

## TAXONOMIC RESEARCHES CARRIED OUT IN THE HERBARIUM OF EGE UNIVERSITY BOTANICAL GARDEN

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**Abstract:** The authors made a survey over the herbarium of the Ege University Botanical Garden. Over there are 33,000 herbarium sheets, gathered in 42 years of field studies over the entire area of Aegean Region. There are showed some data over the flora and vegetation of Turkey, as well as some examples of endemic plant species which are represented as holotypus, isotypus and topotypus in the herbarium.

**Key words:** flora, vegetation, herbarium, endemic plant species Turkey.

### Introduction

Botanical Garden & Herbarium Research and Application Center of the Ege University was founded in 1964. The center is a two-story building covering an area of 300 m<sup>2</sup> and has a collection of 33,000 herbarium samples. During this 42 years period, several floristic studies have been performed in the center. Studies mainly started in 1976 and since then have continued with new ones. Thirty two studies on postgraduate and doctorate levels have been achieved, as a result of which the number of the taxa and the endemism conditions have been shown on maps (**Fig 2.**). Within these activities, the flora and the vegetation of higher mountains of the Aegean Region were documented. The completion of ongoing studies will greatly contribute to the herbarium collection.

### The general vegetation of Ege region

The richness of the flora and vegetation of Turkey is related to the wide range of different habitats in different phytogeographical regions. That is why Turkey harbours a total of 9,222 vascular plant species, of which 8988 are native (Güner & al. 2000).

Turkey covers a total area of 780,580 km<sup>2</sup>, 23,764 km<sup>2</sup> of which lie on the European continent. The Aegean region covers an area of 140,230 km<sup>2</sup> and underlies a typical Mediterranean climate with dry, hot, rainless summers, and mild and wet winters. Precipitation in the form of snow occurs mainly in the inner parts of the region. The Aegean coastline is quite irregular because the mountains in the area fall precipitously into the Aegean Sea. As a result, the length of the Aegean Sea coast is over 2,800 kilometers. Alternating plains run forests to west, formed by the Rivers Gediz, Küçük Menderes and Bakırçay (Atalay 1994).

The vegetation of the Aegean region shows great variation and complexity. It typically ranges from the sub-alpine plant communities of the high mountain peaks like Bozdağ, Muratdağı, Nif Dağı, Spil Dağı and Akdağ, through dense forests of black and red pine down to evergreen maquis and dry phrygana at sea level. The sub-alpine zone is dominated by species of *Astragalus* and *Acantholimon*. These are mixed with species such as *Thymus sipyleus*, *Festuca valesiaca*, *Festuca pinifolia*, *Dianthus erinaceus*, *Minuartia*

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*juniperina*, *Daphne oleoides* and *Euphorbia anacampseros*. Coniferous forests are dominated mainly by two species, *Pinus nigra* subsp. *pallasiana* (black pine), and *Pinus brutia* (red pine). The former ranges from approximately 900 to 1900 m and the latter from 0-900 m. However, two other tree species are important at two peaks in the area, i.e., *Abies nordmanniana* ssp. *equi-trojani* at Kazdağı (1700 m) and *Pinus sylvestris* at Murat Dağı (2150 m). Very few species are able to grow under the canopy of these forest trees, while in more open places, shrubs such as *Crateagus monogyna*, *Rosa canina*, *Prunus divaricata*, *Genista lydia*, *Berberis cretica*, *Juniperus oxycedrus* subsp. *oxycedrus*, *Rubus canascens*, *Quercus cerris* can be found. The herbaceous layer of these coniferous forests is mainly represented by *Dryopteris pallida*, *Lathyrus laxiflorus* subsp. *laxiflorus*, *Doronicum orientale*, *Fragaria vesca*, *Digitalis ferruginea*, *Vicia cracca* subsp. *stenophylla* and *Geum urbanum*. Forests dominated by *Juniperus excelsa* and *Juniperus foetidissima* occur in places where black pine forests have been destroyed, but their extent is very limited. *Juniperus oxycedrus* subsp. *macrocarpa* occurs mainly in the coastal Çesme peninsula (İzmir).

Dense scrub of sclerophyllous, 2-3 m tall, evergreen shrubs, represents the maquis vegetation of the region that is widespread from the coast up to an altitude of 750 m. This vegetation type is dominated by *Quercus coccifera* with species such as *Phillyrea latifolia*, *Olea europaea*, *Arbutus unedo*, *A. andrachne*, *Pistacia lentiscus*, *P. terebinthus*, *Jasminum fruticans*, *Lonicera etrusca*, *Laurus nobilis*, *Calicotome villosa*, *Cistus creticus*, *C. salviifolius*, *C. parviflorus*, *Anthyllis hermanniae*, *Genista acanthoclada*, *Erica arborea*, *Pyrus spinosa* and *Juniperus phoenicea*. *Quercus infectoria* subsp. *boissieri* is also widely distributed in the region, particularly in its north-western and internal parts. Scattered trees of *Quercus ithaburensis* subsp. *macrolepis* occur in the cultivated fields in this area.

The phrygana vegetation is represented by low thickets of often spiny, xerophytic and aromatic dwarf shrubs, with small leathery leaves. It ranges from sea level to 500 m and is dominated by *Sarcopoterium spinosum*. Characteristic species of this formation are *Origanum onites*, *Ballota acetabulosa*, *Coridothymus capitatus*, *Thymbra spicata*, *Micromeria graeca*, *M. juliana*, *M. myrtifolia*, *Satureja thymbra*, *Asphodelus aestivus* and *Prasium majus*.

The major cultivated plants in the Aegean region are tobacco, cotton, potato, rice, various vegetables, grapes, oranges, cherries, figs and peaches. Other fruit trees commonly met within the region are pomegranates, apples, almonds, pears and mulberry (Öztürk & al., 1994).



*Cyclamen coum*  
(ENDEMIC)



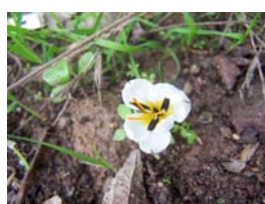
*Hyacinthella lineata*  
(ENDEMIC)



*Fritillaria carica subsp. carica*  
(ENDEMIC)



*Alkanna areolata*  
(ENDEMIC)



*Crocus biflorus sub.sp. nubigena*  
(ENDEMIC)



*Galium aretioides*  
(ENDEMIC)



*Pterocephalus pinardii*  
(ENDEMIC)



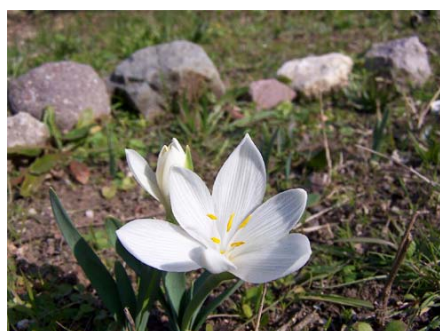
*Trigonella carica*  
(ENDEMIC)



*Chionodoxa luciliae*  
(ENDEMIC)



*Chionodoxa sardensis*  
(ENDEMIC)



*Sternbergia candida*  
(ENDEMIC)

Fig. 1 Some endemic plant species of Turkey

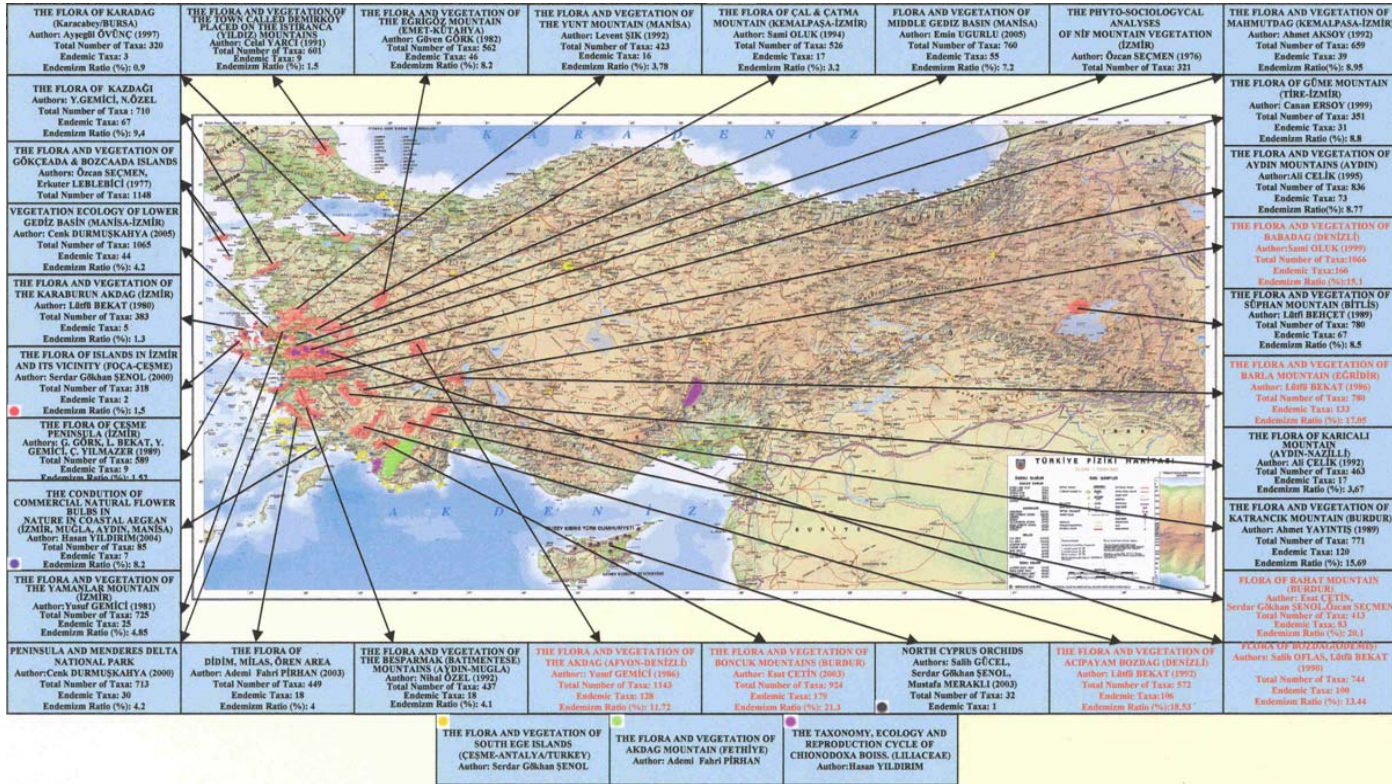


Fig. 2 Map of Taxonomic Researches Carried Out in the Herbarium of Ege University Botanical Garden in Turkey

## Results

33,000 vascular plant taxa were recorded in Ege University Herbarium as a result of twenty-eight studies conducted between 1976 and 2005 and several floristic activities carried out within several projects at certain periods. 941 of these samples are endemic on the basis of species (**Fig. 1**). In addition, there are 28 holotypus, isotypus and topotypus sample available. The list including these samples is given below. (**Tab. 1**) (**Fig. 3**)



Fig. 3 Some specimens of Aegean Herbarium

**Tab. 1** The list of herbarium samples

<p><b>Asteraceae</b>  Isotypus: <i>Pilosella sandrasica</i> Hartvig et Strid  Isotypus: <i>Scorzonera sandrasica</i> Hartvig et Strid  Holotypus: <i>Centaurea zeybekii</i> Wagenitz  Topotypus: <i>Centaurea polyclada</i> DC.</p> <p><b>Brassicaceae</b>  Holotypus: <i>Aethionema acarii</i> Gemici &amp; Leblebici  Holotypus: <i>Thlaspi leblebici</i> Gemici &amp; Görk  Topotypus: <i>Aurinia uechtritziana</i> (Bornm.) Cullen et Dudley</p> <p><b>Caryophyllaceae</b>  Topotypus: <i>Arenaria eliasiana</i> Kit Tan  Holotypus: <i>Dianthus akdagensis</i> Gemici &amp; Leblebici</p> <p><b>Chenopodiaceae</b>  Isotypus: <i>Kalidiopsis wagenitzii</i> Aellen</p> <p><b>Ericaceae</b>  Holotypus: <i>Erica bocquetii</i> (Peşmen) P. F. Stevens</p> <p><b>Fabaceae</b>  Holotypus: <i>Astragalus yilmazii</i> Aytaç &amp; Ekici  Isotypus: <i>Thermopsis turcica</i> Kit Tan, Vural &amp; Küçüködük  Isotypus: <i>Genista sandrasica</i> Hartvig &amp; Strid.</p>	<p><b>Geraniaceae</b>  Holotypus: <i>Erodium somanum</i> Peşmen  Holotypus: <i>Erodium olympicum</i> Gemici &amp; Leblebici</p> <p><b>Guttiferae</b>  Isotypus: <i>Hypericum malatyanum</i> Peşmen  Topotypus: <i>Hypericum morathii</i> Rabson</p> <p><b>Lamiaceae</b>  Holotypus: <i>Ballota sechmenii</i> Gemici &amp; Leblebici  Holotypus: <i>Nepeta anamurensis</i> Gemici &amp; Leblebici  Sintypus: <i>Cyclotrichium longiflorum</i> Leblebici</p> <p><b>Linaceae</b>  Topotypus: <i>Linum tmoleum</i> Boiss.</p> <p><b>Polygonaceae</b>  Holotypus: <i>Polygonum ekimianum</i> Leblebici, Duman &amp; Aytaç  Holotypus: <i>Polygonum afyonicum</i> Leblebici &amp; Gemici  Isotypus: <i>Polygonum samsunicum</i> Yıldırımllı &amp; Leblebici</p> <p><b>Rosaceae</b>  Holotypus: <i>Potentilla aladaghensis</i> Leblebici</p> <p><b>Scrophulariaceae</b>  Holotypus: <i>Scrophularia scopolii</i> (Hoppe ex) Pers. var. burdurensis (Peflmen) RRMill.  Isotypus: <i>Veronica cetikii</i> Öztürk</p>
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When the studies shown on the map are evaluated in terms of endemism;

- The Flora And Vegetation of Boncuk Mountains (Burdur)- Endemism Ratio (%): 21.3
- The Flora of Rahat Mountain (Burdur)- Endemism Ratio (%): 20.1
- The Flora And Vegetation of Acıpayam Bozdağ (Denizli)- Endemism Ratio (%): 18.53
- The Flora And Vegetation of Barla Mountain (Eğridir)- Endemism Ratio (%): 17.05
- The Flora And Vegetation of Babadağ (Denizli)- Endemism Ratio (%): 15.1
- Flora of Bozdağ (Ödemis)- Endemizm Ratio (%): 13.44
- The Flora And Vegetation of The Akdağ (Afyon-Denizli)- Endemism Ratio (%): 11.72

Especially in these areas have a high endemism ratio. For this reason in-situ protection studies must be started on these areas (**Fig. 4**).

Since the Botanical Garden & Herbarium Research and Application Center of the Ege University is located close to the mountains mentioned above, it has shifted its studies from plant conservation biology to the protection of the critical endemic species in these regions(**Tab. 2**). It continues its researches in the light of the projects provided by the Scientific and Technological Research Council of Turkey (TUBİTAK) and research funds of Ege University. Plants worked on within these projects are as follows:



Fig. 4 The protection of the critical endemic species

Tab. 2 The risk category of critical endemic species

Family	Taxon	Risk Category (IUCN 2001)
Linaceae	<i>Linum aretioides</i> Boiss	VU
Caryophyllaceae	<i>Minuartia nifensis</i> McNeill	EN
Caryophyllaceae	<i>Dianthus erinaceus</i> var. <i>erinaceus</i> Boiss	VU
Rubiaceae	<i>Asperula daphneola</i> O.Schwartz	VU
Asteraceae	<i>Anthemis xylopoda</i> O. Schwarz	CR

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