

The Diversity of Plant Species in Rangelands (Ordu Region, Turkey)

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Abstract: The study was carried out in the rangelands of Ordu located in the Euro-Siberian floral region between 2009-2010 is to present the plant species diversity of the local rangelands. In this study, 246 genera, 461 species and subspecies belongs to 61 different families were identified in the research area. The distribution of taxa according to phytogeographic regions is as follows: 42.28% Euro-Siberian, 5.94% Irano-Turanian, 4.04% Mediterranean and 47.74% unknown region or widely distributed. The families with the largest number of genera are Asteraceae (48; 11.85%), Fabaceae (47; 11.16%) and Poaceae (43; 10.21%), respectively. The richest genera are *Trifolium* L. (16 taxa), *Campanula* L. (10 taxa) and *Medicago* L. (8 taxa). The distribution of taxa according to life-form is as follows: 261 Hemicryptophyte (62.00%), 83 Therophyte (19.72%), 40 Geophyte (7.96%), 23 Chamaephyte (5.46%), 8 Phanerophyte (1.90%) and 6 Hydrophyte (1.43%). The study identified 421 taxa of which 318 are perennial, 76 are annual, 19 are biennial, 3 are annual and biennial and 5 are biennial and perennial. The endemism rate is 6.89% (29 taxa). The risk status of 15 taxa was evaluated according to International Union for Conservation of Nature and Natural Resources (IUCN) risk criteria.

Key words: Plant species, endemic plants, rangelands, Euro-Siberian, Ordu, 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. The endemism ratio is approximately 34% with 3925 endemic species (NPNC, 2007). There are three different flora regions represented in Turkey, Euro-Siberian, Mediterranean and Irano-Turanian (Davis, 1985). The Euro-Siberian floral region is divided into the Euxin and Hyrcanien. The Black sea region in Euxin takes the fourth place with 220 species in relation with the number of species grown in a single region within the country (Ekim *et al.*, 2000).

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. Ansin (1980) identified 2239 different plant species and determined 222 endemic plant taxa in the Eastern Black sea Region. Further studies were carried out in the same region by Ansin (1983), Karakaya and Kilinc

(1996), Eminagaoglu and Ansin (2003, 2004), Palaba and Ansin (2006), Uzun and Terzioglu (2008), Severoglu *at al.* (2011) and Deveci (2012). In addition to species richness, diversity existed within the species. 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.

Rangelands is one of the most important among natural resources of the earth that produce a wide variety of goods and services desired by society, including livestock forage, wildlife habitat, water, mineral resources, wood products, wildland recreation, open space and natural beauty. Rangelands are rich in biological diversity are also the gene source of plant and animal organisms. Soil is protected through the vegetation on rangelands also rangelands reduced the greenhouse effect and warming of the earth. In addition, the formation of water resources are also important for the development and preservation.

The rangelands of Ordu region as the field study are located in the zone Euro-Siberian floristic regions. In this regard, the aim of this study is to determine the plant species diversity of the endemic and endangered plant species which have the feature of a biological heritage for the country.

MATERIALS AND METHODS

The material of this study, carried out during 2009-2010 is comprised of the vegetation cover in the zone of Ordu city. According to development periods of plants,

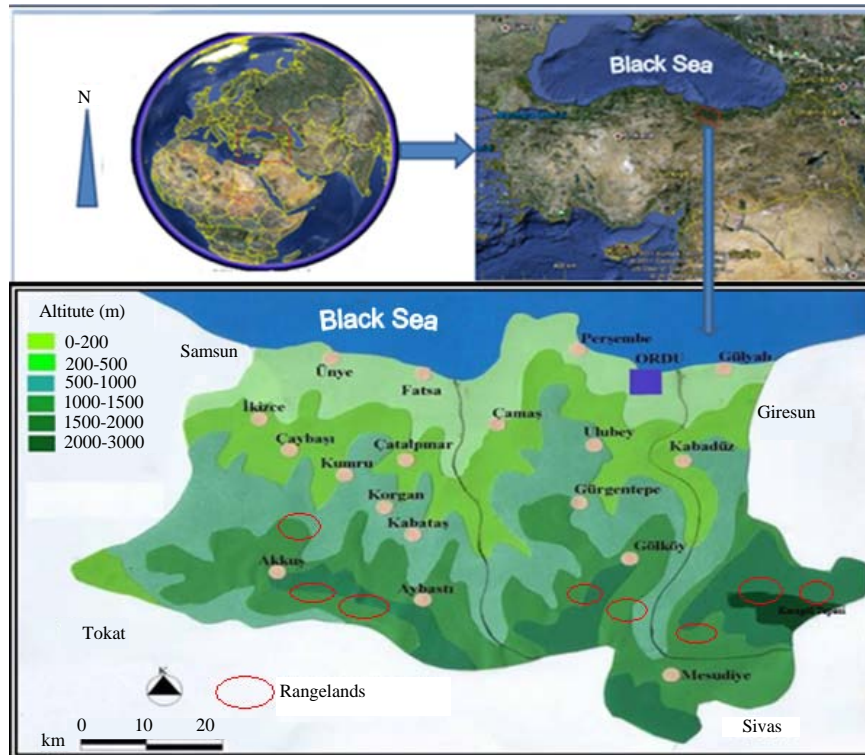


Fig. 1: Ordu Region and its location in Turkey

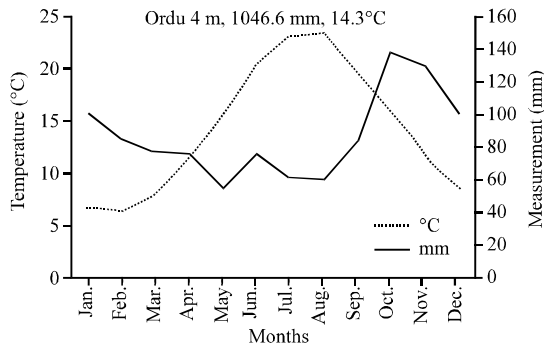


Fig. 2: Climatic diagram of province in Ordu region

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 Cambasi high plateau rangelands (1650 m), Golkoy Aydogan Alanyurt plateau rangelands (1450 m), Persembe plateau rangeland (1550 m), Kumru Duzoba plateau rangelands (1475 m), Kabaduz Sinanli-Hummetli Plateau Rangelands (1460 m) situated within the province of Ordu (Fig. 1).

Regional climatic data for 1975-2010 (35 years) shows that Ordu generally experience drought during July and August (Fig. 2). Frost can be seen between the second half of September and April on the coast of Ordu. According to the long-term data, the highest annual

precipitation of Ordu was 1046.6 mm. According to the long term data, annual average temperature was 14.3°C. The average temperature values of the hottest month (M) was August (27.7°C) and the coldest month (m) was February (3.6°C) in Ordu. The hottest and coldest temperature in Ordu was determined to be during June (37.3°C) and February (-6.7°C). The relative humidity level is much higher during summer than during winter. The prevailing wind direction is South-Southeast in Ordu. A climate diagram of the cities within the research area was prepared using the Walter Method (Akman, 1999). Ordu region generally has a mild oceanic climate in which precipitation is evenly distributed throughout the year (Akman, 1999).

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.

The study was conducted during the vegetation period between April and November in both years and assessment of the flora was performed during these periods by visiting the rangelands which each had different topographical structures semimonthly.

Samples were taken of any unidentified plants which were subsequently identified according to Davis (1985) by preparing herbarium samples. Furthermore, the digital photographs of plant species obtained from the areas were taken. The rangelands where the plants were obtained and their picking times were noted. The plants came into blossom at different times therefore, obtaining samples from the plants with different blossom periods were ensured by visiting the same lands at various dates in the vegetation period.

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, 1985; Yaltirak and Efe, 1996; Deveci and Andic, 1992), their floristic regions and whether or not they are endemic (Davis, 1985; Baytop, 1997). 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 421 taxa were determined at the level of species, subspecies and variety which belong to 246 genera of 61 families out of 1500 plant samples taken from the region during the research.

Given the distribution of the plants in the research area according to the floristic regions, 201 taxa (47.74%) were classed as having more than one region or as having no specific region. The Euro-Siberian (178; 42.28%) element was found to be most widespread followed respectively by the Irano-Turanian (25; 5.94%) and Mediterranean (17; 4.04%) elements (Table 1). The high inclusion rate of Euro-Siberian element indicates that the region is a part of this floral element. Similar values in terms of each three floral elements were reported in previous studies in the same and nearby regions (Deveci, 2012; Karakaya and Kilinc, 1996; Eminagaoglu and Ansin, 2003, 2004; Palaba and Ansin, 2006; Uzun and Terzioglu, 2008) (Table 2). 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.

Twenty nine of the determined taxa are endemic (6.89%). Endemic taxa are listed as Euro-Siberian (18; 4.28%), Irano-Turanian (5; 1.19%) and unknown or with more than one origin (6; 1.43%) (Table 1). The results for endemism were same compared to previous studies carried out in similar regions (Karakaya and Kilinc, 1996; Eminagaoglu and Ansin, 2003, 2004; Palaba and Ansin, 2006; Uzun and Terzioglu, 2008) (Table 2). This rate is low

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

Phytogeographical region	Endemic		Nonendemic		Total	
	No.	%	No.	%	No.	%
Euro-Sib.	18	4.28	160	38.00	178	42.28
Ir.-Tur.	5	1.19	20	4.75	25	5.94
Medit.	-	-	17	4.04	17	4.04
Mul. or Unk. P.Reg.	6	1.43	195	46.78	201	47.74
Total	29	6.89	392	-	421	100.00
CR	-	-	1	0.24	1	0.24
EN	2	0.48	-	-	2	0.48
VU	2	0.48	1	0.24	3	0.71
LR (nt)	2	0.48	-	-	2	0.48
LR (lc)	8	2.14	1	0.24	10	2.36
Total	14	-	3	-	18	-

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	No. of taxa	Euro-Sib.	Ir.-Tur.	Medit.	Endemism
	Present study	421	42.28	5.94	4.04
Deveci (2012)	540	40.56	7.78	2.96	11.5
Uzun and Terzioglu (2008)	383	48.04	3.66	2.87	4.2
Palaba and Ansin (2006)	384	50.27	5.99	1.04	8.3
Eminagaoglu and Ansin (2004)	872	39.40	10.30	1.10	6.3
Eminagaoglu and Ansin (2003)	769	35.60	6.90	2.20	7.4
Karakaya and Kilinc (1996)	323	46.74	4.03	0.93	8.7

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%. However, a study conducted in the same region Zone Colchic were found higher rate of endemism (11.6%) (Deveci, 2012). The rate of endemism were lower found in this study because this study was only carried in rangeland areas of the region. Babalik and Fakir (2010) reported that the endemism rate in Isparta region rangelands was 27.15%. Because Isparta located in Mediterranean region takes the first place with 750 taxa in relation with the number of species grown in a single region within the Turkey (Ekim *et al.*, 2000).

A total of 14 taxa, all endemic and 3 nonendemic taxa were evaluated according to IUCN risk categories (Ekim *et al.*, 2000; IUCN, 2001). The distribution of the threat categories is as follows: 1 nonendemic taxa in CR, 2 endemic taxa in EN, 2 endemic and 1 nonendemic taxa in VU, 2 endemic taxa in LR (nt), 9 endemic and 1 nonendemic taxa in LR (lc) (Table 1).

The richest family in terms of number of taxa was Asteraceae (Compositae) (48; 11.40%). Additionally, it is followed by Fabaceae (Leguminosae) (47; 11.16%), Poaceae (Gramineae) (43; 10.21%), Lamiaceae (Labiatae) (28; 6.65%), Scrophulariaceae and Rosaceae (23; 5.46%), Apiaceae (Umbelliferae) (16; 3.80%), Liliaceae (14; 3.33%),

Campanulaceae (12; 2.85%) and Brassicaceae (Cruciferae) (8; 1.90%) (Table 3 and 4). The results are similar to those of Babalik and Fakir (2010) in respect to floristic composition. However, the results of this study are higher than those of other similar studies (Eminagaoglu and Ansin, 2004; Palaba and Ansin, 2006; Uzun and Terzioglu, 2008; Deveci, 2012). Differences in diversity of plant might be due to the results of dissimilarities in climates and habitats.

Asteraceae (Compositae) (the largest family in the list) is one of the largest family in the Flora of Turkey (Guner *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 the study (Table 3).

The richest genera in terms of the number of taxa in study area were *Trifolium* L. (16), *Campanula* L. (10), *Geranium* L. and *Medicago* L. (8) 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 Heller, 1984). The most common genera were *Trifolium* (16 taxa), *Medicago* (8 taxa), *Lathyrus* (5 taxa) and *Vicia* (4 taxa). *Trifolium* and *Medicago* genera are listed in all previous researches realized in the Eastern Black sea region of Turkey (Davis, 1985; Ansin, 1980, 1983; Eminagaoglu and Ansin, 2003, 2004; Uzun and Terzioglu, 2008; Severoglu *et al.*, 2011).

The life-form spectrum of the taxa in this study was as follows: Hemicryptophytes 261 (62.00%), Therophytes 83 (19.72%), Geophytes 40 (9.50%), Chamaephytes 23 (5.46%), Phanerophytes 8 (1.90%) and Hydrophytes 6 (1.43%). Hemicryptophytes were the best represented class in the study area (Fig. 3). 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. The 20 taxa of Hemicryptophytes are endemic.

About 318 taxa among 421 plants taxa are perennial, 76 of the plants are annual, 19 of the plants are biannual, 3 of them are annual and biannual plants and 5 of them are biannual and perennial plants (Table 4).

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

Family	No. of taxa	Rates (%)
Asteraceae	48	11.40
Fabaceae	47	11.16
Poaceae	43	10.21
Lamiaceae	28	6.65
Scrophulariaceae	23	5.46
Rosaceae	23	5.46
Apiaceae	16	3.80
Liliaceae	14	3.33
Orchidaceae	13	3.09
Campanulaceae	12	2.85
Brassicaceae	8	1.90
Other families	146	34.68
Total	421	100.00

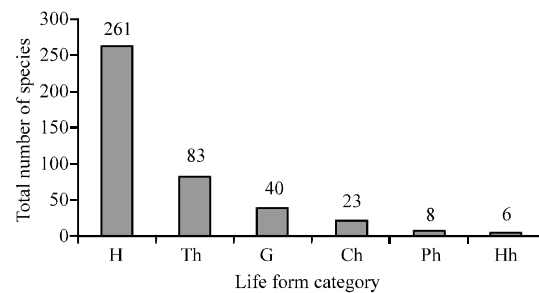


Fig. 3: Life form spectrum of taxa

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

Family	Present study	Deveci (2012)	Babalik and Fakir (2010)	Uzun and Terzioglu (2008)	Palaba and Ansin (2006)	Eminagaoglu and Ansin (2004)
Asteraceae	11.4	11.9	13.6	9.1	10.2	10.3
Fabaceae	11.2	10.0	12.9	6.0	6.0	8.8
Poaceae	10.2	8.7	9.6	2.6	7.6	6.9
Lamiaceae	6.7	6.1	9.9	7.0	3.1	5.7
Scrophulariaceae	5.5	4.3	3.3	5.0	6.3	5.1
Rosaceae	5.5	4.1	2.0	5.7	9.1	6.4
Apiaceae	3.8	3.2	2.0	4.4	2.3	2.2
Liliaceae	3.3	3.0	2.7	2.9	3.9	2.8
Brassicaceae	1.9	2.6	8.0	4.7	2.3	5.2
Campanulaceae	2.9	2.6	2.3	1.8	2.9	1.8
Total	62.4	56.5	66.3	49.2	53.7	55.2

Table 5: Length of life, life-form category, phytogeographic, 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
Pteridophyta					
Aspleniaceae					
<i>Phyllitis scolopendrium</i> (L.) Newm.	Per.	H	-	-	-
Aspidiaceae					
<i>Dryopteris affinis</i> (Lowe) Fraser-Jenkins subsp. <i>coriacea</i> Fraser-Jenkins	Per.	H	Euro-Sib.	-	-
Hypolepidaceae (Dennstaedtiaceae)					
<i>Pteridium aquilinum</i> (L.) Kuhn.	Per.	H	-	-	-
Thelypteridaceae					
<i>Thelypteris limbosperma</i> (All.) Fuchs.	Per.	H	-	-	-
Spermatophyta					
Angiospermae					
Dicotyledones					
Anacardiaceae					
<i>Rhus coriaria</i> L.	Per.	Ch	-	-	-
Apiaceae (Umbelliferae)					
<i>Ammi visnaga</i> (L.) Lam.	Bia	H	Medit.	-	-
<i>Angelica sylvestris</i> L. var. <i>sylvestris</i> L.	Per.	H	Euro-Sib.	-	-
<i>Anthriscus nemorosa</i> (Bieb.) Sprengel.	Per.	H	-	-	-
<i>Astrantia maxima</i> Pallas subsp. <i>maxima</i> Pallas.	Per.	H	Medit.	-	-
<i>Carum meifolium</i> (Bieb.) Boiss.	Per.	H	-	-	-
<i>Caucalis platycarpos</i> L.	Ann.	Th	-	-	-
<i>Chaerophyllum aureum</i> L.	Per.	H	-	-	-
<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>Oenanthe pimpinelloides</i> L.	Per.	H	-	-	-
<i>Pimpinella anthriscoides</i> Boiss. var. <i>cruciata</i> (Bomm. 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	-	-	-
Araliaceae					
<i>Hedera colchica</i> (C. Koch).	Per.	Ph	Euro-Sib.	-	-
Asteraceae (Compositae)					
<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>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>Carduus nutans</i> L.	Per.	H	-	-	-
<i>Carduus acanthoides</i> L. subsp. <i>acanthoides</i> L.	Bia	H	Euro-Sib.	-	-
<i>Carlina vulgaris</i> L.	Bia	H	-	-	-
<i>Centaurea iberica</i> Trev. Ex Sprengel.	Per.	H	-	-	-
<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 trachylepis</i> Boiss.	Per.	H	Euro-Sib.	End.	LR (nt)
<i>Crepis sancta</i> (L.) Babcock.	Ann.	Th	-	-	-
<i>Erigeron acer</i> L. subsp. <i>acer</i> L.	Per.	H	Euro-Sib.	-	-
<i>Erigeron caucasicus</i> Stev. subsp. <i>caucasicus</i> Stev.	Per.	H	Euro-Sib.	-	-
<i>Eupatorium cannabinum</i> L.	Per.	H	Euro-Sib.	-	-
<i>Gnaphalium sylvaticum</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>Imula vulgaris</i> (Lam.) Trevisan	Bia	H	Euro-Sib.	-	-
<i>Lapsana communis</i> L. subsp. <i>grandiflora</i> (Bieb.) Sell.	Per.	H	Euro-Sib.	-	-
<i>Leontodon hispidus</i> L. var. <i>hispidus</i> L.	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>Picnemon acarna</i> (L.) Cass.	Ann.	Th	Medit.	-	-
<i>Picris hieracioides</i> L.	Bia. Per.	H	Euro-Sib.	-	-

Table 5: Continue

Family and taxa of plants	Length of life	Life-form	Element region	End.	IUCN
<i>Prenanthes cacaliifolia</i> (Biebb.) Bbeaverd.	Per.	H	Euro-Sib.	-	-
<i>Ptilostemon afer</i> (Jacq.) Greuter subsp. <i>eburneus</i> Greuter.	Bia.	H	-	End.	-
<i>Scorzonera cana</i> (C.A. Meyer) Hoffin. var. <i>cana</i> (C.A. Meyer) Hoffin.	Per.	H	-	-	-
<i>Scorzonera pseudolanata</i> Grossh.	Per.	H	Ir.-Tur.	-	-
<i>Senecio vulgaris</i> L.	Ann.	Th	-	-	-
<i>Solidago virgaurea</i> L. subsp. <i>virgaurea</i> L.	Per.	H	Euro-Sib.	-	-
<i>Tanacetum macrophyllum</i> (Waldst. Et Kit.) Sscultz Bip.	Per.	H	Euro-Sib.	-	-
<i>Tanacetum partheniifolium</i> (Willd.) Schultz Bip.	Per.	H	Ir.-Tur.	-	-
<i>Taraxacum crepidiforme</i> DC. subsp. <i>crepidiforme</i> DC.	Per.	H	Ir.-Tur.	-	-
<i>Taraxacum turcicum</i> Van Soest.	Per.	H	-	End.	-
<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>Xeranthemum annuum</i> L.	Ann.	Th	-	-	-
Balsaminaceae					
<i>Impatiens noli-tangere</i> L.	Ann.	Th	Euro-Sib	-	-
Betulaceae					
<i>Alnus glutinosa</i> (L.) Gaertner subsp. <i>barbata</i> (C.A. Meyer) Yalt.	Per.	Ph	Euro-Sib.	-	-
Boraginaceae					
<i>Buglossoides arvensis</i> (L.) Johnston.	Ann.	Th	-	-	-
<i>Cerinthe 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 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.	-	-
Brassicaceae (Cruciferae)					
<i>Arabis caucasica</i> Wild. subsp. <i>caucasica</i> Wild.	Per.	H	Medit.	-	-
<i>Capsella bursa-pastoris</i> (L.)	Ann.	Th	-	-	-
<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>Sinapis arvensis</i> L.	Ann.	Th	-	-	-
<i>Rorippa sylvestre</i> (L.) Bess.	Per.	H	-	-	-
<i>Thlaspi ochroleucum</i> Boiss. Et Heldr.	Ann.	Th	-	-	-
Campanulaceae					
<i>Asyneuma amplexicaule</i> (Willd.) Hand.-Mazz. subsp. <i>amplexicaule</i> Willd.	Per.	H	-	-	-
<i>Campanula alliariifolia</i> Willd.	Per.	H	Euro-Sib.	-	-
<i>Campanula aucheri</i> A. DC	Per.	H	Euro-Sib.	-	-
<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 latifolia</i> L.	Per.	H	Euro-Sib.	-	-
<i>Campanula olympica</i> Boiss.	Per.	H	Euro-Sib.	-	-
<i>Campanula persicifolia</i> L.	Per.	H	Euro-Sib.	-	-
<i>Campanula rapunculoides</i> L. subsp. <i>rapunculoides</i> L.	Per.	H	Euro-Sib.	-	-
<i>Campanula sibirica</i> L. subsp. <i>hohenackeri</i> (Fisch. Et Mey.) Damboldt.	Per.	H	Euro-Sib.	-	-
<i>Legousia speculum-veneris</i> (L.) Chaix.	Ann.	Th	Medit.	-	-
Caprifoliaceae					
<i>Sambucus ebulus</i> L.	Per.	H	Euro-Sib.	-	-
<i>Sambucus nigra</i> L.	Per.	Ch	Euro-Sib.	-	-
Caryophyllaceae					
<i>Cerastium glomeratum</i> Thuill.	Ann.	Th	-	-	-
<i>Dianthus carmelitarum</i> Reut. Ex Boiss.	Per.	H	Euro-Sib.	End.	LR (c)
<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 multifida</i> (Adams) Rohrb.	Per.	H	-	-	-
<i>Silene saxatilis</i> Sims.	Per.	H	-	-	-
<i>Silene vulgaris</i> (Moench) Garcke var. <i>vulgaris</i> (Moench) Garcke.	Per.	H	-	-	-
Chenopodiaceae					
<i>Chenopodium album</i> L.	Ann.	Th	-	-	-
<i>Chenopodium foliosum</i> (Moench) Aschers.	Ann.	Th	-	-	-
Cistaceae					
<i>Helianthemum nummularium</i> (L.) Miller subsp. <i>tomentosum</i>	Per.	Ch	-	-	-

Table 5: Continue

Family and taxa of plants (Scop.) Schinz Et Thellung.	Length of life	Life-form	Element region	End.	IUCN
Convolvulaceae					
<i>Convolvulus arvensis</i> L.	Per.	H	-	-	-
<i>Convolvulus lineatus</i> L.	Per.	H	-	-	-
Crassulaceae					
<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 (c)
Datisceae					
<i>Datisca carmabina</i> L.	Per.	H	-	-	-
Dipsacaceae					
<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.	-	-
Ericaceae					
<i>Rhododendron luteum</i> Sweet.	Per.	Ph	Euro-Sib.	-	-
<i>Rhododendron ungermii</i> Trautv.	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.	-	-
Euphorbiaceae					
<i>Euphorbia amygdaloides</i> L. var. <i>amygdaloides</i> L.	Per.	H	Euro-Sib.	-	-
<i>Euphorbia helioscopia</i> L.	Ann.	Th	-	-	-
<i>Euphorbia lathyris</i> L.	Per.	H	-	-	-
<i>Euphorbia stricta</i> L.	Ann.	Th	Euro-Sib.	-	-
<i>Mercurialis annua</i> L.	Ann.	Th	-	-	-
Fabaceae (Leguminosae)					
<i>Anthyllis vulneraria</i> L. subsp. <i>boisseri</i> (Sag.) Bornm.	Bia. Per.	H	-	-	-
<i>Argyrolobium biebersteinii</i> Ball.	Per.	H	-	-	-
<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 ponticus</i> Pall.	Per.	H	-	-	-
<i>Colutea cilicica</i> Boiss. Et Bal.	Per.	Ch	-	-	-
<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 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> Czezc.	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.) Shinners.	Ann.	Th	-	-	-
<i>Medicago sativa</i> L.	Per.	H	-	-	-
<i>Medicago scutellata</i> (L.) Miller.	Ann.	Th	Medit.	-	-
<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.) Sij.	Per.	H	-	-	-
<i>Trifolium angustifolium</i> L. var. <i>angustifolium</i> L.	Ann.	Th	-	-	-
<i>Trifolium campestre</i> Schreb.	Ann.	Th	-	-	-
<i>Trifolium canescens</i> Willd.	Ann.	Th	Euro-Sib.	-	-
<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 micranthum</i> Viv.	Ann.	Th	-	-	-
<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	-	-	-
<i>Trifolium pannonicum</i> Jacq. subsp. <i>elongatum</i> (Willd.) Zoh.	Per.	H	-	End.	LR (c)
<i>Trifolium pratense</i> L.	Per.	H	-	-	-
<i>Trifolium repens</i> L. var. <i>repens</i> L.	Per.	H	-	-	-

Table 5: Continue

Family and taxa of plants	Length of life	Life-form	Element region	End.	IUCN
<i>Trifolium resupinatum</i> L. var <i>resupinatum</i> L.	Ann.	Th	-	-	-
<i>Trifolium sintenisii</i> Freyn.	Ann.	Th	Euro-Sib.	-	-
<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	-	-	-
Gentianaceae					
<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 cruciata</i> L.	Per.	H	Euro-Sib.	-	-
<i>Gentiana nivalis</i> L.	Ann.	Th	-	-	-
<i>Gentiana pyrenaica</i> L.	Per.	H	Euro-Sib.	-	-
Geraniaceae					
<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>jubatum</i> (Hand.-Mazz.) Davis.	Per.	H	Euro-Sib.	End.	LR(lc)
<i>Geranium psilostemon</i> Ledeb.	Per.	H	Euro-Sib.	-	-
<i>Geranium purpureum</i> Vill.	Per.	H	-	-	-
<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	-	-	-
Guttiferae (Hypericaceae)					
<i>Hypericum lydiu</i> m Boiss.	Per.	H	-	-	-
<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.	-	-
Lamiaceae (Labiatae)					
<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 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>Galeopsis ladanum</i> L.	Ann.	Th	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>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 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.	-	-
<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	-	-	-
Linaceae					
<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.	-	-
Lytraceae					
<i>Lythrum salicaria</i> L.	Per.	H	Euro-Sib.	-	-
Malvaceae					
<i>Abutilon theophrastii</i> Medik.	Ann.	Th	-	-	-
<i>Alcea hohenackeri</i> (Boiss. Et Huet) Boiss.	Per.	H	-	-	-
<i>Lavatera punctata</i> All.	Ann.	Th	-	-	-

Table 5: Continue

Family and taxa of plants	Length of life	Life-form	Element region	End.	IUCN
<i>Malva neglecta</i> Wallr.	Per.	H	-	-	-
Onagraceae					
<i>Circaea lutetiana</i> L.	Per.	H	-	-	-
<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	-	-	-
Oxalidaceae					
<i>Oxalis corniculata</i> L.	Ann.	Th	-	-	-
Papaveraceae					
<i>Fumaria officinalis</i> L.	Ann.	Th	-	-	-
<i>Papaver rhoeas</i> L.	Ann.	Th	-	-	-
Parnassiaceae					
<i>Parnassia palustris</i> L.	Per.	H	-	-	-
Plantaginaceae					
<i>Plantago lanceolata</i> L.	Per.	H	-	-	-
<i>Plantago major</i> L. subsp. <i>major</i> L.	Per.	H	-	-	-
Plumbaginaceae					
<i>Acantholimon acerosum</i> (Willd.) Boiss. var. <i>acerosum</i> (Willd.) Boiss.	Per.	Ch	Ir.-Tur.	-	-
Polygalaceae					
<i>Polygala major</i> Jacq.	Per.	H	Euro-Sib.	-	-
Polygonaceae					
<i>Polygonum aviculare</i> L.	Ann.	Th	-	-	-
<i>Polygonum bistorta</i> L. subsp. <i>carneum</i> (Koch) Coode Et Cullen.	Per.	H	Euro-Sib.	-	-
<i>Polygonum lapathifolium</i> L.	Ann.	Th	-	-	-
<i>Polygonum persicaria</i> L.	Ann.	Th	-	-	-
<i>Rumex acetosella</i> L.	Per.	H	-	-	-
<i>Rumex pulcher</i> L.	Per.	H	-	-	-
<i>Rumex crispus</i> L.	Per.	G	-	-	-
Primulaceae					
<i>Anagalis arvensis</i> L.	Ann.	Th	-	-	-
<i>Cyclamen coum</i> Miller var. <i>coum</i> Miller.	Per.	G	-	-	-
<i>Lysimachia verticillaris</i> Sengel.	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 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.	-	-
Ranunculaceae					
<i>Anemone narcissiflora</i> L. subsp. <i>narcissiflora</i> L.	Per.	H	Euro-Sib.	-	-
<i>Caltha polypetala</i> Hochst. Ex Lorent.	Per.	H	-	-	-
<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.	-	-
Rosaceae					
<i>Agrimonia eupatoria</i> L.	Per.	H	-	-	-
<i>Alchemilla orchuensis</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.	-	-
<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>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>Potentilla micrantha</i> Ramond Ex Dc.	Per.	H	-	-	-
<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	-	-	-

Table 5: Continue

Family and taxa of plants	Length of life	Life-form	Element region	End.	IUCN
<i>Rubus discolor</i> Weihe Et Nees.	Per.	Ch	-	-	-
<i>Sanguisorba minor</i> Scop. subsp. <i>muricata</i> (Spach) Briq.	Per.	H	-	-	-
<i>Sorbus aucuparia</i> L.	Per.	Ph	Euro-Sib.	-	-
<i>Sibbaldia parviflora</i> Willd. var. <i>parviflora</i> Willd.	Per.	Ch	-	-	-
Rubiaceae					
<i>Asperula pontica</i> Boiss.	Per.	H	Euro-Sib.	-	-
<i>Asperula taurina</i> L. subsp. <i>caucasica</i> (Popeđ.) Ehrend.	Per.	H	Euro-Sib.	-	-
<i>Asperula woronowii</i> Krecz.	Per.	Ch	Euro-Sib.	End.	VU
<i>Crucjata 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.	-	-
Saxifragaceae					
<i>Saxifraga cymbalaria</i> L. var. <i>cymbalaria</i> L.	Ann.	Th	-	-	-
Scrophulariaceae					
<i>Digitalis ferruginea</i> L. subsp. <i>ferruginea</i> L.	Per.	H	Euro-Sib.	-	-
<i>Digitalis lamarcckii</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 comosa</i> L. var. <i>sibthorpii</i> (Boiss.) Boiss.	Per.	H	-	-	-
<i>Pedicularis condensata</i> Bieb.	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 scopoli</i> [Hoppe Ex] Pers. var. <i>adenocalyx</i> Somm. Et Lev.	Per.	H	Euro-Sib.	-	CR
<i>Verbascum gnaphalodes</i> L.	Bia.	H	Euro-Sib.	-	-
<i>Verbascum phlomoides</i> L.	Bia.	H	Euro-Sib.	-	-
<i>Verbascum pyramidatum</i> L.	Bia.	H	Euro-Sib.	-	-
<i>Verbascum spectabile</i> Bieb. var. <i>spectabile</i> Bieb.	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	-	-	-
<i>Veronica beccabunga</i> L. subsp. <i>beccabunga</i> L.	Per.	G	-	-	-
<i>Veronica chamaecrys</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	-	-	-
Solanaceae					
<i>Atropa belladonna</i> L.	Per.	H	Euro-Sib.	-	-
<i>Datura stramonium</i> L.	Ann.	Th	-	-	-
<i>Hyocyamus niger</i> L.	Ann.	Th	-	-	-
<i>Solanum dulcamara</i> L.	Ann.	Th	Euro-Sib.	-	-
<i>Solanum nigrum</i> L. subsp. <i>nigrum</i> L.	Ann.	Th	-	-	-
Tamaricaceae					
<i>Myricaria germanica</i> (L.) Desv.	Per.	Ch	-	-	-
Thymelaeaceae					
<i>Daphne oleoides</i> Schreber subsp. <i>oleoides</i> Schreber.	Per.	Ch	-	-	-
Urticaceae					
<i>Parietaria judaica</i> L.	Per.	H	-	-	-
<i>Urtica dioica</i> L.	Per.	H	Euro-Sib.	-	-
<i>Urtica urens</i> L.	Per.	H	-	-	-
Valerianaceae					
<i>Centranthus longiflorus</i> Stev. subsp. <i>longiflorus</i> Stev.	Per.	H	Ir.-Tur.	-	-
<i>Valeriana alliacifolia</i> Adams.	Per.	H	-	-	-
Verbenaceae					
<i>Verbena officinalis</i> L.	Per.	H	-	-	-
Violaceae					
<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	-	-	-
Monocotyledones					
Alismataceae					
<i>Alisma lanceolatum</i> With.	Per.	Hh	-	-	-
<i>Alisma plantago-aquatica</i> L.	Per.	Hh	Euro-Sib.	-	-

Table 5: Continue

Family and taxa of plants	Length of life	Life-form	Element region	End.	IUCN
Amaryllidaceae					
<i>Galanthus rizehensis</i> Stern.	Per.	G	Euro-Sib.	-	VU
<i>Leucojum aestivum</i> L.	Per.	G	Euro-Sib.	-	-
Araceae					
<i>Arum italicum</i> Miller.	Per.	G	-	-	-
<i>Arum maculatum</i> L.	Per.	G	-	-	-
Cyperaceae					
<i>Carex echinata</i> Murray.	Per.	H	Euro-Sib.	-	-
<i>Carex capitellata</i> Boiss. Et Bal.	Per.	H	Euro-Sib.	-	-
<i>Carex ovalis</i> Good.	Per.	H	Euro-Sib.	-	-
<i>Carex pallascens</i> L. var. <i>chalcodeta</i> (V. Krecz.) O. Nilsson.	Per.	H	Euro-Sib.	-	-
<i>Carex vesicaria</i> L.	Per.	H	-	-	-
Iridaceae					
<i>Crocus kotschyanus</i> C. Koch. subsp. <i>suworowianus</i> (C. Koch) Mathew.	Per.	G	-	-	-
<i>Gladiolus atroviolaceus</i> Boiss.	Per.	G	Ir.-Tur.	-	-
Juncaceae					
<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.	-	-
Liliaceae					
<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 akkasiannum</i> R. Gamperle.	Per.	G	Euro-Sib.	End.	-
<i>Lilium ciliatum</i> P.H. Davis	Per.	G	Euro-Sib.	End.	-
<i>Lilium monadelphum</i> Bieb. var. <i>armenum</i> (Misch. 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>Smilax excelsa</i> L.	Per.	Ch	Medit.	-	-
<i>Veratrum album</i>	Per.	G	Euro-Sib.	-	-
Orchidaceae					
<i>Anacamptis pyramidalis</i> (L.) L.C.M. Richard.	Per.	G	-	-	-
<i>Dactylorhiza ilgazica</i> Kretz.	Per.	G	-	End.	-
<i>Dactylorhiza nieschalkiorum</i> H. Baumann Et Kunkele.	Per.	G	-	End.	-
<i>Dactylorhiza romana</i> (Seb.) Soo. subsp. <i>georgica</i> (Klinge) Soo.	Per.	G	Euro-Sib.	-	-
<i>Dactylorhiza saccifera</i> (Brongn.) Soo.	Per.	G	Medit.	-	-
<i>Dactylorhiza urvilleana</i> (Steudel) Baumann Et Kunkele.	Per.	G	Euro-Sib.	-	-
<i>Ophrys apifera</i> Hudson	Per.	G	-	-	-
<i>Ophrys oestriifera</i> Bieb. subsp. <i>oestriifera</i> Bieb.	Per.	G	Euro-Sib.	-	-
<i>Epipactis hellaborne</i> (L.) Crantz subsp. <i>bithynica</i> (Robartsch) Kretz.	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.	-	-
Poaceae (Gramineae)					
<i>Agrostis gigantea</i> Roth.	Per.	H	Euro-Sib.	-	-
<i>Agrostis stolonifera</i> L.	Per.	H	Euro-Sib.	-	-
<i>Alopecurus arundinaceus</i> Poir.	Per.	H	Euro-Sib.	-	-
<i>Alopecurus myosuroides</i> Hudson var. <i>mysuroides</i> Hudson.	Per.	H	Euro-Sib.	End.	-
<i>Arrhenatherum elatius</i> (L.)	Per.	H	Euro-Sib.	-	-
<i>Bothriochloa ischaemum</i> (L.) Keng.	Per.	H	-	-	-
<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 sequevarosus</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.	-	-

Table 5: Continue

Family and taxa of plants	Length of life	Life-form	Element region	End.	IUCN
<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>Elymus repens</i> L.	Per.	H	-	-	-
<i>Eragrostis minor</i> Host	Ann.	Th	-	-	-
<i>Festuca gigantea</i> (L.) Vill.	Per.	H	Euro-Sib.	-	-
<i>Festuca heterophylla</i> Lam.	Per.	H	Euro-Sib.	-	-
<i>Festuca pratensis</i> Hudson.	Per.	H	-	-	-
<i>Festuca valesiaca</i> Schleicher Ex Gaudin	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>Lolium perenne</i> L.	Per.	H	Euro-Sib.	-	-
<i>Lolium rigidum</i> Gaudin var. <i>rigidum</i> Gaudin.	Per.	H	-	-	-
<i>Nardus stricta</i> L.	Per.	H	Euro-Sib.	-	-
<i>Paspalum dilatatum</i> Poiret.	Per.	H	-	-	-
<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>Sesleria phleoides</i> Steven Ex Roemer Et Schultes.	Per.	H	-	-	-
<i>Setaria viridis</i> (L.) P. Beauv.	Ann.	Th	-	-	-
<i>Taeniatherum caput-medusae</i> (L.) Nevski subsp. <i>crinitum</i> (Schreber) Melderis.	Ann.	Th	Ir.-Tur.	-	-
<i>Vulpia bromoides</i> (L.) S.F. Gray	Ann.	Th	-	-	-

CONCLUSION

As a result of the study, rangelands region of Ordu was observed to have a considerably rich flora with 246 genera, 461 species and subspecies belongs to 61 different families. Important results were found in the present study which was conducted to draw attention to and improve understanding of the plant variety of rangelands in the Ordu province. The present study was carried out in specific areas that are representative of the region and emphasizes the importance of the rangelands region in terms of plant diversity and endemism. The endemism rate of 6.89% was considered low compared to the rate of 16% estimated for the region (Ansin *et al.*, 2002). Since, the region is located in the Euro-Siberian floral region, a great majority of the endemics belong to the same element (4.28%). The endemics identified in the region include the following: *Allium olympicum* Boiss., *Alopecurus myosuroides* Hudson var. *myosuroides* Hudson., *Astragalus densifolius* Lam. subsp. *densifolius*, *Centaurea sessilis* Willd., *Dactylorhiza nieschalkiorum* H. Baumann Et Kunkele, *Dianthus carmelitarum* Reut. Ex Boiss., *Heracleum platytaenium* Boiss., *Lathyrus czechottianus* Bassler., *Lilium akkusianum* R. Gamperle., *Origanum vulgare* L. subsp. *gracile* (C. Koch) Et Swaart., *Ptilostemon afer* (Jacq.) Greuter subsp. *eburneus* Greuter., *Sempervivum armenum* Boiss. Et Huet. var. *armenum* Boiss. Et Huet., *Taraxacum turcicum* Van Soest. In addition, 18 plants were determined as being under threat

according to IUCN criteria including: *Alchemilla orduensis* B. Pawl., *Anthemis tinctoria* L., *Cirsium trachylepis* Boiss., *Galanthus rizehensis* Stern., *Genista tinctoria* L., *Myosotis lazica* M. Podov., *Rhododendron ponticum* L. subsp. *ponticum* var. *heterophyllum* Ansin.

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.

RECOMMENDATIONS

For protection of endemic and endangered plant species and so prevent the destruction of rangelands which are considered as natural resources and heritages, there is a need for preventing the excessive and disorganized benefitting from the rangelands hence, animal should graze throughout the grazing season. Enabling the uniform distribution of animals in the rangelands. Grazing with the number of animals compatible with grazing capacity of the rangelands. Should be grazing with the animal species compatible with the rangelands are extremely important.

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.

In many suitable places in Ordu region, botanical gardens and arboretums 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.

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NOMENCLATURE

Ann.	=	Annual
Bia.	=	Biannual
Ch	=	Chamaephytes
CR	=	Critically Endangered
EN	=	Endangered
Euro-Sib.	=	Euro-Siberian Elements
G	=	Geophytes
H	=	Hemicryptophytes
Hh	=	Hydrophytes
Ir.-Tur.	=	Irano-Turanian elements
IUCN	=	International Union for the Conservation of Nature and Natural Resources
lc	=	Least Concern
LR	=	Lower Risk

m	=	Meter
mm	=	Milimeter
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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