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

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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 well 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 km². 97% (Anatolia) of

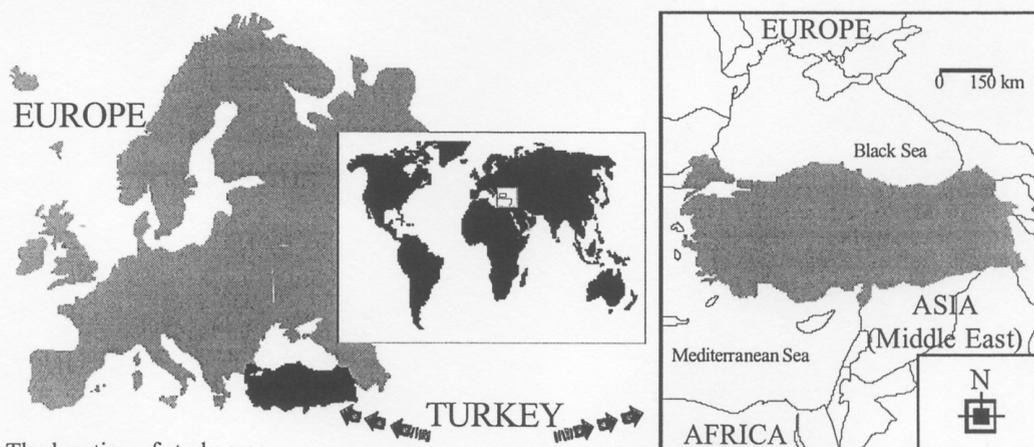


Fig. 1: The location of study area

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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).

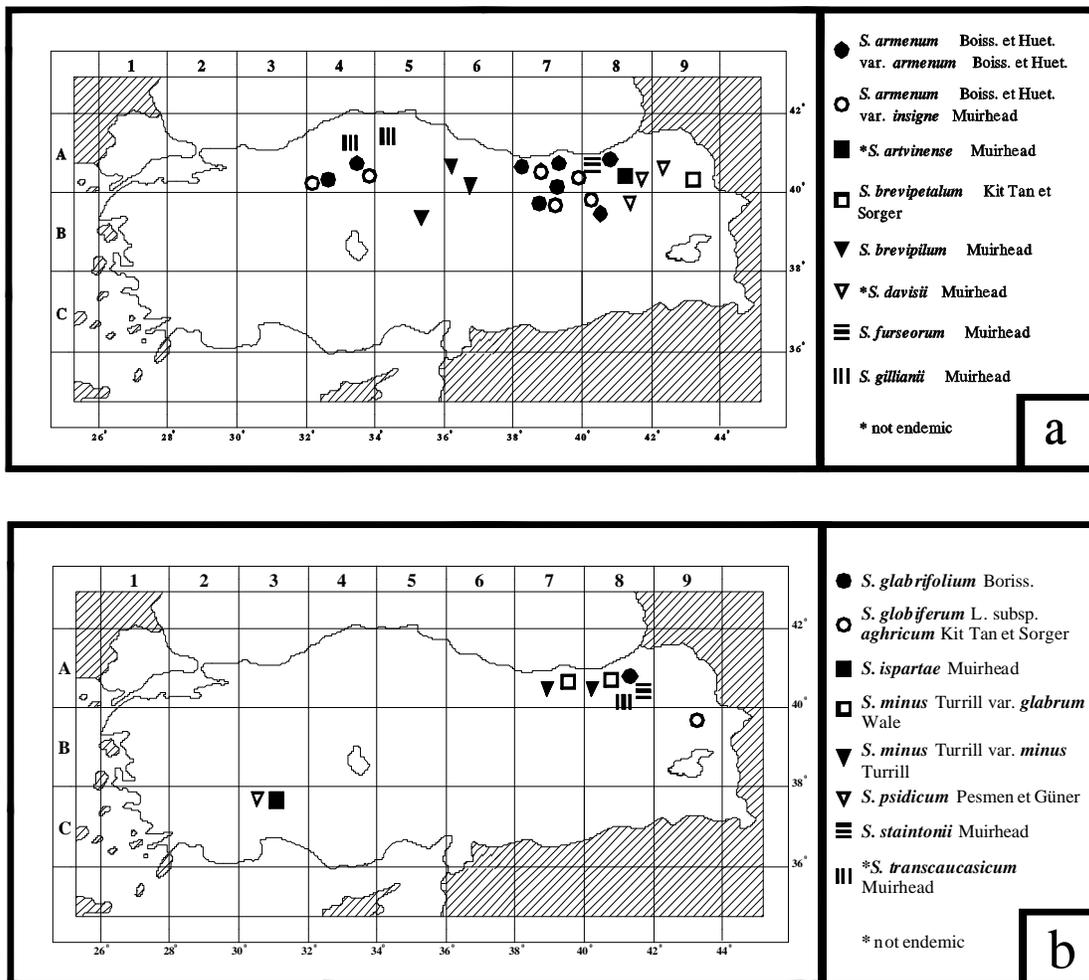


Fig. 2a, b: Distribution of *Sempervivum* species in Turkey based on Davis's square system

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
<i>S. armenum</i> Boiss. et Huet. var. <i>armenum</i> Boiss. et Huet.	LR [lc]	Euro-Siberian (E)	1600-3200	Limestone hills, volcanic slopes, screes	Perennial (P)	7-8
<i>S. armenum</i> Boiss. et Huet. var. <i>insigne</i> Muirhead	LR [cd]		1600-3200	Limestone hills, volcanic slopes, screes	P	7-8
<i>S. artvinense</i> Muirhead			2200	Volcanic stones	P	6
<i>S. brevipetalum</i> Kit Tan et Sorger	EN	Irano-Turanian (I)	1350	Rocky slopes	P	8
<i>S. brevipilum</i> Muirhead	LR [nt]		1700-2300	Limestone splits	P	8
<i>S. davisii</i> Muirhead			700-2300	Volcanic stones, grassy slopes	P	6-7
<i>S. furseorum</i> Muirhead	EN	E	1800-2500	Rocky slopes	P	7
<i>S. gillianii</i> Muirhead	LR [cd]	E	1800-2100	Limestone slopes	P	7-8
<i>S. glabrifolium</i> Boriss.	LR [cd]		300-730	Volcanic masses	P	6-7
<i>S. globiferum</i> L. subsp. <i>aghricum</i> Kit Tan et Sorger	EN	I	2700	Gravelly slopes with upright protruding	P	
<i>S. ispartae</i> Muirhead	CR	Mediterranean (M)	1300	Metamorphosis rockies	P	8
<i>S. minus</i> Turrill var. <i>glabrum</i> Wale	LR [nt]	E	600-2000	Rocky splits	P	7-9
<i>S. minus</i> Turrill var. <i>minus</i> Turrill	LR [nt]	E	600-2000	Rocky splits	P	7-9
<i>S. psidicum</i> Pesmen et Guner	EN	M	1250-2400	Limestone and metamorphosis rockies	P	7-9
<i>S. staintonii</i> Muirhead	VU		1800	Granite splits	P	8
<i>S. transcaucasicum</i> 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 gravelly 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.

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