

*Full Length Research Paper*

# An investigation on plant species diversity in Colchic Province (Turkey)

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The present study was carried out during 2005 to 2010 to determine the important plants of Colchic Province in Turkey, which includes Ordu, Giresun, Trabzon, Rize, Gumushane and Artvin cities. The research area is located in the Colchic part of the Euxin province of the Euro-Siberian floral region, within the Holarctic phytogeographical region. In this study, 327 genera, 540 species and subspecies belongs to 89 different families, were identified in the research area. The distribution of taxa according to phytogeographic regions is as follows: 40.56% Euro-Siberian, 7.78% Irano-Turanian, 2.96% Mediterranean and 48.70% unknown region or widely distributed. The families with the largest number of genera are Asteraceae (64; 11.85%), Fabaceae (54; 10.00%), Poaceae (47; 8.70%), Lamiaceae (33; 6.11%), Scrophulariaceae (23; 4.26%) and Rosaceae (22; 4.07%), respectively. The richest genera are *Trifolium* L. (13 taxa), *Campanula* L. (11 taxa) and *Astragalus* L. (8 taxa). The distribution of taxa according to life-form is as follows: 309 Hemicryptophyte (57.22%), 92 Therophyte (17.04%), 44 Chamaephyte (8.15%), 44 Phanerophyte (8.15%), 43 Geophyte (7.96%), and 8 Hydrophyte (1.48%). The study identified 540 taxa, of which 428 are perennial, 84 are annual, 19 are biennial, 6 are annual and biennial, and 6 are biennial and perennial. The endemism rate is 11.67% (63 taxa). The risk status of 39 taxa was evaluated according to International Union for Conservation of Nature and Natural Resources (IUCN) risk criteria.

**Key words:** Eastern black sea, flora, Colchic province, Turkey.

## INTRODUCTION

Biological diversity is the most important natural richness of a country. The conservation and maintenance of national biological diversity are of great importance for sustainable global biological diversity and natural balance. Turkey is one of the most important centers in the world with relations to the flora. The floristically rich region is the gene center of many plants found around the world.

Erik and Tarikahya (2004) reported that almost 12,000 different plant taxa were found within Turkey. With the latest new genera and records by Ozhatay and Kultur (2006) and Ozhatay et al. (2009), this number reached 12.476. There are three different flora regions represented in Turkey, Euro-Siberian, Mediterranean and Irano-Turanian (Davis, 1965,1985). The Euro-Siberian floral region is divided into the Euxin and Hyrcanien. The western area, which is closer to Black Sea is called Euxin, while the northern part of Iran and the area where

the Talysh Mountains are located is called Hyrcanien. The Euro-Siberian floral region is represented by Euxin Province in Turkey. The Euxin area is divided into two by River Melet, which separates the Eastern Black Sea from the Central Black Sea, and the eastern part is called Colchic.

The present research was carried out over a large area, including Ordu, Giresun, Trabzon, Rize, Gumushane and Artvin cities. The study area is located in the Colchic province of Euxin region, in the Euro-Siberian phytogeographical area; according to the grid system employed by Davis, the area is within square A6-7-8-9 (Figure 1). According to records from Davis (1965, 1985) and the Turkish Plants Data Service (TUBIVES, 2011), this region is rarely studied and is not well known. The primary objective of the present study was to draw attention to potential damage to the regional flora due to the interventions to be made to the plant diversity of the

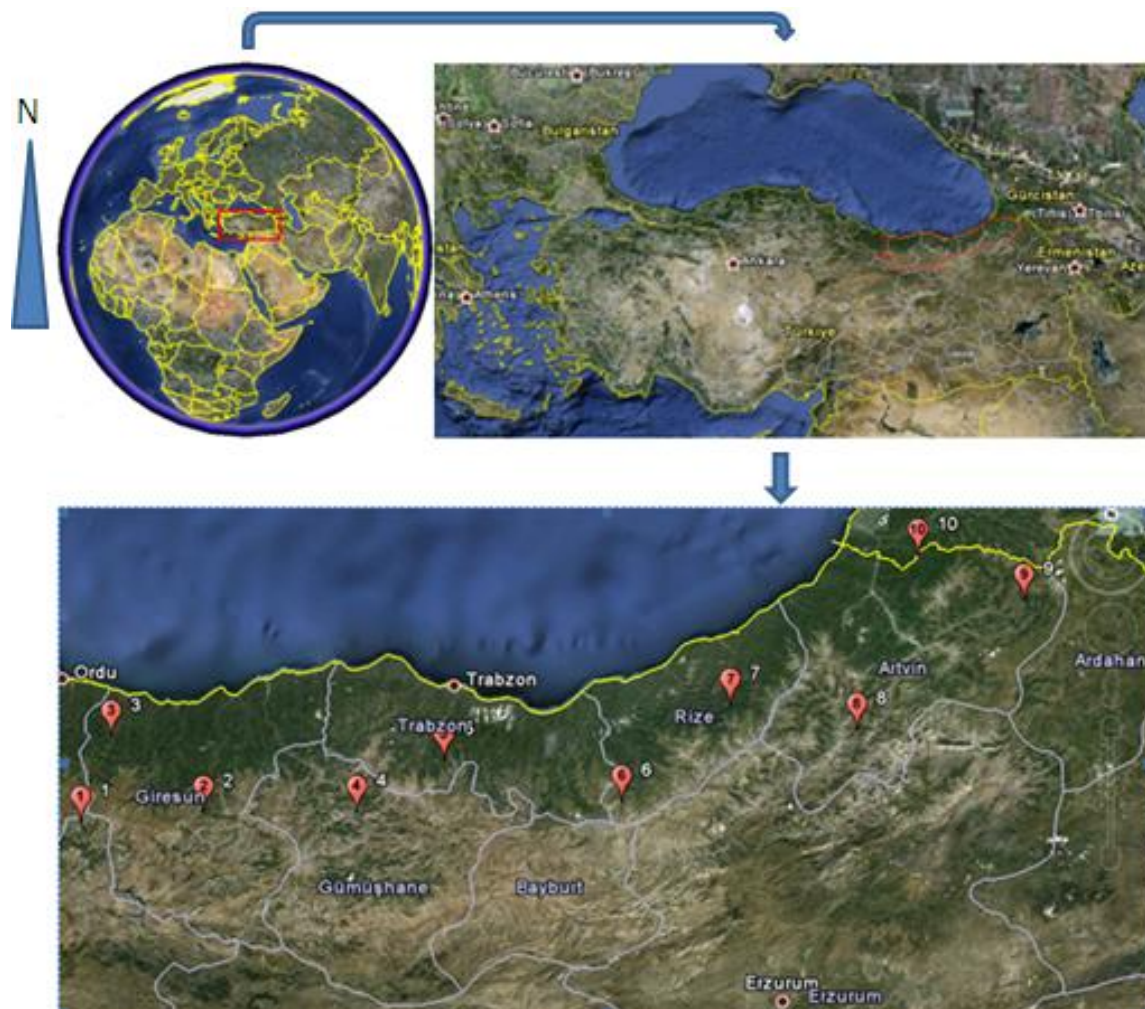


Figure 1. East Black Sea and its location in Turkey (by Google Earth).

Colchic Province, located on the eastern part of the River Melet in Eastern Black Sea region because of developing tourism sector in the region; hydroelectric projects, highway construction, agricultural activities and the transhumance tradition. The data obtained from the research area are thought to make a contribution to the understanding of the regional flora.

### General description of the research area

The research area starts from Ordu City and from the River Melet, which flows into the Black Sea, and extends to Georgia, and to the provincial borders of Ardahan and Erzurum. The Black Sea is situated in the north of the research area and Tokat, Sivas, Erzincan, Bayburt and Erzurum Cities are located in the south. The area is located between  $36^{\circ}41'25''$  and  $42^{\circ}42'35''$  eastern meridians and between  $39^{\circ}50'23''$  and  $41^{\circ}31'28''$  northern parallels (Figure 1).

Within the region, great soil groups such as grey-brown podzolic soil, red-yellow podzolic, brown forest, non-calcareous brown soil, brown, high mountain-meadow, alluvial and colluvial soils are widespread. Alluvial soils constitute 1.4% of the regional surface area, while Colluvial soils constitute 0.6%. The majority of the soils consist of great soil groups such as red-yellow podzolic, grey-brown podzolic, non-calcareous brown forest, brown forest and high mountain-meadow soils (KHGM, 2011).

The surface area of the region is 3.62 million ha, representing 4.64% of that of Turkey. The land suitable for tillage farming in the region constitute 1.18% of the lands suitable for tillage farming throughout Turkey, and 11.02% of the lands unsuitable for tillage farming. The high proportion of VII class land indicates that the region generally has rugged terrains. While I to IV class land represents 8.3% of the surface area of the region, that of VI and VII class lands is 86.1% and that of VIII class lands is 5.6%. The region is comprised of land unsuitable for tillage farming because of the general structure it has.

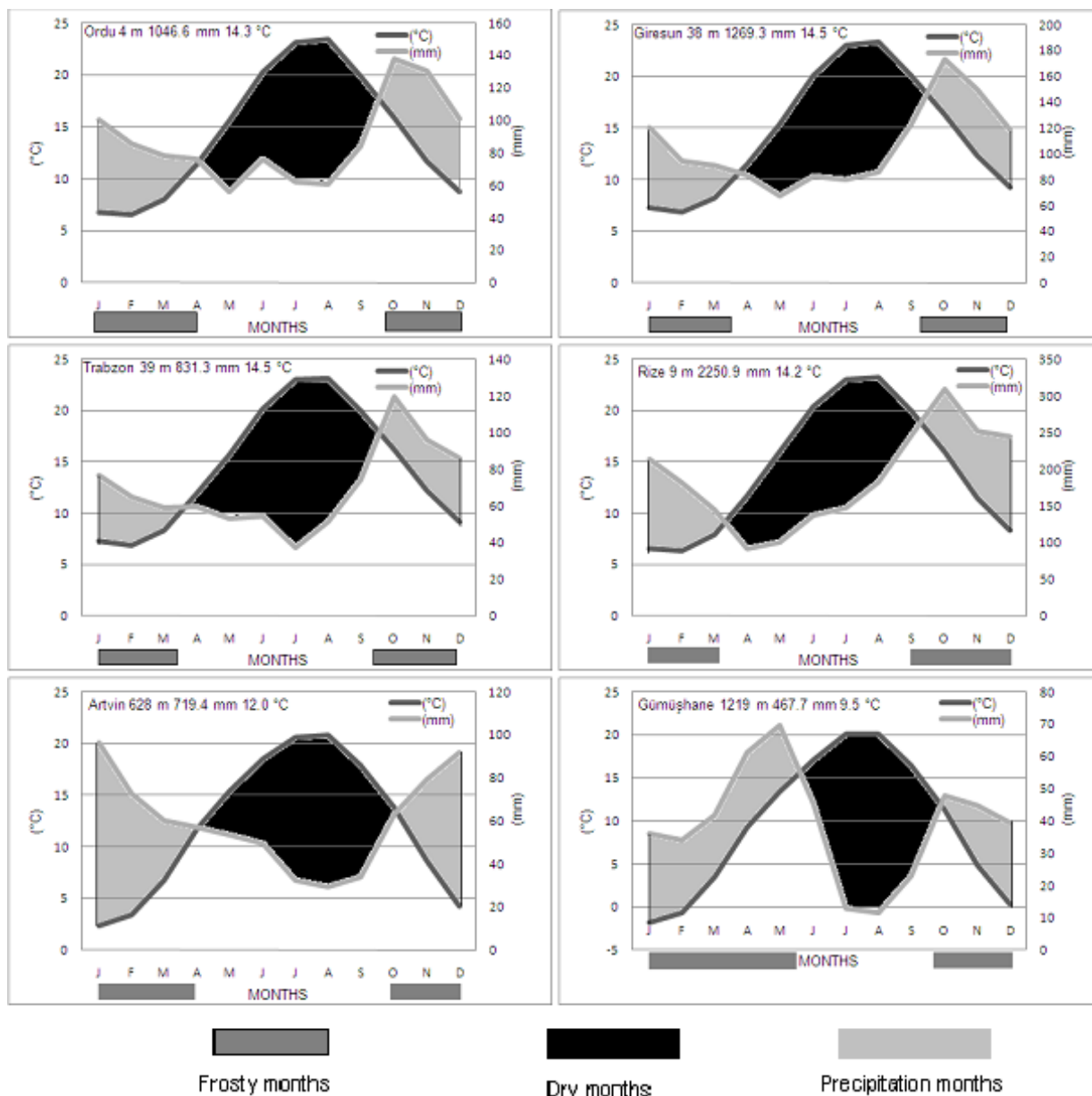


Figure 2. Climatic diagram of province in Eastern Black sea.

Gumushane has the highest proportion of land suitable for tillage farming (37.78%), and Rize has the lowest (3.02%). Although the total area of the lands in the region suitable for tillage farming is 469,987 ha, tillage farming is practiced on an area of 946,737 ha, meaning that 50.4% of tillage farming within the region is practiced on unsuitable land (Askın and Tarakcioglu, 2005).

Analyzing the regional topography in terms of slope, it is found that 1% of the area is flat, 0.6% has a gentle slope, 2.1% have moderate slope, 6.4% are steep, 20.6% of them are very steep and 69.3% of them are rugged. Gümüşhane has the highest proportion of flat land in the region (75%), while Trabzon has the lowest (2.8%) (KHGM, 2011). Regional climatic data for 1975 to 2010

(35 years) (Figure 2) shows that the cities in the region generally experience drought during July and August. While possible frost is seen on the coast of Ordu, Giresun, Trabzon, Rize and Arvin cities until April in spring; in fall, frost is seen after the second half of September. In Gumushane, frost may occur until May. According to the long-term data, the highest annual precipitation of 2250.9 mm occurred in Rize, followed by respectively Giresun (1269.3 mm), Ordu (1046.6 mm), Trabzon (831.3 mm), Artvin (719.4 mm) and Gumushane (467.7 mm). According to the long-term data, annual average temperature was as follows: Giresun and Trabzon 14.5°C, Ordu 14.3°C, Rize 14.2°C, Artvin 12.0°C and Gumushane 9.5°C.

The average temperature values of the hottest month (M) and the coldest month (m) are as follows; Ordu (27.7 and 3.6°C), Giresun (26.7 and 4.3°C), Trabzon (26.9 and 4.1°C), Rize (26.8 and 3.3°C), Artvin (25.9 and -0.7°C) and Gumushane (28.6 and -8°C). In all of the cities, the hottest month was August, whereas the coldest month was February in Ordu, Giresun Trabzon and Rize, and January in Artvin and Gumushane (DMI, 2011). The hottest and coldest temperature in Ordu was determined to be during June (37.3°C) and February (-6.7°C), respectively; in Giresun, during April (36.0°C) and February (-4.9°C); in Trabzon, during May (37.8°C) and February (-1°C); in Rize, during May (38.2°C) and February (-6.4°C); in Artvin, during July (41.6°C) and January (-11.9°C); and in Gumushane, during July (41.0°C) and February (-25.7°C) (DMI, 2011).

While the relative humidity level is generally over 70% annually across the coastal regions, it reduces to around 50 to 60% inland. The relative humidity level is much higher during summer than during winter. The prevailing wind direction is south-southeast in Ordu; generally south-southwest in Trabzon, Giresun, Rize and Gumushane; and west, north-west in Artvin (DMI, 2011). The Eastern Black Sea Region has a rich vegetation cover, as it includes various ecological units, due to an altitude range from sea level up to 3376 m, mountains running parallel to the coastline, the northern border formed by the Black Sea, several large and small streams, and varying soil and climatic characteristics.

The forest flora of the region is comprised of various trees, shrubs and herbaceous and woody living covers. Moreover, meadows, pastures and high plateaus embody important plant diversity. In terms of agricultural products, tea and hazelnut are peculiar to the region and a large variety of additional products are grown, including land, vegetable and fruit groups. When the vegetation structure of the region is considered with the Black Sea hinterlands, four primary vegetation types are observed: pseudomaquis, forest, steppe and alpine vegetations (Ansin, 1980 and 1983).

The pseudomaquis vegetation generally occurs within a narrow zone along the coastal parts of the region, and it extends 0 to 200 m and more along the River Coruh at altitudes of 100 to 500 m. This vegetation type is mainly comprised with a mixture of some Mediterranean plants in collective, scattered or small groups, primarily consisting of Euxine elements. The main taxa of the pseudomaquis vegetation are Euro-Siberian elements such as *Acer cappadocicum* Gleditsch var. *cappadocicum* Gleditsch, *Alnus glutinosa* L., *Buxus sempervirens* L., *Corylus avellana* L. var. *avellana* L., *Daphne pontica* L., *Diospyros lotus* L., *Frangula alnus* Miller subsp. *alnus* Miller., *Ilex colchica* Poj., *Laurocerasus officinalis* Roemer., *Mespilus germanica* L., *Rhododendron ponticum* L. subsp. *ponticum* var. *heterophyllum* Ansin. *R. luteum* Sweet., *Vaccinium arctostaphylos* L. At the same time, the vegetation taxa

include *Arbutus andrachne* L., *Erica arborea* L., *Cistus creticus* L., *Cistus salviifolius* L., *Rhus coriaria* L., *Cotinus coggygria* Scop., *Ficus carica* L. subsp. *carica*. (All.) Schinz Et Thell., *Juniperus oxycedrus* L. subsp. *oxycedrus* L., *Laurus nobilis* L., *Olea europaea* L. var. *sylvestris* (Miller) Lehr., *Phillyrea latifolia* L., *Pinus pinea* L., *Pyracantha coccinea* Roemer (Anşin, 1980).

Forest vegetation is the one of the most widespread vegetation types in the region, beginning immediately above the pseudomaquis (300 to 400 m) and extending up to altitudes of 1900 to 2300 m, where alpine vegetation begins. The main forest vegetation taxa include *Abies nordmanniana* (Stev.) Spach subsp. *nordmanniana* (Stev.) Spach., *Acer campestre* L. subsp. *campestre* L., *A. cappadocicum* Gleditsch var. *cappadocicum* Gleditsch., *A. platanoides* L., *A. trautvetteri* Medw., *Alnus glutinosa* (L.) Gaertner subsp. *barbata* (C. A. Meyer) Yalt., *Carpinus betulus* L., *Castanea sativa* Miller., *Fagus orientalis* Lipsky., *Juglans regia* L. *Ostrya carpinifolia* Scop., *Picea orientalis* (L.) Link., *Pinus sylvestris* L., *Platanus orientalis* L., *Populus tremula* L., *Sorbus aucuparia* L., *Quercus hartwissiana* Steven., *Q. petraea* (Mattuschka) Liebl. subsp. *iberica* (Steven Ex Bieb.) Krassiln., *Q. macranthera* Fisch. Et Mey. Ex Hohen. subsp. *sypirensis* (C. Koch) Menitsky., *Tilia rubra* DC. subsp. *caucasica* (Rupr.) V. Engler, *Ulmus glabra* Hudson., *U. minor* Miller subsp. *minor* Miller.

The steppe vegetation in the Eastern Black Sea is widespread between Gümüşhane and Bayburt and in the Sebinkarahisar locality of Giresun city. This vegetation is comprised of several genera belonging to *Acantholimon acerosum* (Willd.) Boiss. var. *acerosum* (Willd.) Boiss., *Alchemilla* sp.(L.), *Artemisia* sp. (L.), *Astragalus* sp. (L.), *Centaurea* sp. (L.), *Eryngium giganteum* Bieb., *Thymus* sp. (L.), *Helianthemum* sp (L.), *Minuartia* sp. (L.), *Dianthus* sp. (L.) , *Teucrium* sp. (L.), *Stipa* sp. (L.), *Festuca* sp. (L.), *Pilosella* sp. (Hill.) *Trifolium* sp.

The alpine vegetation starts at almost 1900 to 2000 m altitude above the forest line and is comprised of some very rich herbaceous and some woody plants, which extend up to the peaks of the mountains (3500 to 3900 m). The localities where the alpine vegetation is widespread and distinct in the region are as follows: Giresun (Kumbet-Karagol), Trabzon (Zigana and Cakirgol mountains), Gumushane Torul (Saric Mountains), Rize (Anzer, Ayder localities), Artvin (Melo high plateau, Yanlızcam mountain and Savsat Zendebe high plateau). The distinctive taxa of the subalpine vegetation, which is located below alpine vegetation, include plants such as *Anemone narcissiflora* L. subsp. *narcissiflora* L., *Anemone blanda* Schott Et Kotschy. *Trollius ranunculinus* (Smith) Stearn, *Caltha polypetala* Hochst. Ex Lorent., *Colchicum speciosum* Steven, *Primula elatior* (L.) Hill subsp. *meyeri* (Rupr.) Valentine Et Lamond., *Ajuga orientalis* L., *Gagea* sp. (Salips.), *Erysimum pulchellum* (Willd.) Gay, *Galium* sp. (L.), *Reseda lutea* L. var. *lutea*

L., *Scutellaria* sp. (L.), *Juniperus excelsa* M. Bieb. subsp. *excelsa*, , *Crataegus* sp. (L.). Among the herbaceous plants mainly found in the alpine vegetation such as *Helichrysum graveolens* (Bieb.) Sweet, *H. plicatum* Dc. subsp. *plicatum* Dc., *Geum coccineum* Sm., *Trifolium polyphyllum* C. A. Meyer., *Jasione supina* Sieber subsp. *pontica* (Boiss.) Damboldt., *Festuca* sp. (L.), *Alchemilla* sp. (L.) , *Pedicularis* sp. (L.), *Scorzonera* sp. (L.), *Anthyllis vulneraria* L. subsp. *boisseri* (Sag.) Bornm., *Campanula tridentata* Schreber, *Veronica gentianoides* Vahl subsp. *gentianoides*, *V. multifida* L., *Potentilla crantzii* (Crantz), *Astragalus viciifolius*, Dc., *Oxytropis ablana* Stev., *Carex* sp. L., *Sibbaldia parviflora* Willd. var. *parviflora* Willd., *Ornithogalum* sp. L., *Asperula affinis* Boiss. Et Huet, , *Erigeron caucasicus* Stev. subsp. *caucasicus* Stev., *Geranium* sp. L. some woody taxa such as *Juniperus communis* L. *J. excelsa* M. Bieb. subsp. *excelsa*, *Vaccinium vitis-idaea* L., *Rosa montana* Chaix., *Rhododendron luteum* Sweet are also observed (Ansin, 1980).

Many studies have been carried out in order to determine the flora of the Black Sea Region, a great majority of which includes the Western and Eastern Black Sea Region. A floristic study of the Eastern Black Sea Region by Ansin (1980) identified 2239 different plant species and determined 222 endemic plant taxa. Further studies were carried out in the same region by Ansin (1983), Karakaya and Kılıç (1996), Eminagaoglu (2003, 2004, 2008), Palabas (2006), Uzun (2008) and Severoğlu et al. (2011). In addition to species richness, diversity existed within the species. Onal Asci (2011a,b) reported that large variation existed among the red clover genotypes, collected from Black Sea Region, in terms of morpho-agronomic properties and salt tolerance. A climate diagram of the cities within the research area was prepared using the Walter method (Akman, 1999). The Eastern Black Sea generally has a mild oceanic climate in which precipitation is evenly distributed throughout the year (Akman, 1999).

## MATERIALS AND METHODS

The material of this study, carried out during 2005 to 2010, is comprised of the vegetation cover in the zone of Ordu, Giresun, Trabzon, Rize, Gumushane and Artvin cities. According to their development periods, attempts were made to identify the plants in the field, especially during their generative periods; studies were conducted along the line of Mesudiye town and Cambası high plateau (Ordu), Karagol and Kumbet high plateaus (Giresun), Hidirnebi, Kadirga high plateaus (Trabzon), Anzer, Ayder and Cimil high plateaus (Rize), Altınpınar high plateau (Gumushane) Savsat, and Camili (Artvin) and İkizdere and Fitina valley (Figure 1). Samples were taken of any unidentified plants, which were subsequently identified according to Davis (1965 to 1985) by preparing herbarium samples.

The plants obtained from the research area were classified alphabetically according to their class, family, genus and species. The classification list included the lifespans of the plants (Anonymous, 2008), habitus types, life forms (Raunkiaer, 1934;

Ellenberg and Mueller- Dombois, 1967; Andic, 1977 and 1985; Yaltırak and Efe, 1996; Deveci and Andic, 1992), their floristic regions and whether or not they are endemic (Davis, 1965, 1985; Baytop, 1997; TUBIVES, 2011). The risk categories of the endemic and non-endemic taxa identified in the region were determined according to IUCN criteria (Ekim et al., 2000; IUCN, 2001).

## RESULTS AND DISCUSSION

A total of 540 taxa were determined at the level of species, subspecies and variety which belong to 327 genera of 89 families out of 2000 plant samples taken from the region during the research. Those which are marked by \* are the culture forms. Given the distribution of the plants in the research area according to the floristic regions, 251 taxa (48.70%) were classed as having more than one region or as having no specific region. The Euro-Siberian (219, 40.56%) element was found to be most widespread, followed respectively by the Irano-Turanian (42, 7.78%) and Mediterranean (16, 2.96%) elements (Table 1). The high inclusion rate of Euro-Siberian element indicates that the region is a part of this floral element. Similar results were reported in previous studies in the same and nearby regions. The results shown in Table 2 demonstrate that the studies by Karakaya (1996), Eminagaoglu (2003, 2006, 2008), Palabas Uzun (2006) and Uzun (2008) have similar values in terms of each three floral elements. Similar results were obtained from other floristic studies in the Eastern Black Sea region of Turkey. The Euro-Siberian elements seem to be dominant in all areas studied while the Irano-Turanian elements come second, Mediterranean elements third in all these areas.

Sixty-three of the determined taxa are endemic (11.67%). Endemic taxa are listed as Euro-Siberian (32, 5.93%), Irano-Turanian (19, 3.52%), and unknown or with more than one origin (12, 2.22%) (Table 1). A comparison of the distribution of species according to their phytogeographical region and endemism rate is given in Table 2. The results for endemism were higher compared to previous studies carried out in similar regions (Karakaya, 1996; Eminagaoglu, 2003, 2006, and 2008; Palabas Uzun, 2006; Uzun, 2008) This rate is low compared with the average endemism rate of the flora of Turkey (34.5%) (Guner et al., 2000) because the region is lower than that of the other two phytogeographical region. Moreover, Ansin et al. (2002) reported that the rate of endemism in a study carried out in the Eastern Black Sea Region was almost 16%.

A total of 33 taxa, all endemic, and 6 nonendemic taxa were evaluated according to IUCN risk categories (Ekim et al., 2000; IUCN, 2001). The results are summarised in Table 1. The distribution of the threat categories is as follows: 1 nonendemic taxa in CR, 2 endemic taxa in EN, 6 endemic and 4 nonendemic taxa in VU, 3 endemic taxa in LR(nt), 22 endemic and 1 nonendemic taxa in LR(lc). The largest families in terms of number of genera were



**Table 1.** Phytogeographic, endemic, nonendemic and threat categories distribution of the plant taxa located in the study area.

Phytogeographical region	Endemic		Nonendemic		Total	
	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)
Euro-Sib.	32	5.93	187	34.63	219	40.56
Ir.-Tur.	19	3.52	23	4.26	42	7.78
Medit.			16	2.96	16	2.96
Mul. or Unk. P. Reg.	12	2.22	251	46.78	263	48.70
Total	63	11,67			540	100.00
CR			1	0.19	1	0.19
EN	2	0.37			2	0.37
VU	6	1.11	4	0.74	10	1.85
LR(nt)	3	0.56			3	0.56
LR(lc)	22	4.07	1	0.19	23	4.26
Total	33		6		39	

**Table 2.** Comparison (%) of floristic results between the present study and other studies conducted in adjacent or nearby areas according to number of taxa, the phytogeographical elements, and endemism.

Studies	Number of taxa	Euro-Sib.	Ir.-Tur.	Medit.	Endemism
Present study	540	40.56	7.78	2.96	11.5
Eminagaoglu(2008)	990	48.20	3.50	1.90	2.3
Uzun (2008)	383	48.04	3.66	2.87	4.2
Palabas Uzun (2006)	384	50.27	5.99	1.04	8.3
Eminagaoglu(2004)	872	39.40	10.30	1.10	6.3
Eminagaoglu(2003)	769	35.60	6.90	2.20	7.4
Karakaya (1996)	323	46.74	4.03	0.93	8.7

Asteraceae (Compositae) (41.), Poaceae (Gramineae) (32), Lamiaceae (Labiatae) (19), Fabaceae (Leguminosae) (17), Apiaceae (Umbelliferae) (16), Rosaceae (14), Brassicaceae (Cruciferae) (12), Scrophulariaceae (11), Liliaceae (9), and Campanulaceae (3) (Tables 3 and 5). The richest families in terms of number of taxa were Asteraceae (Compositae) (64; 11.85%), Fabaceae (Leguminosae) (54; 10.00%), Poaceae (Gramineae) (47; 8.70%), Lamiaceae (Labiatae) (33; 6.11%), Scrophulariaceae (23; 4.26%), Rosaceae (22; 4.08%), Apiaceae (Umbelliferae) (17; 3.15%), Liliaceae (16; 2.96%), Brassicaceae (Cruciferae) (14; 2.59%), and Campanulaceae (3; 2.59%) (Tables 3, 4, 5).

The total ratio of the 10 major families is 56.5%, with the remaining families comprising 45.0%. The major family order in our study is concordant with the Flora of Turkey (Guner et al., 2000). A comparison of families in terms of the largest number of species found in this study and in previous studies carried out in nearby regions is given in Table 4. The results of this study are in agreement with those of other similar studies (Eminagaoglu, 2003, 2004, 2008; Palabas Uzun, 2006; and Uzun, 2008). Differences in several families might be

due to the results of dissimilarities in climates and habitats. Asteraceae(Compositae) (the largest family in our list) is one of the largest family in the Flora of Turkey (Güner et al., 2000). The Asteraceae, Fabaceae and Poaceae families are the richest families in terms of number of taxa and these results are very similar to those in our study (Table 4).

The richest genera in terms of the number of taxa were *Trifolium* L. (13), *Campanula* L. (11), *Astragalus* L. (8), *Centaurea* L (7), *Geranium* L. (7), *Silene* L. (7), *Medicago* L. (6), *Polygonum* L. (6), and *Veronica* L. (6) (Table 5).

The Fabaceae family varies in habit from annual and perennial herbs to shrubs, trees, and even a few aquatics, and therefore it is cosmopolitan in distribution and well-represented throughout temperate and tropical regions of the world (Rundel, 1989). The preference of Fabaceae members for semi-arid to arid habitats is related to a nitrogen-demanding metabolism, which is thought to be an adaptation to climatically variable or unpredictable habitats (McKey, 1994). Turkey is the richest Mediterranean country for *Trifolium* genus with over 100 species in its natural flora (Zohary and Heler, 1984). The most common genera were *Trifolium* (13 taxa), *Astragalus* (8 taxa) *Medicago* and *Lathyrus* 6 taxa

**Table 3.** Numerical and dispersion rates of 10 families containing the most taxa identified in the study area.

Family	Number of genera	Number of taxa	Rates (%)
Asteraceae	41	64	11.85
Fabaceae	17	54	10.00
Poaceae	32	47	8.70
Lamiaceae	19	33	6.11
Scrophulariaceae	11	23	4.26
Rosaceae	14	22	4.08
Apiaceae	16	17	3.15
Liliaceae	9	16	2.96
Brassicaceae	12	14	2.59
Campanulaceae	3	14	2.59
Other Families	153	236	43.70
Total	327	540	100.00

**Table 4.** Comparison of 10 families containing the most species in studies conducted in nearby regions (%).

Family	Present study	Eminagaoglu (2008)	Uzun (2008)	Eminagaoglu (2003)	Eminagaoglu (2004)	Uzun (2006)
Asteraceae	11.9	11.5	9.1	9.5	10.3	10.2
Fabaceae	10.0	6.0	6.0	8.7	8.8	6.0
Poaceae	8.7	7.0	2.6	4.9	6.9	7.6
Lamiaceae	6.1	4.3	7.0	5.5	5.7	3.1
Scrophulariaceae	4.3	4.7	5.0	4.2	5.1	6.3
Rosaceae	4.1	6.0	5.7	6.5	6.4	9.1
Apiaceae	3.2	2.4	4.4	1.7	2.2	2.3
Liliaceae	3.0	2.6	2.9	2.7	2.8	3.9
Brassicaceae	2.6	4.7	4.7	6.4	5.2	2.3
Campanulaceae	2.6	1.5	1.8	1.3	1.8	2.9
Total	56.5	50.7	49.2	51.4	55.2	53.7

of each, and *Vicia* (4 taxa). *Trifolium* and *Astragalus* genera are present in all researches realized in the Eastern Black Sea region of Turkey (Davis, 1965,1985; Ansin, 1980, 1983; Eminagaoglu and Ansin, 2003, 2004; Uzun and Terzioglu, 2008; Severoglu et al., 2011).

The life-form spectrum in the present study is given in Figure 3. The life-form spectrum of the taxa was as follows: Hemicryptophytes 309 (57.22%), Therophytes 92 (17.04%), Chamaephytes 44 (8.15%), Phanerophytes 44 (8.15%), Geophytes 43 (7.96%), and Hydrophytes 8 (1.48%). Hemicryptophytes were the best represented class in the study area. The results of this study are in agreement with those of other similar studies (Altay et al., 2010; Severoglu et al., 2011)

Hemicryptophytes have been followed by therophytes; annual plants which survive the unfavorable season in the form of seeds and complete their life-cycle during favorable seasons. 47 taxa of Hemicryptophytes are endemic. About 428 taxa among 540 plants taxa are perennial, 83 of the plants are annual, 19 of the plants

are biannual, 6 of them are annual and biannual plants, and 6 of them are biannual and perennial plants (Table 5).

## Conclusion

Important results were found in the present study, which was conducted to draw attention to and improve understanding of the plant variety of Colchic province in the Eastern Black Sea Region. The present study was carried out in specific areas that are representative of the region (Figure 1), and emphasizes the importance of the Colchic province in terms of plant diversity and endemism. The endemism rate of 11.67% was considered low compared to the rate of 16% estimated for the region (Anşin et al., 2002). Since the region is included in the Euro-Siberian floral region, a great majority of the endemics belong to the same element (5.93%). The endemics identified in the region include the

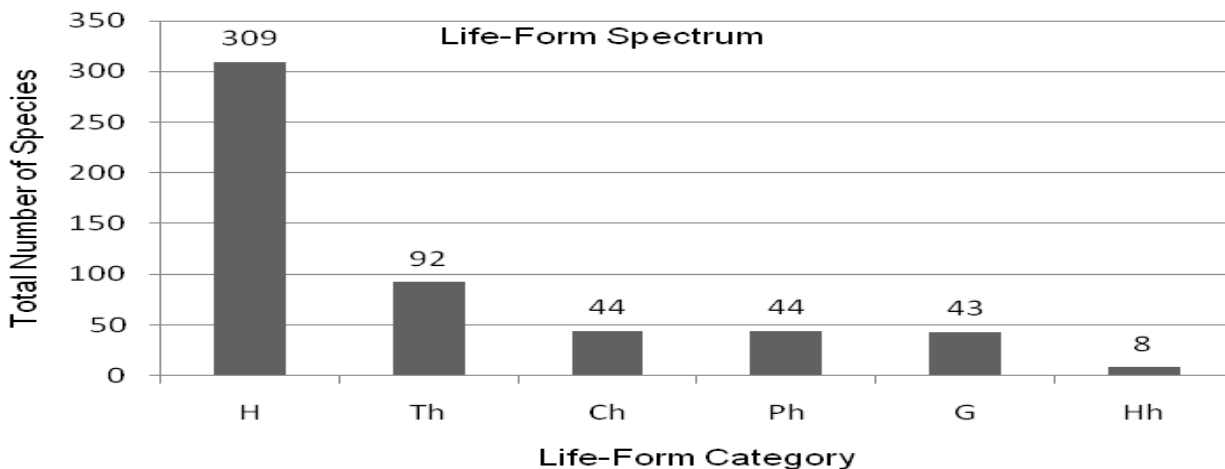


Figure 3. Life-form spectrum of taxa.

Table 5. Length of life, life-form category, phylogeographic, endemic, nonendemic and threat categories distribution of the plant taxa located in the study area.

Family and taxa of plants	Length of life	Life-form	Element region	End.	IUCN
<b>PTERIDOPHYTA</b>					
<b>Aspidiaceae</b>					
<i>Dryopteris filix-max</i> (L.) Schott.	Per.	H			
<i>Dryopteris affinis</i> (Lowe) Fraser-Jenkins subsp. <i>coriacea</i> Fraser-Jenkins	Per.	H	Euro-Sib.		
<b>Aspleniaceae</b>					
<i>Phyllitis scolopendrium</i> (L.)	Per.	H			
<b>Athyriaceae</b>					
<i>Athyrium filix-foemina</i> (L.) Roth.	Per.	G			
<b>Equisataceae</b>					
<i>Equisetum arvense</i> L.	Per.	G			
<b>Hypolepidaceae (Dennstaedtiaceae)</b>					
<i>Pteridium aquilinum</i> (L.) Kuhn.	Per.	H			
<b>Lycopodiaceae</b>					
<i>Lycopodium clavatum</i> L.	Per.	H			
<i>Lycopodium alpinum</i> L.	Per.	H			
<b>SPERMATOPHYTA</b>					
<b>GYMNOSPERMAE</b>					
<b>Cupressaceae</b>					
<i>Juniperus communis</i> L. var. <i>saxatilis</i> Pall.	Per.	Ch			
<b>Pinaceae</b>					
<i>Abies nordmanniana</i> (Stev.) Spach subsp. <i>nordmanniana</i> (Stev.) Spach	Per.	Ph	Euro-Sib.		
<i>Pinus sylvestris</i> L. var. <i>hamata</i> Steven.	Per.	Ph	Euro-Sib.		



Table 5. Contd.

<i>Picea orientalis</i> (L.) Link.	Per.	Ph		
<b>ANGIOSPERMAE</b>				
<b>DICOTYLEDONES</b>				
<b>Acanthaceae</b>				
<i>Acanthus mollis</i> L.	Per.	H	Medit.	
<b>Aceraceae</b>				
<i>Acer cappadocicum</i> Gleditsch var. <i>cappadocicum</i> Gleditsch	Per.	Ph	Euro-Sib.	
<i>Acer platanoides</i> L.	Per.	Ph	Euro-Sib.	
<i>Acer trautvetteri</i> Medw.	Per.	Ph	Euro-Sib.	
<b>Amaranthaceae</b>				
<i>Amaranthus retroflexus</i> L.	Ann.	Th		
<b>Apiaceae (Umbelliferae)</b>				
<i>Aegopodium podagraria</i> L.	Per.	H	Euro-Sib.	
<i>Aethusa cynapium</i> L.	Ann.	Th	Euro-Sib.	
<i>Ammi visnaga</i> (L.) Lam.	Bia.	H	Medit.	
<i>Angelica sylvestris</i> L. var. <i>stenoptera</i> Lallemand.	Per.	H	Euro-Sib.	End.
<i>Antheriscus nemorosa</i> (Bieb.) Sprengel.	Per.	H		
<i>Apium nodiflorum</i> (L.) Lag.	Per.	H		
<i>Caucalis platycarpus</i> L.	Ann.	Th		
<i>Chaerophyllum byzantium</i> Boiss.	Per.	H	Euro-Sib.	
<i>Daucus carota</i> L.	Bia.	H		
<i>Eryngium giganteum</i> Bieb.	Bia.	H	Euro-Sib.	
<i>Heracleum platytaenium</i> Boiss.	Bia.	H	Euro-Sib.	End.
<i>Ligusticum alatum</i> (Bieb.) Sprengel.	Per.	H		
<i>Oenanthe pimpinelloides</i> L.	Per.	H		
<i>Pimpinella anthriscoides</i> Boiss. var. <i>cruciata</i> (Bornm. Et Wolff.) Matthews.	Per.	H	Ir.-Tur.	End.
<i>Pimpinella rhodantha</i> Boiss.	Per.	H		
<i>Torilis arvensis</i> (Huds.) Link subsp. <i>arvensis</i> (Huds.) Link.	Per.	H		
<i>Turgenia latifolia</i> (L.) Hoffm.	Ann.	Th		
<b>Apocynaceae</b>				
<i>Vinca herbacea</i> Waldst. Et Kit.	Per.	H		
<b>Aquifoliaceae</b>				
<i>Ilex aquifolium</i> L.	Per.	Ph		VU
<i>Ilex colchica</i> Poj.	Per.	Ch	Euro-Sib.	
<b>Araliaceae</b>				
<i>Hedera colchica</i> (C. Koch).	Per.	Ph	Euro-Sib.	
<i>Hedera helix</i> L.	Per.	Ph		
<b>Aristolochiaceae</b>				
<i>Aristolochia iberica</i> Fisch. Et Mey. Ex Boiss.	Per.	H	Euro-Sib.	VU
<i>Aristolochia pontica</i> Lam.	Per.	H	Euro-Sib.	
<b>Asteraceae (Compositae)</b>				

Table 5. Contd.

<i>Achillea millefolium</i> L. subsp. <i>millefolium</i> L.	Per.	H	Euro-Sib.		
<i>Anthemis tinctoria</i> L.	Per.	H			LR(lc)
<i>Anthemis triumfettii</i> (L.) All.	Per.	H			
<i>Arctium platylepis</i> (Boiss.Et. Bal.) Sosn. Ex Grossh.	Bia.	Ch	Euro-Sib.		
<i>Artemisia annua</i> L.	Ann.	Th			
<i>Artemisia vulgaris</i> L.	Per.	Ch			
<i>Aster alpinus</i> L.	Per.	H			
<i>Aster caucasicus</i> Willd.	Per.	H	Euro-Sib.		
<i>Bellis perennis</i> L.	Per.	H	Euro-Sib.		
<i>Bidens tripartita</i> L.	Ann.	Th			
<i>Carduus acanthoides</i> L. subsp. <i>acanthoides</i> L.	Bia.	H	Euro-Sib.		
<i>Centaurea appendicigera</i> C. Koch.	Per.	H	Euro-Sib.	End.	LR(nt)
<i>Centaurea armena</i> Boiss.	Per.	H	Ir.-Tur.	End.	LR(lc)
<i>Centaurea iberica</i> Trev. Ex Sprengel.	Per.	H			
<i>Centaurea pulcherrima</i> Willd. var. <i>freynii</i> (Sint.) Wagenitz.	Per.	H	Ir.-Tur.	End.	VU
<i>Centaurea pyrrhoblephara</i> Boiss.	Per.	H	Ir.-Tur.	End.	
<i>Centaurea sessilis</i> Willd.	Per.	H	Ir.-Tur.	End.	LR(lc)
<i>Centaurea urvillei</i> DC. subsp. <i>urvillei</i> DC.	Per.	H	Medit.		
<i>Cicerbita racemosa</i> (Willd.) Beauverd.	Per.	H	Euro-Sib.		
<i>Cichorium intybus</i> L.	Per.	H			
<i>Cirsium arvense</i> (L.) Scop. Subsp. <i>arvense</i> (L.) Scop.	Ann.	Th			
<i>Cirsium echinus</i> (Bieb.) Hand.-Mazz.	Bia. Per.	H	Ir.-Tur.		
<i>Cirsium trachylepis</i> Boiss.	Per.	H	Euro-Sib.	End.	LR(nt)
<i>Conyza bonariensis</i> (L.)	Ann.	Th			
<i>Crepis sancta</i> (L.) Babcock.	Ann.	Th			
<i>Dichrocephala integrifolia</i> (L. Fil.) Kuntze.	Ann.	Th			
<i>Doronicum macrophyllum</i> Fischer Ex Hornem.	Per.	H	Euro-Sib.		
<i>Doronicum orientale</i> Hoffm.	Per.	H			
<i>Erigeron caucasicus</i> Stev. subsp. <i>caucasicus</i> Stev.	Per.	H	Euro-Sib.		
<i>Eupatorium cannabinum</i> L.	Per.	H	Euro-Sib.		
<i>Helichrysum armenium</i> DC. subsp. <i>armenium</i> DC.	Per.	H	Ir.-Tur.		
<i>Helichrysum plicatum</i> DC. subsp. <i>plicatum</i> DC.	Per.	H			
<i>Hieracium erythrocarpum</i> Peter.	Per.	H	Euro-Sib.		
<i>Inula helenium</i> L.	Per.	H	Euro-Sib.		
<i>Lactuca scariola</i> L.	Bia.	H	Euro-Sib.		
<i>Lapsana communis</i> L. subsp. <i>grandiflora</i> (Bieb.) Sell.	Per.	H	Euro-Sib.		
<i>Leontodon tuberosus</i> L.	Per.	H	Medit.		
<i>Matricaria chamomilla</i> L.	Ann.	Th			
<i>Mycelis muralis</i> (L.) Dum.	Per.	H	Euro-Sib.		
<i>Petasites hybridus</i> (L.) Gaertner, Mey. Et Scherb.	Per.	H	Euro-Sib.		
<i>Picris hieracioides</i> L.	Bia. Per.	H	Euro-Sib.		
<i>Ptilostemon afer</i> (Jacq.) Greuter subsp. <i>eburneus</i> Greuter.	Bia.	H		End.	
<i>Pulicaria dysenterica</i> (L.) Bernh.	Per.	H			
<i>Scorzonera cana</i> (C. A. Meyer) Hoffm. var. <i>cana</i> (C. A. Meyer) Hoffm.	Per.	H			
<i>Scorzonera pseudolanata</i> Grossh.	Per.	H	Ir.-Tur.		
<i>Scorzonera sericea</i> Dc.	Per.	H		End.	
<i>Scorzonera tomentosa</i> L.	Per.	H	Ir.-Tur.	End.	
<i>Senecio lazicus</i> Boiss. Et Bal.	Per.	H	Euro-Sib.	End.	
<i>Senecio vulgaris</i> L.	Ann.	Th			
<i>Solidago virgaurea</i> L. subsp. <i>virgaurea</i> L.	Per.	H	Euro-Sib.		
<i>Sonchus oleraceus</i> L.	Ann. Bia.	Th			

Table 5. Contd.

<i>Tanacetum macrophyllum</i> (Waldst. Et Kit.) Sscultz Bip.	Per.	H	Euro-Sib.		
<i>Tanacetum nitens</i> (Boiss. Et Noe) Grierson.	Per.	H		End.	LR(lc)
<i>Tanacetum parthenifolium</i> (Willd.) Schultz Bip.	Per.	H	Ir.-Tur.		
<i>Tanacetum sorbifolium</i> (Boiss.) Grierson.	Per.	H	Euro-Sib.		
<i>Tanacetum zahlbruckneri</i> (Nab.) Grierson.	Per.	H	Ir.-Tur.	End.	LR(lc)
<i>Taraxacum crepidiforme</i> DC. subsp. <i>crepidiforme</i> DC.	Per.	H	Ir.-Tur.		
<i>Taraxacum turcicum</i> Van Soest	Per.	H		End.	
<i>Taraxacum scaturiginosum</i> G. Hagl.	Per.	H			
<i>Telekia speciosa</i> (Schreber) Baumg.	Per.	H	Euro-Sib.		
<i>Tripleurospermum oreades</i> (Boiss.) Rech. Fil. var. <i>oreades</i> (Boiss.) Rech. Fil.	Per.	H			
<i>Tussilago farfara</i> L.	Per.	H	Euro-Sib.		
<i>Xanthium strumarium</i> L. subsp. <i>cavanillesii</i> (Schouw) D. Löve Et P. Dansereau.	Ann.	Th			
<i>Xeranthemum annuum</i> L.	Ann.	Th			
<b>Balsaminaceae</b>					
<i>Impatiens noli-tangere</i> L.	Ann.	Th	Euro-Sib.		
<b>Berberidaceae</b>					
<i>Berberis vulgaris</i> L.	Per.	Ch			
<i>Epimedium pubigerum</i> (Dc.) Moren Et Decaisne.	Per.	H	Euro-Sib.		
<b>Betulaceae</b>					
<i>Alnus glutinosa</i> (L.) Gaertner subsp. <i>barbata</i> (C. A. Meyer) Yalt.	Per.	Ph	Euro-Sib.		
<b>Boraginaceae</b>					
<i>Anchusa leptophylla</i> Roemer Et Schultes subsp. <i>incana</i> (Ledeb.) Chamb.	Per.	H	Ir.-Tur.	End.	
<i>Buglossoides arvensis</i> (L.) Johnston.	Ann.	Th			
<i>Cerintho minor</i> L. subsp. <i>auriculata</i> (Ten.) Domac.	Per.	H			
<i>Echium vulgare</i> L.	Bia.	Th	Euro-Sib.		
<i>Myosotis alpestris</i> F. W. Schmidt subsp. <i>alpestris</i> F. W. Schmidt.	Per.	H			
<i>Myosotis heteropoda</i> Trautv.	Ann.	Th			
<i>Myosotis lazica</i> M. Podov.	Ann. Bia.	Th	Euro-Sib.	End.	VU
<i>Onosma sericeum</i> Willd.	Per.	H	Ir.-Tur.		
<i>Onosma tauricum</i> Pallas Ex Willd. var. <i>tauricum</i> Pallas Ex Willd.	Per.	H			
<i>Symphytum asperum</i> Lepechin var. <i>asperum</i> Lepechin.	Per.	H	Euro-Sib.		
<i>Trachystemon orientalis</i> (L.) G. Don.	Per.	G	Euro-Sib.		
<b>Brassicaceae (Cruciferae)</b>					
<i>Arabis nova</i> Vill.	Ann.	Th			
<i>Barbarea plantaginea</i> DC.	Bia.	H			
<i>Capsella bursa-pastoris</i> (L.)	Ann.	Th			
* <i>Brassica oleracea</i> var. <i>acephala</i> DC.	Bia.	H			
<i>Cardamine bulbifera</i> (L.) Crantz.	Per.	G	Euro-Sib.		
<i>Cardamine lazica</i> Boiss. E. Bal.	Per.	G	Euro-Sib.		
<i>Cardamine quinquefolia</i> (Bieb.) Schmalh.	Per.	Hh	Euro-Sib.		
<i>Draba rigida</i> Willd. var. <i>rigida</i> Willd.	Per.	H		End.	LR(lc)
<i>Erysimum sintenisianum</i> Bornm.	Per.	H	Ir.-Tur.	End.	LR(lc)

Table 5. Contd.

<i>Hesperis bicuspidata</i> (Willd.) Poiret.	Per.	Hh			
<i>Nasturdium officinale</i> R. Br.	Per.	Hh			
<i>Rorippa sylvestre</i> (L.) Bess.	Per.	H			
<i>Sisymbrium orientale</i> L.	Ann.	Th			
<i>Thlaspi ochroleucum</i> Boiss. Et Heldr.	Ann.	Th			
<b>Buxaceae</b>					
<i>Buxus sempervirens</i> L.	Per.	Ph	Euro-Sib.		
<b>Campanulaceae</b>					
<i>Asyneuma limonifolium</i> (L.) Janchen subsp. <i>pestalozzae</i> (Boiss.) Damboldt.	Per.	H		End.	LR(Ic)
<i>Asyneuma lobelioides</i> (Willd.) Hand.-Mazz.	Per.	H	Ir.-Tur.		
<i>Campanula alliariifolia</i> Willd.	Per.	H	Euro-Sib.		
<i>Campanula aucheri</i> A. DC	Per.	H	Euro-Sib.		
<i>Campanula betulifolia</i> C. Koch	Per.	H	Euro-Sib.	End.	
<i>Campanula bononiensis</i> L.	Per.	H	Euro-Sib.		
<i>Campanula glomerata</i> L. subsp. <i>hispida</i> (Witasek) Hayek.	Per.	H	Euro-Sib.		
<i>Campanula lactiflora</i> Bieb.	Per.	H	Euro-Sib.		
<i>Campanula latiloba</i> A. DC. subsp. <i>rizeensis</i> Güner	Per.	H	Euro-Sib.	End.	
<i>Campanula olympica</i> Boiss.	Per.	H	Euro-Sib.		
<i>Campanula persicifolia</i> L.	Per.	H	Euro-Sib.		
<i>Campanula ptarmicifolia</i> Lam. var. <i>ptarmicifolia</i> Lam.	Per.	H	Ir.-Tur.	End.	VU
<i>Campanula rapunculoides</i> L. subsp. <i>rapunculoides</i> L.	Per.	H	Euro-Sib.		
<i>Jasione supina</i> Sieber subsp. <i>pontica</i> (Boiss.) Damboldt	Per.	H	Euro-Sib.	End.	
<b>Cannabinaceae</b>					
<i>Humulus lupulus</i> L.	Per.	Ch	Euro-Sib.		
<b>Caprifoliaceae</b>					
<i>Lonicera caucasica</i> Pallas subsp. <i>orientalis</i> (Lam.) Chamb. Et Long	Per.	H	Euro-Sib.		
<i>Sambucus ebulus</i> L.	Per.	Ch	Euro-Sib.		
<i>Sambucus nigra</i> L.					
<b>Caryophyllaceae</b>					
<i>Cerastium glomeratum</i> Thuill.	Ann.	Th			
<i>Dianthus carmelitarum</i> Reut. Ex Boiss.	Per.	H	Euro-Sib.	End.	LR(Ic)
<i>Gypsophila elegans</i> Bieb.	Per.	H	Ir.-Tur.		
<i>Minuartia circassica</i> (Albow) Woron.	Per.	H	Euro-Sib.		
<i>Saponaria prostrata</i> Willd. subsp. <i>calvertii</i> (Boiss.) Hedge.	Bia. Per.	H			
<i>Silene compacta</i> Fischer.	Bia. Per.	H			
<i>Silene conica</i> L.	Ann.	Th			
<i>Silene lazica</i> Boiss.	Per.	H	Euro-Sib.	End.	LR(Ic)
<i>Silene multifida</i> (Adams) Rohrb.	Per.	H			
<i>Silene saxatilis</i> Sims.	Per.	H			
<i>Silene spergulifolia</i> (Desf.) Bieb.	Per.	H	Ir.-Tur.		
<i>Silene vulgaris</i> (Moench) Garcke var. <i>vulgaris</i> (Moench) Garcke.	Per.	H			
<b>Chenopodiaceae</b>					
<i>Chenopodium album</i> L.	Ann.	Th			

Table 5. Contd.

<b>Cistaceae</b>						
<i>Cistus creticus</i> L.	Per.	Ch	Medit.			
<i>Helianthemum nummularium</i> (L.) Miller subsp. <i>tomentosum</i> (Scop.) Schinz Et Thellung.	Per.	Ch				
<b>Commelinaceae</b>						
<i>Commelina communis</i> L.	Per.	H				
<b>Convolvulaceae</b>						
<i>Calystegia sepium</i> (L.) R. Br. Subsp. <i>sepium</i> R. Br.	Per.	G				
<i>Convolvulus arvensis</i> L.	Per.	H				
<i>Convolvulus galaticus</i> Rostan Ex Choisy	Per.	H	Ir.-Tur.	End.		LR(lc)
<i>Convolvulus lineatus</i> L.	Per.	H				
<b>Corylaceae</b>						
* <i>Corylus avellana</i> L. var. <i>avellana</i> L.	Per.	Ph	Euro-Sib.			
<i>Carpinus betulus</i> L.	Per.	Ph	Euro-Sib.			
<i>Carpinus orientalis</i> Miller	Per.	Ph				
<b>Crassulaceae</b>						
<i>Sedum album</i> L.	Per.	H				
<i>Sempervivum armenum</i> Boiss. Et Huet. var. <i>armenum</i> Boiss. Et Huet.	Per.	H	Euro-Sib.	End.		LR(lc)
<i>Sempervivum minus</i> Turrill var. <i>glabrum</i> Wale	Per.	H	Euro-Sib.	End.		
<b>Datisceae</b>						
<i>Datisca cannabina</i> L.	Per.	H				
<b>Dipsacaceae</b>						
<i>Dipsacus laciniatus</i> L.	Bia	H				
<i>Scabiosa columbaria</i> L. subsp. <i>ochroleuca</i> (L.) Celak var. <i>ochroleuca</i> (L.) Coulter.	Per.	H				
<i>Scabiosa crinita</i> Kotschy Et Boiss.	Per.	H	Ir.-Tur.			
<b>Ebenaceae</b>						
<i>Diospyros kaki</i> L. Fil.	Per.	Ph				
<i>Diospyros lotus</i> L.	Per.	Ph				
<b>Ericaceae</b>						
<i>Arbutus andrachne</i> L.	Per.	Ph				
<i>Calluna vulgaris</i> (L.) Hull	Per.	Ch	Euro-Sib.			
<i>Rhododendron caucasicum</i> Pallas.	Per.	Ph	Euro-Sib.			
<i>Rhododendron luteum</i> Sweet.	Per.	Ph	Euro-Sib.			
<i>Rhododendron ponticum</i> L. subsp. <i>ponticum</i> var. <i>heterophyllum</i> Ansin.	Per.	Ph	Euro-Sib.	End		EN
<i>Vaccinium arctostaphylos</i> L.	Per.	Ch	Euro-Sib.			
<i>Vaccinium myrtillus</i> L.	Per.	Ch	Euro-Sib.			
<b>Euphorbiaceae</b>						
<i>Euphorbia amygdaloides</i> L. var. <i>amygdaloides</i> L.	Per.	H	Euro-Sib.			
<i>Euphorbia helioscopia</i> L.	Ann.	Th				

Table 5. Contd.

<i>Euphorbia lathyris</i> L.	Per.	H			
<i>Euphorbia stricta</i> L.	Ann.	Th	Euro-Sib.		
<i>Mercurialis annua</i> L.	Ann.	Th			
<b>Fabaceae(Leguminosae)</b>					
<i>Anthyllis vulneraria</i> L. subsp. <i>boisseri</i> (Sag.) Bornm.	Bia. Per.	H			
<i>Argyrolobium biebersteinii</i> Ball.	Per.	H			
<i>Astragalus baibutensis</i> Bunge.	Per.	Ch	Ir.-Tur.	End.	LR(lc)
<i>Astragalus campylosema</i> Boiss. subsp. <i>nigripilis</i> Hub.-Mor. Et Chamb.	Per.	Ch	Ir.-Tur.	End.	LR(lc)
<i>Astragalus densifolius</i> Lam. subsp. <i>densifolius</i>	Per.	H	Ir.-Tur.	End.	
<i>Astragalus fragrans</i> Willd.	Per.	H	Ir.-Tur.		
<i>Astragalus frickii</i> Bunge.	Per.	H	Euro-Sib.		
<i>Astragalus ponticus</i> Pall.	Per.	H			
<i>Astragalus cylindraceus</i> DC.	Per.	H	Ir.-Tur.	End.	
<i>Astragalus squalidus</i> Boiss. Et Noe	Per.,	H		End.	
<i>Colutea cilicica</i> Boiss. Et Bal.	Per.	Ch			
<i>Coronilla coronata</i> L.	Per.	H			
<i>Coronilla orientalis</i> Miller var. <i>balansae</i> (Boiss.) Uhrova.	Per.	H			
<i>Coronilla varia</i> L. subsp. <i>varia</i> L.	Per.	H			
<i>Dorycnium graecum</i> (L.) Ser.	Per.	Ch	Euro-Sib.		
<i>Galega officinalis</i> L.	Per.	H	Euro-Sib.		
<i>Genista tinctoria</i> L.	Per.	Ch	Euro-Sib.	End.	
<i>Lathyrus aureus</i> (Stev.) Brandza.	Ann.	Th	Euro-Sib.		
<i>Lathyrus cicera</i> L.	Ann.	Th			
<i>Lathyrus czechotianus</i> Bassler.	Per.	H		End.	LR(lc)
<i>Lathyrus pratensis</i> L.	Per.	H	Euro-Sib.		
<i>Lathyrus rotundifolius</i> Willd. subsp. <i>miniatus</i> (Bieb. Ex Stev.) Davis.	Per.	H			
<i>Lathyrus tukhtensis</i> Czecz.	Per.	H		End.	
<i>Lotus angustissimus</i> L.	Ann.	Th			
<i>Lotus corniculatus</i> L. var. <i>tenuifolius</i> L.	Per.	H			
<i>Medicago lupulina</i> L.	Per.	Th			
<i>Medicago arabica</i> (L.) Huds.	Ann.	Th			
<i>Medicago minima</i> (L.) Bart.	Ann.	Th			
<i>Medicago polymorpha</i> L. var. <i>vulgaris</i> (Benth.) Shinnners.	Ann.	Th			
<i>Medicago sativa</i> L.	Per.	H			
<i>Medicago scutellata</i> (L.) Miller.	Ann.	Th	Medit.		
<i>Melilotus indica</i> (L.) All.Hint.	Bia.	Th			
<i>Melilotus alba</i> Desr.	Bia.	Th			
<i>Melilotus officinalis</i> (L.) Desr.	Bia.	Th			
<i>Onobrychis hypargyrea</i> Boiss.	Per.	H			
<i>Ononis spinosa</i> L. subsp. <i>leiosperma</i> (Boiss.) Sirj.	Per.	H			
<i>Robinia pseudoacacia</i> L.	Per.	Ph			
<i>Trifolium angustifolium</i> L. var. <i>angustifolium</i> L.	Ann.	Th			
<i>Trifolium campestre</i> Schreb.	Ann.	Th			
<i>Trifolium hybridum</i> L.	Per.	H			
<i>Trifolium fragiferum</i> L. var. <i>pulchellum</i> Lange.	Per.	H			
<i>Trifolium medium</i> L.	Per.	H			
<i>Trifolium nigrescens</i> Viv.	Ann.Bia	Th			
<i>Trifolium ochroleucum</i> Huds.	Per.	H			
<i>Trifolium pallidum</i> Waldst. Et Kid.	Ann.Bia.	Th			

Table 5. Contd.

<i>Trifolium pannonicum</i> Jacq. subsp. <i>elongatum</i> (Willd.) Zoh.	Per.	H		End.	LR(lc)
<i>Trifolium pratense</i> L.	Per.	H			
<i>Trifolium repens</i> L. var. <i>repens</i> L.	Per.	H			
<i>Trifolium resupinatum</i> L. var. <i>resupinatum</i> L.	Ann.	Th			
<i>Trifolium subterraneum</i> L.	Ann.	Th			
<i>Vicia balansae</i> Boiss.	Per.	H	Euro-Sib.		
<i>Vicia cracca</i> L. subsp. <i>caracca</i> L.	Ann.	Th	Euro-Sib.		
<i>Vicia sativa</i> L. subsp. <i>nigra</i> (L.) Ehrh.	Ann.	Th			
<i>Vicia tetrasperma</i> (L.) Schreb.	Ann.	Th			
<b>Fagaceae</b>					
<i>Castanea sativa</i> Miller.	Per.	Ph	Euro-Sib.		
<i>Fagus orientalis</i> Lipsky.	Per.	Ph	Euro-Sib.		
<i>Quercus hartwissiana</i> Steven.	Per.	Ph	Euro-Sib.		
<i>Quercus infectoria</i> Oliver subsp. <i>infectoria</i> Oliver.	Per.	Ph	Euro-Sib.		
<i>Quercus pontica</i> C. Koch.	Per.	Ph	Euro-Sib.		VU
<b>Gentianaceae</b>					
<i>Centaurium erythraea</i> Rafn subsp. <i>erythraea</i> Rafn.	Bia.Per.	H	Euro-Sib.		
<i>Gentiana asclepiadea</i> L.	Per.	H	Euro-Sib.		
<i>Gentiana nivalis</i> L.	Ann.	Th			
<i>Gentiana pyrenaica</i> L.	Per.	H	Euro-Sib.		
<i>Gentiana verna</i> L. subsp. <i>pontica</i> (Soltok.) Hayek.	Per.	H	Euro-Sib.		
<i>Swertia iberica</i> Fischer Ex C. A. Meyer.	Per.	H	Euro-Sib.		
<b>Geraniaceae</b>					
<i>Geranium asphodeloides</i> Burm. Fil. subsp. <i>sintenisii</i> (Freyn) Davis.	Per.	H	Euro-Sib.	End.	LR(lc)
<i>Geranium ibericum</i> Cav. subsp. <i>jubatatum</i> (Hand.-Mazz.) Davis.	Per.	H	Euro-Sib.	End.	LR(lc)
<i>Geranium psilostemon</i> Ledeb.	Per.	H	Euro-Sib.		
<i>Geranium sanguineum</i> L.	Per.	H	Euro-Sib.		
<i>Geranium stepporum</i> Davis.	Per.	H	Ir.-Tur.		
<i>Geranium sylvaticum</i> L.	Per.	H	Euro-Sib.		
<i>Geranium robertianum</i> L.	Per.	H			
<b>Guttiferae (Hypericaceae)</b>					
<i>Hypericum androsaemum</i> L.	Per.	Ch	Euro-Sib.		
<i>Hypericum orientale</i> L.	Per.	H			
<i>Hypericum perforatum</i> L.	Per.	H	Euro-Sib.		
<i>Hypericum scabrum</i> L.	Per.	H	Ir.-Tur.		
<b>Juglandaceae</b>					
<i>Juglans regia</i> L.	Per.	Ph			
<b>Lamiaceae (Labiatae)</b>					
<i>Ajuga orientalis</i> L.	Per.	H			
<i>Ajuga reptans</i> L.	Per.	H	Euro-Sib.		
<i>Ballota nigra</i> L. subsp. <i>anatolica</i> P. H. Davis.	Per.	H	Ir.-Tur.	End.	LR(lc)
<i>Calamintha grandiflora</i> (L.) Moench.	Per.	H	Euro-Sib.		



Table 5. Contd.

<i>Calamintha nepeta</i> (L.) Savi subsp. <i>glandulosa</i> (Req.) P. W. Ball.	Per.	H			
<i>Calamintha sylvatica</i> Bromf. subsp. <i>sylvatica</i> Bromf.	Per.	H	Euro-Sib.		
<i>Glechoma hederacea</i> L.	Per.	G	Euro-Sib.		
<i>Galeobdolon luteum</i> Hudson subsp. <i>luteum</i> Hudson.	Per.	H	Euro-Sib.		
<i>Hyssopus officinalis</i> L. subsp. <i>angustifolius</i> (Bieb.) Arcangeli.	Per.	H	Euro-Sib.		
<i>Lamium album</i> L.	Per.	H	Euro-Sib.		
<i>Lamium amplexicaule</i> L.	Bia.	H	Euro-Sib.		
<i>Lamium garganicum</i> L. subsp. <i>reniforme</i> (Montbert Et Aucher Ex Bentham) R. Mill.	Per.	H			
<i>Lamium purpureum</i> L.	Ann.	Th	Euro-Sib.		
<i>Marrubium astracanicum</i> Jacq. subsp. <i>astracanicum</i> Jacq.	Per.	H			
<i>Melissa officinalis</i> L. var. <i>officinalis</i> L.	Per.	H			
<i>Mentha aquatica</i> L.	Per.	H			
<i>Mentha longifolia</i> (L.) Hudson subsp. <i>logifolia</i> (L.) Hudson.	Per.	H	Euro-Sib.		
<i>Mentha pulgium</i> L.	Per.	H			
<i>Origanum vulgare</i> L. subsp. <i>gracile</i> (C. Koch) Et Swaart.	Per.	H	Ir.-Tur.		
<i>Origanum acutidens</i> (Hand.-Mazz.) Et Swaart.	Per.	H	Ir.-Tur.	End.	LR(lc)
<i>Phlomis russeliana</i> (Sims) Beanthan.	Per.	H	Euro-Sib.	End.	LR(lc)
<i>Prunella vulgaris</i> L.	Per.	H	Euro-Sib.		
<i>Salvia forskahlei</i> L.	Per.	H	Euro-Sib.		
<i>Salvia glutinosa</i> L.	Per.	H	Euro-Sib.		
<i>Salvia pachystachys</i> Trautv.	Per.	H	Euro-Sib.	End.	
<i>Salvia verticillata</i> L. subsp. <i>verticillata</i> L.	Per.	H	Euro-Sib.		
<i>Satureja spicigera</i> (C. Koch) Boiss.	Per.	Ch	Euro-Sib.		
<i>Stachys iberica</i> Bieb. subsp. <i>iberica</i> Bieb. var. <i>iberica</i> Bieb.	Per.	Ch	Ir.-Tur.	End.	LR(lc)
<i>Stachys macrantha</i> (C. Koch) Stearn.	Per.	H	Euro-Sib.		
<i>Teucrium orientale</i> L. var. <i>orientale</i> L.	Per.	H	Ir.-Tur.		
<i>Thymus praecox</i> Opiz subsp. <i>jankae</i> (Celak) J alas var. <i>jankae</i> Opiz.	Per.	Ch			
<i>Thymus praecox</i> Opiz subsp. <i>caucasicus</i> (Ronniger) J alas var. <i>grossheimi</i> (Ronniger) J alas.	Per.	Ch			
<i>Ziziphora clinopodioides</i> Lam.	Per.	Ch			
<b>Lauraceae</b>					
<i>Laurus nobilis</i> L.	Per.	Ph	Medit.		
<b>Linaceae</b>					
<i>Linum flavum</i> L. subsp. <i>flavum</i> L.	Per.	H	Euro-Sib.		
<i>Linum hypericifolium</i> Salibs.	Per.	H			
<i>Linum nodiflorum</i> L.	Ann.	Th	Medit.		
<b>Lytraceae</b>					
<i>Lythrum salicaria</i> L.	Per.	H	Euro-Sib.		
<b>Malvaceae</b>					
<i>Abutilon theophrastii</i> Medik.	Ann.	Th			
<i>Alcea hohenackeri</i> (Boiss. Et Huet) Boiss.	Per.	H			
<i>Lavatera punctata</i> All.	Ann.	Th			
<i>Malva neglecta</i> Wallr.	Per.	H			

Table 5. Contd.

<b>Moraceae</b>					
* <i>Ficus carica</i> L. subsp. <i>carica</i> . (All.) Schinz Et Thell.	Per	Ph			
* <i>Morus alba</i> L.	Per.	Ph			
* <i>Morus nigra</i> L.	Per	Ph			
* <i>Morus rubra</i> L.	Per	Ph			
<b>Oleaceae</b>					
<i>Fraxinus excelsior</i> L. subsp. <i>excelsior</i> L.	Per.	Ph	Euro-Sib.		
<i>Osmanthus decorus</i> (Boiss. Et Bal) Kasapligil	Per.	Ch	Euro-Sib.	End.	VU
<i>Ligustrum vulgare</i> L.	Per.	Ch	Euro-Sib.		
<b>Onagraceae</b>					
<i>Epilobium anatolicum</i> Hausskn. subsp. <i>prionophyllum</i> (Hausskn.) P. H. Raven.	Per.	H	Euro-Sib.		
<i>Epilobium angustifolium</i> L.	Per.	H			
<i>Epilobium montanum</i> L.	Per.	H	Euro-Sib.		
<i>Epilobium parviflorum</i> Schreber.	Per.	H			
<b>Oxalidaceae</b>					
<i>Oxalis corniculata</i> L.	Ann.	Th			
<b>Papaveraceae</b>					
<i>Chelidonium majus</i> L.	Per.	H	Euro-Sib.		
<i>Fumaria officinalis</i> L.	Ann.	Th			
<i>Papaver bracteatum</i> Lindl.	Per.	H			
<i>Papaver lateritium</i> K. Koch subsp. <i>lateritium</i> .	Per.	H	Euro-Sib.	End.	VU
<i>Papaver fugax</i> Poirlet var. <i>fugax</i> Poirlet.	Bia.	H			
<i>Papaver rhoeas</i> L.	Ann.	Th			
<b>Parnassiaceae</b>					
<i>Parnassia palustris</i> L.	Per.	H			
<b>Phytolaccaceae</b>					
<i>Phytolacca americana</i> L.	Per.	H			
<b>Plantaginaceae</b>					
<i>Plantago lenceolata</i> L.	Per.	H			
<i>Plantago major</i> L subsp. <i>major</i> L.	Per.	H			
<b>Platanaceae</b>					
<i>Platanus orientalis</i> L.	Per.	Ph			
<b>Plumbaginaceae</b>					
<i>Acantholimon acerosum</i> (Willd.) Boiss. var. <i>acerosum</i> (Willd.) Boiss.	Per.	Ch	Ir.-Tur.		
<b>Polygalaceae</b>					
<i>Polygala major</i> Jacq.	Per.	H	Euro-Sib.		
<b>Polygonaceae</b>					
<i>Polygonum aviculare</i> L.	Ann.	Th			

Table 5. Contd.

<i>Polygonum bistorta</i> L. subsp. <i>carneum</i> (Koch) Coode Et Cullen.	Per.	H	Euro-Sib.		
<i>Polygonum hydropiper</i> L.	Per.	H			
<i>Polygonum lapathifolium</i> L.	Ann.	Th			
<i>Polygonum persicaria</i> L.	Ann.	Th			
<i>Polygonum setosum</i> Jacq.	Per.	H	Ir.-Tur.		
<i>Rumex acetosella</i> L.	Per.	H			
<i>Rumex pulcher</i> L.	Per.	H			
<i>Rumex crispus</i> L.	Per.	G			
<i>Rumex tuberosus</i> L. subsp. <i>tuberosus</i> L.	Per.	H			
<b>Portulacaceae</b>					
<i>Portulaca oleracea</i> L.	Ann	Th			
<b>Primulaceae</b>					
<i>Anagalis arvensis</i> L.	Ann.	Th			
<i>Cyclamen coum</i> Miller var. <i>coum</i> Miller.	Per.	G			
<i>Cyclamen parviflorum</i> Poped. subsp. <i>parviflorum</i>	Per.	G	Euro-Sib.	End.	
<i>Lysimachia verticillaris</i> Srengel.	Per.	Hh	Euro-Sib.		
<i>Primula auriculata</i> Lam.	Per.	H	Ir.-Tur.		
<i>Primula elatior</i> (L.) Hill subsp. <i>meyeri</i> (Rupr.) Valentine Et Lamond.	Per.	H	Euro-Sib.		
<i>Primula elatior</i> (L.) Hill subsp. <i>pallasii</i> (Lehm.) W. W. Sm. Et Forrest.	Per.	H	Euro-Sib.		
<i>Primula longipes</i> Freyn Et Sint.	Per.	H	Euro-Sib.	End.	
<i>Primula veris</i> L. subsp. <i>columnae</i> (Ten.) Ludi..	Per.	H	Euro-Sib.		
<i>Primula vulgaris</i> Huds. subsp. <i>sibthorpii</i> (Hoffmanns.).	Per.	H	Euro-Sib.		
<b>Ranunculaceae</b>					
<i>Anemone narcissiflora</i> L. subsp. <i>narcissiflora</i> L.	Per.	H	Euro-Sib.		
<i>Aquilegia olympica</i> Boiss.	Per.	H			
<i>Caltha polypetala</i> Hochst. Ex Lorent.	Per.	H			
<i>Clematis vitalba</i> L.	Per.	Ph			
<i>Delphinium formosum</i> Bois. Et Huet.	Per.	H	Euro-Sib.	End.	
<i>Helleborus orientalis</i> Lam.	Per.	H	Euro-Sib.		
<i>Ranunculus arvensis</i> L.	Ann.	Th			
<i>Ranunculus constantinopolitanus</i> (DC.) D'Urv.	Per.	H			
<i>Ranunculus kochii</i> Ledeb.	Per.	H	Ir.-Tur.		
<b>Rhamnaceae</b>					
<i>Frangula alnus</i> Miller subsp. <i>alnus</i> Miller.	Per.	Ch	Euro-Sib.		
<i>Rhamnus imeretinus</i> Booth.	Per.	Ch	Euro-Sib.		
<b>Rosaceae</b>					
<i>Agrimonia eupatoria</i> L.	Per.	H			
<i>Alchemilla orduensis</i> B. Pawl.	Per.	H	Euro-Sib.	End.	EN
<i>Alchemilla pseudocartalinica</i> Juz.	Per.	H			
<i>Alchemilla sintenisii</i> Rothm.	Per.	H	Euro-Sib.	End.	LR(nt)
<i>Aremonia agrimonoides</i> (L.) DC.	Per.	H	Euro-Sib.		
<i>Cerasus avium</i> (L.) Moench	Per.	Ph			
<i>Filipendula vulgaris</i> Moench.	Per.	H	Euro-Sib.		

Table 5. Contd.

<i>Fragaria vesca</i> L.	Per.	H			
<i>Geum coccineum</i> Sm.	Per.	H	Euro-Sib.		
<i>Geum urbanum</i> L.	Per.	H	Euro-Sib.		
<i>Laurocerasus officinalis</i> Roemer.	Per.	Ph			
<i>Mespilus germanica</i> L.	Per.	Ph	Euro-Sib.		
<i>Potentilla crantzii</i> (Crantz) G. Beck Ex Fritsch var. <i>crantzii</i> (Crantz) G. Beck Ex Fritsch.	Per.	H	Euro-Sib.		
<i>Potentilla erecta</i> (L.) Rauschel.	Per.	H			
<i>Potentilla humifusa</i> Willd.	Per.	H	Euro-Sib.		
<i>Rosa gallica</i> L.	Per.	Ch			
<i>Rosa canina</i> L.	Per.	Ch			
<i>Rubus hirtus</i> Waldst. Et Kit.	Per.	Ch	Euro-Sib.		
<i>Rubus idaeus</i> L.	Per.	Ch			
<i>Rubus discolor</i> Weihe Et Nees.	Per.	Ch			
<i>Sanguisorba minor</i> Scop. subsp. <i>muricata</i> (Spach) Briq.	Per.	H			
<i>Sibbaldia parviflora</i> Willd. var. <i>parviflora</i> Willd.	Per.	Ch			
<b>Rubiaceae</b>					
<i>Asperula pontica</i> Boiss.	Per.	H	Euro-Sib.		
<i>Asperula taurina</i> L. subsp. <i>caucasica</i> (Paped.) Ehrend.	Per.	H	Euro-Sib.		
<i>Asperula woronowii</i> Krecz.	Per.	Ch	Euro-Sib.	End.	VU
<i>Cruciata taurica</i> (Pallas Ex Willd.) Ehrend.	Per.	H	Ir.-Tur.		
<i>Galium aparine</i> L.	Per.	H			
<i>Galium verum</i> L. subsp. <i>verum</i> L.	Per.	H	Euro-Sib.		
<b>Salicaceae</b>					
<i>Salix alba</i> L.	Per.	Ph	Euro-Sib.		
<i>Salix caprea</i> L.	Per.	Ph	Euro-Sib.		
<i>Populus tremula</i> L.	Per.	Ph	Euro-Sib.		
<b>Scrophulariaceae</b>					
<i>Digitalis ferruginea</i> L. subsp. <i>ferruginea</i> L.	Per.	H	Euro-Sib.		
<i>Digitalis lamarckii</i> Ivan.	Per.	H	Euro-Sib.	End.	
<i>Euphrasia rostkoviana</i> Hayne subsp. <i>rostkoviana</i> Hayne	Ann.	Th	Euro-Sib.		
<i>Kickxia elatine</i> (L.) Dumort.	Ann.	Th	Medit.		
<i>Linaria grandiflora</i> Desf.	Per.	H	Ir.-Tur.		
<i>Melampyrum arvense</i> L. var. <i>arvense</i> L.	Ann.	Th	Euro-Sib.		
<i>Melampyrum arvense</i> L. var. <i>elatius</i> Boiss.	Ann.	Th	Euro-Sib.		
<i>Pedicularis atropurpurea</i> Nordm.	Per.	H	Euro-Sib.		
<i>Pedicularis caucasica</i> Bieb.	Per.	H	Euro-Sib.		
<i>Pedicularis comosa</i> L. var. <i>sibthorpii</i> (Boiss.) Boiss.	Per.	H			
<i>Pedicularis nordmanniana</i> Bunge.	Per.	H	Euro-Sib.		
<i>Pedicularis pontica</i> Boiss.	Per.	H	Euro-Sib.		
<i>Rhinanthus angustifolius</i> C. C. Gmelin subsp. <i>grandiflorus</i> (Wallr.) D. A. Webb.	Ann.	Th			
<i>Rhynchocorys stricta</i> (C. Koch) Albov.	Ann.	Th	Euro-Sib.		
<i>Scrophularia scopolii</i> [Hoppe Ex] Pers. var. <i>adenocalyx</i> Somm. Et Lev.	Per.	H	Euro-Sib.		CR
<i>Verbascum phlomoides</i> L.	Bia.	H	Euro-Sib.		
<i>Verbascum thapsus</i> L.	Bia.	H	Euro-Sib.		
<i>Veronica anagallis-aquatica</i> L. subsp. <i>anagallis-aquatica</i> L.	Per.	H			

Table 5. Contd.

<i>Veronica beccabunga</i> L. subsp. <i>beccabunga</i> L.	Per.	G	
<i>Veronica chamaedrys</i> L.	Per.	G	Euro-Sib.
<i>Veronica cymbalaria</i> Bodard.	Ann.	Th	Medit.
<i>Veronica filiformis</i> J. E. Smith.	Per.	H	Euro-Sib.
<i>Veronica persica</i> Poiret.	Ann.	Th	
<b>Solanaceae</b>			
<i>Atropa belladonna</i> L.	Per.	H	Euro-Sib.
<i>Datura stramonium</i> L.	Ann.	Th	
<i>Hyocyamus niger</i> L.	Ann.	Th	
<i>Physalis alkekengi</i> L.	Per.	H	
<i>Solanum dulcamara</i> L.	Ann.	Th	Euro-Sib.
<i>Solanum nigrum</i> L. subsp. <i>nigrum</i> L.	Ann.	Th	
<b>Tamaricaceae</b>			
<i>Myricaria germanica</i> (L.) Desv.	Per.	Ch	
<b>Theaceae</b>			
* <i>Camellia sinensis</i> (L.) O. Kuntze	Per.	Ch	
<b>Thymelaeaceae</b>			
<i>Daphne oleoides</i> Schreber subsp. <i>oleoides</i> Schreber.	Per.	Ch	
<b>Tiliaceae</b>			
<i>Tilia rubra</i> DC. subsp. <i>caucasica</i> (Rupr.) V. Engler	Per.	Ph	Euro-Sib.
<b>Ulmaceae</b>			
<i>Celtis caucasica</i> Willd.	Per.	Ph	
<i>Ulmus glabra</i> Hudson	Per.	Ph	Euro-Sib.
<b>Urticaceae</b>			
<i>Parietaria judaica</i> L.	Per.	H	
<i>Urtica dioica</i> L.	Per.	H	Euro-Sib.
<i>Urtica urens</i> L.	Per.	H	
<b>Valerianaceae</b>			
<i>Centranthus longiflorus</i> Stev. subsp. <i>longiflorus</i> Stev.	Per.	H	Ir.-Tur.
<i>Valeriana alliariifolia</i> Adams.	Per.	H	
<b>Verbenaceae</b>			
<i>Verbena officinalis</i> L.	Per.	H	
<b>Violaceae</b>			
<i>Viola alba</i> Besser subsp. <i>dehnhardtii</i> (Ten.) Becker.	Per.	H	
<i>Viola sieheana</i> Becker.	Per.	H	
<i>Viola tricolor</i> L.	Per.	H	
<b>MONOCOTYLEDONES</b>			
<b>Alismataceae</b>			
<i>Alisma lanceolatum</i> With.	Per.	Hh	
<i>Alisma plantago-aquatica</i> L.	Per.	Hh	Euro-Sib.

Table 5. Contd.

<b>Amaryllidaceae</b>				
<i>Galanthus rizehensis</i> Stern.	Per.	G	Euro-Sib.	VU
<i>Leucojum aestivum</i> L.	Per.	G	Euro-Sib.	
<b>Araceae</b>				
<i>Arum italicum</i> Miller.	Per.	G		
<i>Arum maculatum</i> L.	Per.	G		
<b>Asclepiadaceae</b>				
<i>Periploca graeca</i> L. var. <i>graeca</i> Boiss. Et Heldr.	Per.	Ch	Medit.	
<b>Cyperaceae</b>				
<i>Carex echinata</i> Murray.	Per.	H	Euro-Sib.	
<i>Carex pallascens</i> L. var. <i>chalcodeta</i> (V. Krecz.) Ö. Nilsson.	Per.	H	Euro-Sib.	
<i>Carex vesicaria</i> L.	Per.	H		
<i>Cyperus serotinus</i> Rottb.	Per.	H		
<b>Iridaceae</b>				
<i>Crocus scharojanii</i> Rupr.	Per.	G	Euro-Sib.	
<i>Crocus kotschyanus</i> C. Koch. subsp. <i>suworowianus</i> (C. Koch) Mathew.	Per.	G		
<i>Gladiolus atrovioleaceus</i> Boiss.	Per.	G	Ir.-Tur.	
<i>Iris pseudacorus</i> L.	Per.	G		
<b>Juncaceae</b>				
<i>Juncus articulatus</i> L.	Per.	Hh	Euro-Sib.	
<i>Juncus inflexus</i> L.	Per.	Hh		
<i>Luzula sylvatica</i> (Hudson) Gaudin	Per.	H	Euro-Sib.	
<b>Liliaceae</b>				
<i>Allium olympicum</i> Boiss.	Per.	G	Euro-Sib.	End.
<i>Allium scorodoprasum</i> L. subsp. <i>rotundum</i> (L.) Stearn	Per.	G	Euro-Sib.	
<i>Colchicum speciosum</i> Steven	Per.	G	Euro-Sib.	
<i>Gagea fistulosa</i> Ker-Gawler.	Per.	G		
<i>Muscari neglectum</i> Guss.	Per.	G		
<i>Muscari tenuiflorum</i> Tausch.	Per.	G		
<i>Lilium ciliatum</i> P. H. Davis	Per.	G	Euro-Sib.	End.
<i>Lilium monadelphum</i> Bieb. var. <i>armenum</i> (Miscz. Ex Grossh.) Davis Et Henderson	Per.	G	Euro-Sib.	
<i>Ornithogalum oligophyllum</i> E. D. Clarke.	Per.	G		
<i>Ornithogalum orthophyllum</i> Ten.	Per.	G		
<i>Ornithogalum sigmoideum</i> Freyn Et Sint.	Per.	G	Euro-Sib.	
<i>Ruscus aculeatus</i> L. var. <i>angustifolius</i> Boiss.	Per.	Ch		
<i>Ruscus colchicus</i> P. F. Yeo	Per.	Ch	Euro-Sib.	
<i>Ruscus hypoglossum</i> L.	Per.	Ch	Euro-Sib.	
<i>Smilax excelsa</i> L.	Per.	Ch	Medit.	
<i>Veratrum album</i>	Per.	G	Euro-Sib.	
<b>Orchidaceae</b>				
<i>Anacamptis pyramidalis</i> (L.) L. C. M. Richard.	Per.	G		
<i>Epipactis pontica</i> Taub.	Per.	G	Euro-Sib.	End.

Table 5. Contd.

<i>Cephalanthera kotschyana</i> Renz Et Taub.	Per.	G		End.	LR(lc)
<i>Dactylorhiza urvilleana</i> (Steudel) Baumann Et Kunkele.	Per.	G	Euro-Sib.		
<i>Ophrys apifera</i> Hudson	Per.	G			
<i>Ophrys oestrifera</i> Bieb. subsp. <i>oestrifera</i> Bieb.	Per.	G	Euro-Sib.		
<i>Epipactis helleborone</i> (L.) Crantz subsp. <i>bithynica</i> (Robartsch) Kreutz.	Per.	G			
<i>Orchis provincialis</i> Balbis Ex Dc.	Per.	G	Medit.		
<i>Orchis purpurea</i> Hudson.	Per.	G	Euro-Sib.		
<i>Serapias feldwegiana</i> H. Baumann Et Kunkele.	Per.	G	Euro-Sib.		
<i>Serapias vomeracea</i> (Burm. Fil.) Briq. subsp. <i>orientalis</i> Greuter.	Per.	G	Medit.		
<b>Poaceae (Gramineae)</b>					
<i>Aegilops triuncialis</i> L. subsp. <i>triuncialis</i> L.	Ann.	Th			
<i>Agrostis gigantea</i> Roth.	Per.	H	Euro-Sib.		
<i>Agrostis stolonifera</i> L.	Per.	H	Euro-Sib.		
<i>Alopecurus arundinaceus</i> Poiret.	Per.	H	Euro-Sib.		
<i>Alopecurus myosuroides</i> Hudson var. <i>myosuroides</i> Hudson.	Per.	H	Euro-Sib.	End.	
<i>Avena fatua</i> L. var. <i>glabrata</i> Peterm.	Ann.	Th	Euro-Sib.		
<i>Brachypodium sylvaticum</i> (Hudson) P. Beauv.	Per.	H	Euro-Sib.		
<i>Brachypodium pinnatum</i> (L.) P. Beauv.	Per.	H	Euro-Sib.		
<i>Briza maxima</i> L.	Ann.	Th			
<i>Bromus diandrus</i> Roth.	Ann.	Th			
<i>Bromus japonicus</i> Thunb. subsp. <i>japonicus</i> Thunb.	Ann.	Th			
<i>Bromus hordeaceus</i> L.	Ann.	Th			
<i>Bromus squarrosus</i> L.	Ann.	Th			
<i>Catabrosa aquatica</i> (L.) P. Beauv.	Per.	H			
<i>Cynodon dactylon</i> L.	Per.	H			
<i>Cynosurus cristatus</i> L.	Per.	H	Euro-Sib.		
<i>Cynosurus echinatus</i> L.	Per.	H	Medit.		
<i>Dactylis glomerata</i> L. subsp. <i>glomerata</i> L.	Per.	H	Euro-Sib.		
<i>Deschampsia flexuosa</i> (L.) Trin.	Per.	H	Euro-Sib.		
<i>Digitaria sanguinalis</i> (L.) Scop.	Ann.	Th			
<i>Echinochloa crus-galli</i> (L.) P. Beauv.	Ann.	Th			
<i>Elymus repens</i> L.	Per.	H			
<i>Festuca gigantea</i> (L.) Vill.	Per.	H	Euro-Sib.		
<i>Festuca pratensis</i> Hudson.	Per.	H			
<i>Gastridium ventricosum</i> (Gouan) Schinz Et Thell.	Ann.	Th	Medit.		
<i>Helictotrichon argaeum</i> (Boiss) Parsa	Per.	H	Ir.-Tur.	End.	
<i>Holcus lanatus</i> L.	Per.	H	Euro-Sib.		
<i>Hordeum murinum</i> L. subsp. <i>glaucum</i> (Steudel) Tzvelev.	Per.	H			
<i>Leymus racemosus</i> (Lam.) Tzvelev subsp. <i>sabulosus</i> (Bieb.) Tzvelev.	Per.	H			
<i>Lolium perenne</i> L.	Per.	H	Euro-Sib.		
<i>Lolium rigidum</i> Gaudin var. <i>rigidum</i> Gaudin.	Per.	H			
<i>Microstegium vimineum</i> (Trin.) A. Camus	Per.	H			
<i>Nardus stricta</i> L.	Per.	H	Euro-Sib.		
<i>Oplismenus undulatifolius</i> (Ard.) P. Beauv.	Per.	H			
<i>Parapholis incurva</i> (L.) C. E. Hubbarn.	Ann.	Th			
<i>Paspalum dilatatum</i> Poiret.	Per.	H			
<i>Paspalum paspalodes</i> (Michx.) Scribner.	Per.	H			



Table 5. Contd.

<i>Poa alpina</i> L. subsp. <i>fallax</i> F. Hermann.	Per.	H
<i>Poa annua</i> L.	Ann.	Th
<i>Poa bulbosa</i> L.	Per.	H
<i>Poa pratensis</i> L.	Per.	H
<i>Poa trivialis</i> L.	Per.	H
<i>Rostraria cristata</i> (L.) Tzvelev var. <i>cristata</i> (L.) Tzvelev.	Ann.	Th
<i>Setaria glauca</i> (L.) P. Beauv.	Ann.	Th
<i>Setaria viridis</i> (L.) P. Beauv.	Ann.	Th
<i>Sorghum halepense</i> (L.) Pers. var. <i>halepense</i> (L.) Pers.	Per.	H
<i>Vulpia bromoides</i> (L.) S. F. Gray	Ann.	Th

following: *Astragalus baibutensis* Bunge., *Campanula ptarmicifolia* Lam. var. *ptarmicifolia* Lam., *Centaurea appendicigera* C. Koch., *Centaurea armena* Boiss., *Centaurea pulcherrima* Willd. var. *freynii* (Sint.) Wagenitz., *Centaurea sessilis* Willd., *Centaurea pyrrhoblephara* Boiss., *Dianthus carmelitarum* Reut. Ex Boiss., *Draba rigida* Willd. var. *rigida* Willd., *Galanthus rizehensis* Stern., *Heracleum platytaenium* Boiss., *Lathyrus czeczottianus* Bassler., *Origanum vulgare* L. subsp. *gracile* (C. Koch) Et Swaart., *Papaver lateritium* K. Koch subsp. *lateritium*., *Ptilostemon afer* (Jacq.) Greuter subsp. *eburneus* Greuter., *Sempervivum armenum* Boiss. Et Huet. var. *armenum* Boiss. Et Huet., *Tanacetum zahlbruckneri* (Nab.) Grierson. In addition, 39 plants were determined as being under threat according to IUCN criteria, including: *Alchemilla orduensis* B. Pawl., *Aristolochia iberica* Fisch. Et Mey. Ex Boiss., *Campanula ptarmicifolia* Lam. var. *ptarmicifolia* Lam., *Centaurea pulcherrima* Willd. var. *freynii* (Sint.) Wagenitz., *Galanthus rizehensis* Stern., *Ilex aquifolium* L., *Quercus pontica* C. Koch., *Rhododendron ponticum* L. subsp. *ponticum* var. *heterophyllum* Ansin., *Scrophularia scopolii* [Hoppe Ex] Pers. var. *adenocalyx* Somm. Et Lev.

In order to meet the energy requirements of Turkey, large dams and hydroelectric power station (HES) have been established (DSI, 2010). Several of the dams and hydroelectric plants planned by the State Hydraulic Works within the Eastern Black Sea Region are regarded as significant threats to the vegetation cover. Due to the topographical structure of the Eastern Black Sea Region, settlements are scattered. Many road construction studies have been carried out in order to reach villages, towns and high plateaus. Due to the rugged terrain, road construction damages the natural structure. In the regions where the transhumance tradition is widespread, people start to move to high plateaus during spring in order to feed animals and the vegetation cover sustains greater damage when they move to the high plateaus earlier than the usual season. Moreover, some plants (medical plants, spices, ornamental plants, fuel, food, animal feeds, etc.) are collected from their natural habitats. In this case, uncontrolled plant collection would

damage many plant types, particularly rare endemic and non-endemic plants. The following precautions are necessary in order to maintain the ecosystem, which is the result of processes taking many years, in order to benefit from natural resources without harming the natural structure.

Flora and fauna studies should be performed before dam, hydroelectric plants, road construction studies are performed and environmental impact assessments should be prepared.

In many suitable places in the Eastern Black Sea Region, botanical gardens and arboreturns should be established where regional plants may be grown and kept. Plants that are picked from their natural habitat for medicinal use, spices, ornamental, fuel, food and animal feed plants should be checked and tested and cultivation studies should be accelerated. Any facilities constructed in the region where high plateau tourism is developed should be built without harming the natural environment. Moreover, the construction of concrete buildings should not be permitted.

In regions where the high plateau culture is widespread, in order not to harm meadow species, early and over-grazing should be prevented. The dates on which livestock are moved to and returned from the high plateaus should be determined according to the development of the vegetation cover. In order to ensure the sustainability of the soil, water and natural resources throughout Turkey, and especially in the Eastern Black Sea Region, the regions should be divided into basins and basin-based management and organization should be implemented.

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help in the diagnosis of plant samples.

**Abbreviations:** **Ann**, Annual; **Bia**, biannual; **Ch**, chamaephytes; **CR**, critically endangered; **DMİ**, Turkish State Meteorological Service; **EN**, endangered; **Euro-Sib**, Euro-Siberian Elements; **G**, geophytes; **H**, hemicryptophytes; **HES**, hydroelectric power station; **Hh**, hydrophytes; **Ir.-Tur**, Irano-Turanian Elements; **IUCN**, International Union for the Conservation of Nature and Natural Resources; **KHGM**, General Directorate of Ruler Services; **lc**, least concern; **LR**, lower risk; **m**, meter; **mm**, millimeter; **Medit**, mediterranean elements; **Mul. or Unk. P. Reg.**, Multiregional or Unknown Phytogeographical Region; **nt**, near threatened; **Per.**, perennial; **Ph**, phanerophytes; **Th**, therophytes; **TUBIVES**, Turkish Plants Data Service; **VU**, vulnerable.

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