajuga xylorrhiza</i> Kit Tan	E	EN
<i>Ballota macrodonta</i> Boiss. & Bal.	E	VU
<i>Calamintha caroli-benricana</i> Kit Tan & Sorger	E	EN
<i>Calamintha tauricola</i> P.H. Davis	E	VU
<i>Cyclotrichium niveum</i> (Boiss.) Manden & Scheng.	E	VU
<i>Dorystaechas hastata</i> Boiss. & Heldr. ex Benth	E	VU
<i>Lamium armenum</i> Boiss. subsp. <i>sintenisii</i> R. Mill	E	VU
<i>Lamium bilgili</i> Celep	E	CR
<i>Lamium demirizii</i> A. Khohhr.	E	EN
<i>Lamium microphyllum</i> Boiss.	E	VU
<i>Lamium purpureum</i> L. var. <i>aznavourii</i> Gand. Ex Aznav.	E	CR
<i>Lamium sandrasicum</i> P.H. Davis	E	EN
<i>Lamium veronicifolium</i> Benth	E	VU
<i>Lamium violaceo-velutinum</i> A. Khohhr.	–	EN
<i>Lopanthus turcicus</i> Dirmenci, Yıldız & Hedge (B9)	E	CR
<i>Marrubium bourgaei</i> Boiss. subsp. <i>caricum</i> P.H. Davis	E	CR
<i>Marrubium cephalanthus</i> Boiss. & Noe subsp. <i>montanum</i> Akgül&Ketenoglu	E	EN
<i>Marrubium vanense</i> Hub.-Mor.	E	EN
<i>Marrubium vulcanicum</i> Hub.-Mor.	E	VU
<i>Micromeria carica</i> P.H. Davis	E	EN
<i>Micromeria cilicica</i> Hausskn. ex P.H. Davis	E	EN
<i>Micromeria cristata</i> (Hampe) Griseb. subsp. <i>carminea</i> (P.H. Davis) P.H. Davis	E	VU
<i>Micromeria cymuligera</i> Boiss. & Hausskn.	E	VU
<i>Micromeria dolichodonta</i> P.H. Davis	E	CR
<i>Micromeria fruticosa</i> (L.) Druce subsp. <i>giresunica</i> P.H. Davis	E	CR
<i>Nepeta baytopii</i> Hedge & Lamond	E	EN
<i>Nepeta conferta</i> Hedge & Lamond	E	CR
<i>Nepeta crinita</i> Montbret & Aucher ex Benth	E	EN
<i>Nepeta nuda</i> L. subsp. <i>glandulifera</i> Hub.-Mor. & Davis	E	CR
<i>Nepeta phyllochlamys</i> P.H. Davis	E	VU

<i>Nepeta tumeriana</i> B. Yıldız & T. Dirmenci	E	CR
<i>Origanum boissieri</i> Ietswaart	E	CR
<i>Origanum husnucan-baseri</i> H. Duman, Z. Aytaç & A. Duran	E	EN
<i>Origanum micranthum</i> Vogel	E	VU
<i>Origanum munzurense</i> Kit Tan & Sorger	E	EN
<i>Origanum solymicum</i> P.H. Davis	E	EN
<i>Phlomis amanica</i> Vierh.	E	EN
<i>Phlomis angustissima</i> Hub.-Mor.	E	VU
<i>Phlomis brunneogaleata</i> Hub.-Mor.	E	EN
<i>Phlomis grandiflora</i> H.S. Thompson var. <i>fimbrilligera</i> (Hub.-Mor.) Hub.-Mor.	E	VU
<i>Phlomis integrifolia</i> Hub.-Mor.	E	CR
<i>Phlomis physocalyx</i> Hub.-Mor.	E	VU
<i>Phlomis sintenisii</i> Rech. fil.	E	VU
<i>Salvia adenocaulon</i> P.H. Davis	E	VU
<i>Salvia adenophylla</i> Hedge & Hub.-Mor.	E	EN
<i>Salvia albimaculata</i> Hedge & Hub.-Mor.	E	EN
<i>Salvia anatolica</i> Hamzaoğlu & A. Duran	E	CR
<i>Salvia aramiensis</i> Rech. f.	-	VU
<i>Salvia aucheri</i> Benth. var. <i>aucheri</i>	E	VU
<i>Salvia aucheri</i> Benth. var. <i>canescens</i> Boiss. & Heldr.	E	VU
<i>Salvia aytachii</i> M. Vural & N. Adıgüzel	E	EN
<i>Salvia ballsiana</i> (Rech. f.) Hedge	E	CR
<i>Salvia brachyanth</i> (Bordz.) Pobed subsp. <i>tankutiana</i> Bagherpour, Celep, Kahraman & Doğa	E	EN
<i>Salvia cassia</i> G. Samuelsson ex Rech. f.	E	VU
<i>Salvia cedronella</i> Boiss.	E	EN
<i>Salvia cerino-pruinosa</i> Rech. var. <i>elazigensis</i> A. Karaman, F. Celep & Dogan	E	EN
<i>Salvia chionantha</i> Boiss	E	VU
<i>Salvia chrysophylla</i> Stapf	E	VU
<i>Salvia cilicica</i> Boiss. & Kotschy	E	EN
<i>Salvia ekimiana</i> F. Celep & Doğan	E	EN
<i>Salvia eriophora</i> Boiss. & Kotschy ex Boiss.	E	EN
<i>Salvia freyniana</i> Bornm.	E	CR
<i>Salvia fruticosa</i> Mill	-	VU
<i>Salvia halophila</i> Hedge	E	EN
<i>Salvia hasankeyfense</i> Dirmenci, Celep & Ö. Güner	E	CR
<i>Salvia hedgeana</i> Dönmez	E	CR
<i>Salvia heldreichiana</i> Boiss. ex DC.	E	VU
<i>Salvia kronenburgii</i> Rech. fil.	E	EN
<i>Salvia kurdica</i> Boiss. & Hohen. Ex Benth.	-	VU
<i>Salvia marashica</i> A. İlçim, F. Celep & Doğan	E	CR
<i>Salvia modesta</i> Boiss.	E	EN
<i>Salvia nutans</i> L.	-	VU

<i>Salvia nydeggeri</i> Hub.-Mor.	E	EN
<i>Salvia odontochlamys</i> Hedge	E	CR
<i>Salvia pilifera</i> Montbr. & Auch.	E	VU
<i>Salvia pisidica</i> Boiss. & Hohen. Ex Benth.	E	VU
<i>Salvia pomifera</i> L.	-	VU
<i>Salvia potentillifolia</i> Boiss. & Hohen. Ex Benth.	E	VU
<i>Salvia pseudeuphratica</i> Rech.	E	CR
<i>Salvia quezelii</i> Hedge & Afzal-Rafii	E	CR
<i>Salvia sericeo-tomentosa</i> Rech. fil. var. <i>sericeo-tomentosa</i>	E	CR
<i>Salvia sericeo-tomentosa</i> Rech. fil. var. <i>hatayica</i> F. Celep & Doğan	E	CR
<i>Salvia smyrnaea</i> Boiss.	E	EN
<i>Salvia tigrina</i> Hedge & Hub.-Mor.	E	CR
<i>Salvia tobeyi</i> Hedge	E	EN
<i>Salvia vermifolia</i> Hedge & Hub.-Mor.	E	CR
<i>Satureja aintabensis</i> P.H. Davis	E	CR
<i>Satureja amani</i> P.H. Davis	E	CR
<i>Scutellaria glaphyrostachys</i> Rech. fil.	E	VU
<i>Scutellaria orientalis</i> L. subsp. <i>carica</i> Edmondson	E	EN
<i>Scutellaria orientalis</i> L. subsp. <i>porphyrostegia</i> Edmondson	E	VU
<i>Scutellaria orientalis</i> L. subsp. <i>sintenisii</i> (Hasskn. Ex Bornm.) Edmondson	E	VU
<i>Scutellaria orientalis</i> L. subsp. <i>tortumensis</i> Kit Tan & Sorger	E	EN
<i>Scutellaria rubicunda</i> Hornem. subsp. <i>pannosula</i> (Rech. fil.) Edmondson	E	CR
<i>Scutellaria uzundereensis</i> A. Khohhr.	E	EN
<i>Sideritis akmanii</i> Z. Aytaç, M. Ekici & A. Dönmez	E	VU
<i>Sideritis bilgerana</i> P.H. Davis	E	VU
<i>Sideritis brevibracteata</i> P.H. Davis	E	VU
<i>Sideritis brevidens</i> P.H. Davis	E	VU
<i>Sideritis cilicica</i> Boiss. & Bal.	E	EN
<i>Sideritis erythrantha</i> Boiss. & Heldr. apud Bentham var. <i>cedratorum</i> P.H. Davis	E	VU
<i>Sideritis gulendamii</i> H. Duman & F.A. Karavelioğulları	E	EN
<i>Sideritis huber-morathii</i> Greuter & Burdet	E	VU
<i>Sideritis lycica</i> Boiss. & Heldr. apud Bentham	E	VU
<i>Sideritis ozturkii</i> Aytaç & Aksoy	E	EN
<i>Sideritis serratifolia</i> Hub.-Mor.	E	VU
<i>Sideritis trojana</i> Bornm.	E	CR
<i>Sideritis vulcanica</i> Hub.-Mor.	E	VU
<i>Sideritis vuralii</i> H. Duman & Başer	E	VU
<i>Stachys anamurensis</i> H. Sümbül	E	EN
<i>Stachys antalyensis</i> Y. Ayaşlıgil & P.H. Davis	E	VU
<i>Stachys bayburtensis</i> Bhattacharjee & Hub.-Mor.	E	CR
<i>Stachys baytopiorum</i> Kit Tan & Yıldız	-	EN
<i>Stachys butleri</i> R. Mill	E	EN

<i>Stachys cataonica</i> Bhattacharjee & Hub.-Mor.	E	VU
<i>Stachys chasmosericea</i> Ayaşlıgil & P.H. Davis	E	CR
<i>Stachys choruhensis</i> Kit Tan & Sorger	E	EN
<i>Stachys distans</i> Bentham var. <i>cilicica</i> Bhattacharjee & Hub.-Mor.	E	EN
<i>Stachys hakkariensis</i> Akçiçek & Fırat	E	EN
<i>Stachys huber-morathii</i> Bhattacharjee	E	VU
<i>Stachys inanis</i> Hausskn. & Bornm.	E	VU
<i>Stachys munzurdagensis</i> Bhattacharjee	E	EN
<i>Stachys pseudobombycina</i> Kaynak, Daşkın & Yılmaz	E	CR
<i>Stachys pseudopinardii</i> Bhattacharjee & Hub.-Mor.	E	VU
<i>Stachys sivasica</i> Kit Tan & Yıldız	E	EN
<i>Stachys subnuda</i> Montbret & Aucher ex Bentham	E	VU
<i>Stachys tundjeliensis</i> Kit Tan & Sorger	E	EN
<i>Stachys willemsei</i> Kit Tan & Hedge	E	EN
<i>Teucrium aladagense</i> Vural & H. Duman	E	EN
<i>Teucrium antitauricum</i> T. Ekim	E	VU
<i>Teucrium cavernarum</i> P.H. Davis	E	VU
<i>Teucrium ekimii</i> H. Duman	E	CR
<i>Teucrium leuchophyllum</i> Montbret & Aucher ex Bentham	E	CR
<i>Teucrium montbretii</i> Bentham subsp. <i>pamphylicum</i> P.H. Davis	E	VU
<i>Teucrium odontites</i> Boiss. & Bal.	E	EN
<i>Teucrium paederotoides</i> Boiss. & Hausskn.	E	EN
<i>Teucrium pruinosum</i> Boiss. var. <i>aksarayense</i> M. Dinç & S. Doğu	E	EN
<i>Teucrium sirnakense</i> Özcan & Dirmenci	-	CR
<i>Thymus aznavourii</i> Velen.	E	CR
<i>Thymus bornmuelleri</i> Velen.	E	VU
<i>Thymus canoviridis</i> Jalas	E	EN
<i>Thymus cappadocicus</i> Boiss. var. <i>globifer</i> Jalas	E	VU
<i>Thymus cappadocicus</i> Boiss. var. <i>pruinosus</i> (Boiss.) Boiss.	E	VU
<i>Thymus cariensis</i> Hub.-Mor. & Jalas	E	CR
<i>Thymus cherlioides</i> Vis. var. <i>isauricus</i> Jalas	-	EN
<i>Thymus cherlioides</i> Vis. var. <i>oxyodon</i> Jalas	E	CR
<i>Thymus convolutus</i> Klokov	E	EN
<i>Thymus leucostomus</i> Hausskn. & Velen. var. <i>argillaceus</i> Jalas	E	VU
<i>Thymus leucostomus</i> Hausskn. & Velen. var. <i>gypsaceus</i> Jalas	E	CR
<i>Thymus pectinatus</i> Fisch. & Mey. var. <i>pallasicus</i> (Hayek & Velen.) Jalas	E	CR
<i>Thymus praecox</i> Opiz subsp. <i>praecox</i> var. <i>laniger</i> (Borbás) Jalas	E	CR
<i>Thymus pulvinatus</i> Celak.	E	CR
<i>Thymus revolutus</i> Celak.	E	VU
<i>Thymus spathulifolius</i> Hausskn. & Velen.	E	EN