http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 7 (6): 977-980, 2004
ISSN 1028-8880

Succulent Plant Diversity of Turkey: The Case Study of *Sempervivum* genus

Faris Karahan
Department of Landscape Architecture, Agricultural Faculty,
Ataturk University, 25240, Erzurum, Turkey

Abstract: This study has evaluated the *Sempervivum* diversity in Turkey based on geographical distribution, threatened cases in respect of IUCN Red Data Book Categories and landscape characteristics. As a result of this study, 16 *Sempervivum* species including 13 endemic are mapped in respect of geographical distribution and Davis's square system.

Key words: Succulent plants, *Sempervivum,* geographical distribution, Red Data Book Categories, landscape characteristics, Turkey

INTRODUCTION

Turkey is one of the richest countries based on diversity of family, genera and plant species in the world. On the other hand, it is the richest country in Europe as wall as among its neighbouring countries from the point of view of plant species diversity[1]. Turkey is also accepted to be the primary or the secondary genetic centre for some plant groups of the level of genus and species[2, 3].

The country has approximately 10.000 vascular plants. Approximately one third of its flora (34.4%) is endemic to the country[4, 5]. Along with its rich flora, it also has a wide diversity of habitats such as wetlands, heatlands, grasslands and rocky slopes. However, the unique flora, plant species and habitats of Turkey are being threatened and have declined rapidly for nearly last thirty–forty years[6, 7, 8].

Succulent plants including *Sempervivums* have wide spreading nearly all over the world tropics to arctics. *Sempervivum* genus is the member of *Crassulaceae* family and native for Europe and Asia continents. This genus exist both arid and semiarid regions. *Sempervivums* have wide use potential in landscape design and applications such as home gardens, rock and dry wall gardens as succulent ground cover plant due to their cultivation and maintenance are very easy[9, 10].

The purpose of the study is to point out the *Sempervivum* diversity of Turkey containing the geographical distributions, habitat attributions and threats status.

MATERIALS AND METHODS

Turkey is located in the northern hemisphere the 36°–42° northern parallel and the 26°–45° eastern meridian. It has an area of 776,329 km^2. 97% (Anatolia) of

Fig. 1: The location of study area

Corresponding Author: Dr. Faris Karahan, Osman Bektas Mah., Süleyman Demirel Bul, Özkent Yapi Koop, D Block No: ½, 25070 Kayakyolu, Erzurum/Turkey, Tel: 90 442 231 2356 Fax: 90 442 236 0958 E-mail: fkarahan@atauni.edu.tr

Turkey lies in Asia; the other 3% (Thrace region) lies in Europe (Fig. 1). The study area boundaries the Mediterranean, the Aegean, the Marmara and the Black Sea and has total coastline of 8.333 km[11].

Turkey has an important potential based on climatic diversity due to seas stretching out on three sides of the country, the location of the mountains and the variety of geographical formations. The climate is temperature in the coastal regions because of the effect of the sea. The central regions including Inner and Eastern Anatolian Regions are isolated from the sea by the Taurus Mountain Range and the northern Anatolian Mountains and show characteristics of a continental climate.

Detailed and updated data about *Sempervivum* species in the study was supplied from Flora of Turkey[12], Red Data Book of Turkey[13] and Turkish Plants Data Service (TUBIVES)[14] by founded TÜBİTAK (The Scientific and Technical Research Council of Turkey). In this study, all the existing *Sempervivum* species was mapped based on TUBIVES and Davis's square systems for Turkish Flora. Finally, *Sempervivum* species in Turkish flora were classified as habitat characteristics.

RESULTS

As a result of this study, 16 *Sempervivum* genus including 13 endemic species were showed on two maps by comparing and updating with Flora of Turkey, Red Data Book of Turkish Plants and TUBIVES aid (Fig. 2a, b). Finally, *Sempervivum* species in Turkish flora are classified as habitat characteristics based on their phyto–geographical origin, altitudes, life forms and flowering periods (Table 1). Threatened *Sempervivum* species are displayed in the connected with IUCN Red Data Book Categories (Table 1).

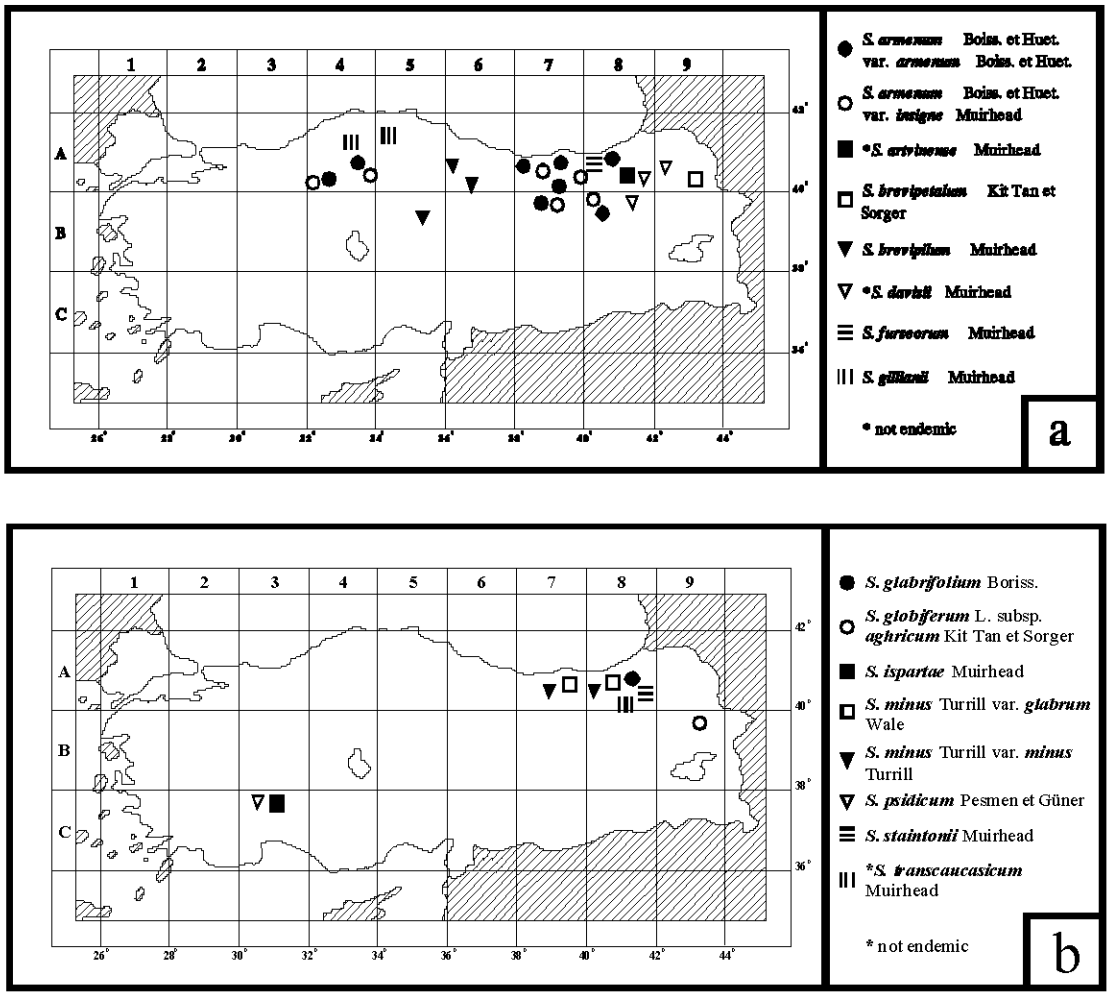

Fig. 2a, b: Distribution of *Sempervivum* species in Turkey based on Davis's square system

Table 1: *Sempervivum* species in Turkey based on landscape characteristics

Species	Threatened Status based on IUCN Red Data Book Categories*	Phyto–Geographical Origin	Altitudes	Habitats	Life Forms	Blooming Months
S. armenum Boiss. et Huet. var. *armenum* Boiss. et Huet.	LR [lc]	Euro–Siberian (E)	1600–3200	Limestone hills, volcanic slopes, screes	Perennial (P)	7–8
S. armenum Boiss. et Huet. var. *insigne* Muirhead	LR [cd]		1600–3200	Limestone hills, volcanic slopes, screes	P	7-8
S. artvinense Muirhead			2200	Volcanic stones	P	6
S. brevipetalum Kit Tan et Sorger	EN	Irano–Turanian (I)	1350	Rocky slopes	P	8
S. brevipilum Muirhead	LR [nt]		1700–2300	Limestone splits	P	8
S. davisii Muirhead			700–2300	Volcanic stones, grassy slopes	P	6-7
S. furseorum Muirhead	EN	E	1800–2500	Rocky slopes	P	7
S. gillianii Muirhead	LR [cd]	E	1800–2100	Limestone slopes	P	7–8
S. glabrifolium Boriss.	LR [cd]		300–730	Volcanic masses	P	6–7
S. globiferum L. subsp. *aghricum* Kit Tan et Sorger	EN	I	2700	Gravely slopes with uprigh protruding	P	
S. ispartae Muirhead	CR	Mediterranean (M)	1300	Metamorphosis rockies	P	8
S. minus Turrill var. *glabrum* Wale	LR [nt]	E	600–2000	Rocky splits	P	7–9
S. minus Turrill var. *minus* Turrill	LR [nt]	E	600–2000	Rocky splits	P	7–9
S. psidicum Pesmen et Guner	EN	M	1250–2400	Limestone and metamorphosis rockies	P	7-9
S. staintonii Muirhead	VU		1800	Granite splits	P	8
S. transcaucasicum Muirhead			2700	Volcanic rockies	P	8

* EX : extinct, EW: extinct in the wild CR: critically endangered EN: endangered VU: vulnerable
LR: Lower risk cd: conservation dependent lc: least concern nt: near threatened DD: data deficient
NE: not evaluated

DISCUSSION

Turkey has shown a continent feature in respect of biodiversity, climate and geographical characteristics due to its location among Europe, Africa and Asia. On the other hand, the country has an important potential based on succulent plants including *Sempervivum* species. In the study, it has been determined that *Sempervivums* are especially spreading out the mountain ranges including Northern Anatolian Mountain Range and Taurus Range. Main distribution area for *Sempervivums* is the Northern Anatolia Region containing the Black Sea Region, Northern Anatolian Mountain Range and transition zone between Black Sea and Eastern Anatolia Regions. Only two species are spreading out West Taurus Mountain. The study results has shown that *Sempervivums* are generally adopted temperature climate and mountainous habitats including rocky, limestone and gravely slopes, volcanic masses, screes. With supporting new research projects on plant diversity including succulent species, the number of *Sempervivum* species is to increase horizontally and vertically throughout the Turkey land. Besides, succulent plants containing *Sempervivum* and Sedum species should be placed in landscape planning and design studies such as roadway filling and digging slopes, rock and dry wall garden due to easy maintenance, cultivation and resistant to aridity.

REFERENCES

1. Anonymous, 1997. Biodiversity Assessment, Strategy and Action Plan (BSAP)–Turkey. (First Draft, Report to World Bank, Ankara Office).
2. Kaya, Z., E. Kun and A. Guner, 1997. National Plan for *in situ* Conservation of Plant Genetic Diversity in Turkey. The Report Submitted to the Ministry of Environment (MOE), The Republic of Turkey, Ankara, Turkey.
3. Mytilini, L., 2001. Report on a Ricamare Workshop Biodiversity and Conservation in Changing Mediterranean Landscapes (Eds. by A. Troumbis, J. M. Moreno and F. Medail), 27–29 November 2000.
4. Atakol, A., 2002. Red Blank. J. of Yesil Atlas (Special Issue), 5: 8–17 [in Turkish].
5. Ozhatay, N., A. Byfield and S. Atay, 2003. Important Plant Areas of Turkey. WWF Turkey, pp: 88, Istanbul, Turkey [in Turkish].
6. Anonymous, 1999. National Environment Action Plan (NEAP). The Republic of Turkey, The State Planning Organization (DPT), Ankara, Turkey.
7. Eken, G., G.O. Aydemir, B. Kurt, G. Yalcin, E. Basak and O. E. Can, 2000. Biodiversity Atlas of Turkey. J. of Yesil Atlas (Special Issue for Environment), 3: 22–33 [in Turkish].

8. Kaya, Z and D. J. Raynal, 2001. Biodiversity and conservation of Turkish forest. Biological Conservation, 97: 2, 131–141.
9. Demir, S and M. E. Yazgan, 1992. Cactus and Succulents. Turkish Foundation for Landscape Architecture. Publication No: 1, Ankara, Turkey [in Turkish].
10. Öztan, Y and M. Arslan, 1992. Utilization Possibilities as Groundcover from Succulent Plants Suitable for Ecological Conditions of Inner Anatolian Region in Landscape Architecture Studies. Ankara, Turkey [in Turkish].
11. Sahin, C and H. Doganay, 2003. Geography of Turkey (Physical, Demography, Economical, Geopolitical). Gündüz Egitim Press, Ankara, Turkey [in Turkish].
12. Davis, P.H., 1965-1985. Flora of Turkey and East Aegean Islands. Edinburg.
13. Ekim, T., M. Koyuncu, M. Vural, H. Duman, Z. Aytac and N. Adiguzel, 2000. Red Data Book of Turkish Plants (Pteridophyta and Spermatophyta). Foundation for Turkish Nature Conservation (TTKD) and Van Centennial University (VCU), Ankara, Turkey [in Turkish].
14. TUBIVES, 2004. Turkish Plants Data Service. TÜBİTAK (The Scientific and Technical Research Council of Turkey), http://www.tubitak.gov.tr /tubives/ [accessed in 20 January 2004].