



Plant diversity of Ulugöl Natural Park (Ordu/Turkey)

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Abstract

This study consists of the plant diversity of the Ulugöl which is 36 st Natural Park of Turkey. The research area is situated south of center Gököy town of Ordu province in the A6 square. Approximately 310 plant specimens collected from the research area between 2010 and 2011. At the end of the study 98 genera, 124 species, belonging to 42 families have been determined. The distribution of the taxa phytogeographical regions are as follows; Euro-Siberian elements 44 (35,4%), Irano-Turanien elements 4 (3,2%) Mediterranean elements 2 (1,6%), Euxine 21 (16,9%), Hyrcano-Euxine 3 (2,4%), Cosmopolitan 1 (0,8 %) and Multiregionals 51 (41,4%). When life forms of the plant taxa determined in the research area are checked, it can be seen in the following ratios: Hemicryptophytes 83 (66,9%), Therophytes 19 (15%), Geophytes 9 (7,2%), Phanerophytes 9 (7,2%), Chameophytes 3 (2,4%) and Hydrophytes 1 (0,8%). Species appraised according to IUCN Red Data Categories (IUCN, 2001) include 3 (2,4%) CR (Critically Edangered) taxon, 4 (3,2%) EN (Endangered) taxon, 4 (3,2%) VU (Vulnerable) taxon, 1(0,84%) NT (Near Threatened) taxon and 46 (37%) LC (Least Concern) taxon. 2 plants are endemic in the area.

Key words: Ulugöl Natural Park, plant diversity, IUCN red data categories, Ordu, Turkey

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Ulugöl Tabiat Parkı (Gököy/Ordu)'nın bitki çeşitliliği

Özet

Bu çalışma Türkiye'nin 36. Tabiat Parkı olan Ulugöl'ün bitki çeşitliliğinden oluşmaktadır. Araştırma alanı A6 karesinde yer alan Ordu İli'nin güneyinde bulunan Gököy ilçesindedir. Araştırma alanından 2010-2011 yılları arasında yaklaşık 310 bitki örneği toplanmıştır. Çalışmanın sonucunda, 42 familyaya ait 98 cins, 124 tür belirlenmiştir. Toplanan taksonların fitocoğrafik bölgelere dağılım oranları; Avrupa-Sibirya Elementi 44(35,4%), İran-Turan Elementi 4(3,2%), Akdeniz Elementi 2 (1,6%), Öksin Elementi 21(16,9%), Hirkan-Öksin Elementi 3(2,4%), Kozmopolit 1(0,8%) ve birden fazla bölgesi olanlar 51 (41,4%) şeklindedir. Araştırma alanında belirlenen taksonların hayat formları aşağıdaki oranlarda belirlendi; Hemikriptofitler 83 (66,9%), Terofitler 19 (15,3%), Geofitler 9 (7,2%), Fanerofitler 9 (7,2%), Kamefitler 3 (2,4%) ve Hidrofitler 1 (0,8%) şeklindedir. Türlerin tehlike kategorilerine (IUCN 2001) göre dağılımları ise; 3 (2,4%) CR (Çok tehlikede), 4 (3,2%) EN (Tehlikede), 4 (3,2%) VU (Zarar görebilir) taxon, 1(0,84%) NT (Tehlike altına girebilir) ve 46 (37%) LC (En az endişe verici) takson şeklinde olup alanda bulunan taksonların 2tanesi endemiktir.

Anahtar kelimeler: Ulugöl Tabiat Parkı, bitki çeşitliliği, IUCN risk kategorileri Ordu, Türkiye

1. Introduction

Turkey is located at the temperate region of the World, has quite rich habitat diversity because of its geomorphologic, topographic and climatic characteristics. However, Anatolia which is connected with three continents (Europe, Asia and Africa) and located at the intersection of three phytogeographical regions (Euro-Siberian, Irano-Turanian and Mediterranean) has been changed under long term natural and anthropogenic effects (Harris et al. 2003; Özgül and Öztaş, 2002). The land mass of Turkey lies between 42 °N and 36 °N latitudes at a transect between the sea

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level and over 5500 m. and it is under the influence of three different climates, namely, Mediterranean, continental, and oceanic. Most of Turkey is under the Mediterranean influence. The Central Anatolian Plateau and the more eastern mountainous parts enjoy continental climate. Oceanic climate occurs only in an enclave in the northeastern part around the Rize province (Akman and Ketenoglu, 1986). When all these factors are combined, it provides many properties for the different plants to grow up. Therefore, The Flora of Turkey has a lot of interesting species such as halophytic species, semi-desert plants and hyper accumulators plants (Avci, 2005).

However, plant diversity is under considerable threat. The wildlife in Turkey is having hard time in regenerating owing to environmental problems. That is the reason why it really is significant to protect the diversity of plants (Avci, 2005). Therefore, plant areas which have significant diversity are protected as National Park, Nature Protect Area and Natural Park.

In this study was carried out the plant diversity of the Ulugöl Natural Park located in the south of center Gökkyöy town of Ordu province. It is declared 36 st. Natural Park of Turkey in 2009 (Figure1). At the end of the study, plants are classified to life forms and IUCN Red Data Categories (IUCN, 2001).



Figure 1. General view of Ulugöl Natural Park

1.1. General Characteristic of Study Area

The study area is located at the city borders of Ordu in Central Black Sea Region. Ulugöl Natural Park lies approximately at latitude 40° 37' 33" – 40° 37' 59" North and longitude 37° 32' 39" – 37° 32' 59" East. The altitudinal range of the area map was drawn (Figure 2). According to the Figure 2, altitude changes between 1194 and 1265 m. (Figure 2). The area lies in A6 square according to Davis's Grid System (1965). Ulugöl Feasts are held in 3 rd Sunday of August months.

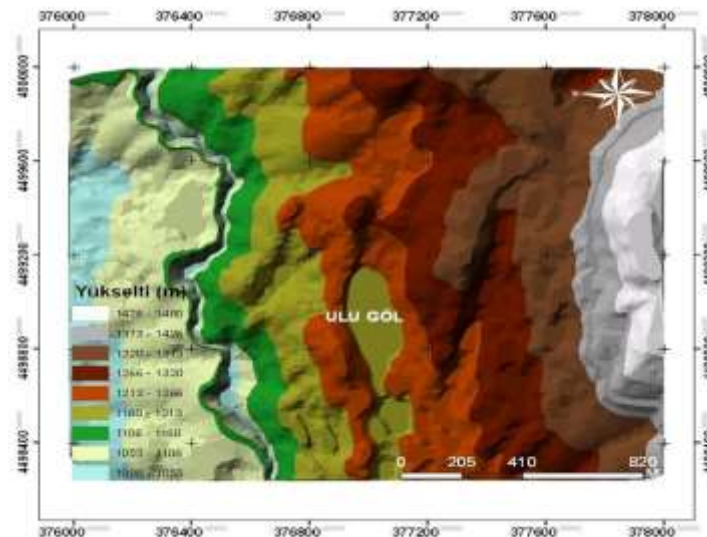


Figure 2. The map of altitude of the research area

1.2. Climate

The results of bioclimatic analysis based on meteorological data of Ordu according to Emberger method (Anonymous, 2011; Akman, 2011) (Table 1). Climatic diagram of Ordu is given in Figure 3.

Table 1. Bioclimatic analysis of the study area according to Emberger method (1952)

Station	P (mm)	PE (mm)	M	m	S (PE/M)	Q	Bioclimatic zone
Ordu	1034.5	202.3	27.4	3.7	8.14	151.1	Rainy-mediterranean

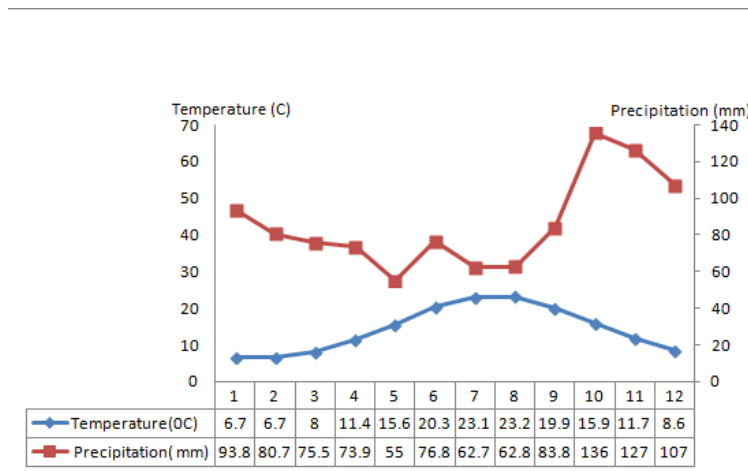


Figure 3. Climatic diagram of Ordu City

1.2. Geology

The study area is characterized by The Black Sea Region Pontide Mountain Zone formation. West and East Pontids are represented by Cretaceous-Eocene and Jura-Eocene, respectively. All of the study area consists of volcanic rocks. Basalts which are widespread in the research area, black in color, fractures-crannied, mean resistant and less decomposed. Rhyolites are found in east of study area, dark gray in color, less fractures, high resistant and solid (Anonymous, 2006).

1.3. Soil types

According to examining, gray-brown podsol and lime-fire brown soils are found in the research area. Mean values of physical and chemical analysis results of the soil samples taken from different directions (North, South, East, West) of the research area are given in Table 3. The research area soils generally have loamy-sandy texture. Ph levels and saltless degree of soils are found slightly acidic and saltless, respectively in three directions. Ph value was determined nötr in north direction. Soils can be remarkable as rich in the way of P₂O₅, organic matter and nitrogen.

Table 3. Physical and chemical analysis results of the soil samples

Analysis	Directions of research area			
	East	West	North	South
Texture	Loamy-sandy	Sandy-loamy	Loamy	Sandy-loamy
PH	6.78(Slightly acid)	6.46 (Slightly acid)	6.23(Slightly acid)	7.01(Nötr)
Salinity	Saltless	Saltless	Saltless	Saltless
P ₂ O ₅ (ppm)	36.6±4.38	43.4±6.37	37.3±7.28	32.8±10.2
Organic matter (%)	4.06±0.01	4.73±0.08	5.93±0.02	6.46±0.1
Nitrogen (%)	0.2±0.01	0.23±0.08	0.29±0.02	0.32±0.1

2. Materials and methods

Plant species were collected from Ulugöl Natural Park which was found in Gököy town between 2009 and 2011 years. It was taken into account that the specimens including both flowers and fruits to provide the identifying of the specimens without any problem. The specimens were identified mainly by using Flora of Turkey and East Aegean Islands (Davis 1965; Davis et al., 1988; Güner et al., 2000). Some of the plant taxa were checked in the herbaria of Ondokuz Mayıs University (OMUB), Karadeniz Technic University (KATO) and Gazi University (GAZI). The plant samples were prepared according to established herbarium techniques. Taxonomic nomenclature was followed that of Brummitt and Powell (Brummitt and Powell, 2001). Phytogeographical regions were determined according to Flora of Turkey (Davis, 1965). Abbreviations used in the appendix are as follows: Euro-Siberian element: Euro.-Sib.el,

Mediterranean element: *Medit. el*, East Mediterranean element: *E. Medit.*, Irano-Turanian element: *Ir.-Tur. el.*, Hyrcano-Euxine element: *Hyr. Eux.*, Euxine: *Eux.*

The life forms of species were determined to Raunkier's. Dominant life forms are Hemicryptophytes (H), Therophytes (Th), Geophytes (G), Phanerophytes (Ph), Chameophytes (Ch) in the research area.

The IUCN (International Union for Conservation of Nature) has established 9 categories of species. IUCN Conservation (or Red List) categories are Extinct (EX, EW), Threatened (CR, EN, VU), Lower Risk (NT, LC), Data Deficient (DD) Not Evaluated (NE) (IUCN, 2001). These categories are useful as a diagnostic tool to determine the risk of extinction and establish conservation strategies for the involved species (Işık, 2011). Conservation status is re-evaluated by taxonomic experts, conservationists, and other biologists (Ekim et al., 2000).

Soil samples were collected at depths of 0-20 cm from different directions of the research area. Soil samples were air-dried and then passed through a 2 mm sieve. Soil texture was determined by the Bouyoucus hydrometer method. Soil pH was determined with a Beckman pH meter. Organic matter (%) and N (%) were determined by the Walkley-Black and micro-Kjeldahl methods respectively. P₂O₅ was determined by using the ammonium molybdate stannous chloride method following the extraction by ammonium florid in hydrochloric acid (Chapman and Pratt, 1973).

3. Results

At the end of the study of the 310 vascular plant specimens were collected from Ulugöl Natural Park, 124 taxa and 98 genera belonging to 42 families were established. One species belong to Pteridophyta, the other 123 taxa belong to Angiosperm. Dicotyledonous and Monocotyledonous comprise 116 and 7 taxa, respectively. Two taxa are endemic (1,6%) for Turkey. The distribution of the taxa phytogeographical regions are as follows; Euro-Siberian elements 44 (35,4%), Irano-Turanien elements 4 (3,2%) Mediterranean elements 2(1,6%), Euxine 21(16,9%), Hyrcano-Euxine 3(2,4%), Cosmopolitan 1(0,8%) and the remaining species are multiregional 51(41,4%). The research area is located in the Euro-Siberian region. Therefore, Euro-Siberian elements (35, 4%) have the highest percentage in the flora. When the results of this study is compared with some performed in nearby areas, the ratio of Euro-Siberian elements is also high in other studies (Korkmaz, 2001; Eminağaoğlu, 2008; Şenel et.al., 2014). Irano-Turanien elements have a higher percentage (3,2%) than Mediterranean elements (1,6%) because the research area is close to the Irano-Turanien region. Endemism rate is very low in our study area. The most important cause of this situation is high climatic and edaphic similarity in the research area and topographic structure of the study area is rather homogeneous. It has long been known that endemism rate affected by climatic, edaphic and topographic factors (Kutbay and Kılınç, 1995).

The largest families are Lamiaceae with 14 species (11,2%), Fabaceae with 13 species (10,4%) and Asteraceae with 11 species (8,8%) in the research area. Lamiaceae and Fabaceae are the largest families according to the flora of Turkey. Because they have wide tolerance limits and involves large genera containing many species (Köse and Ocak, 2003). Asteraceae is the largest and most widespread family of flowering plants in the World. Most members of this family protect themselves with their spiny structures. They can distribute their seeds easily and also have a wide ecological tolerance (Türe, 2003). The other widespread families are Scrophulariaceae (7,2%) and Boraginaceae (4,8%).

The life forms of species were determined in the research area. Because, life forms, floristic elements and various formations is the best indicator of bioclimate (Böcük et al., 2009). The life forms and strategies of species which are found in plant community is an indicator of the ecological factors. Determination of life forms and strategies provides important information on morphological, anatomical and functional adaptation (Kürschner et al., 1998). In the our study, the life forms are seen in the following ratios: Hemicryptophytes 83 (66,9%), Therophytes 19 (15,3%), Geophytes 9 (7,2%), Phanerophytes 9 (7,2%) and Chameophytes 3 (2,4%) (Table 4). These results similar to Altay et al., (2012). In the research area, the ratio of Hemicryptophytes and Therophytes are higher than Geophytes, Phanerophytes and Chameophytes. Because, hemicryptophytes are usually herbaceous perennials and are commonly found in cold moist climates. And also, hemicryptophytes protect their productive vegetative parts underground during difficult conditions (Çetik, 1985; Floret et al., 1990; Keshet et al., 1990). Hemicryptophytes have dormant buds in the upper crust of the soil, the top of the plant dying down in the winter. All shallow-rooted herbaceous perennials belong here (Adamson, 1939). Therophytes are annuals plants and are more resistant to summer drought than the hemicryptophytes, phanerophytes and geophytes, since the former spend the summer in seed form and the latter in the form of vegetative structures (Böcük et al., 2009). Therophytes was found second life form with 19 taxa in the research area. The reason for this may be research area found in Melet River basin. Geophytes and Phanerophytes ratio are found same in the research area. Chameophytes are represented in the research area with 3 taxa. Because, they are widespread in region which have hard winter and drought summer.

When the conservation categories of the plant taxa determined in the research area are checked according to Red Data Book of Turkish Plants and revised according to IUCN Red List Categories, it can be seen that 3 (2,4%) taxa are in the Critically Endangered (CR), 4 (3,2%) in Endangered (EN), 4 (3,2%) in Vulnerable (VU), 1 (0,8%) in Near Threatened (NT), and 46 (37%) in Least Concern (LC) risk categories (Ekim et al., 2000) (Table 4). The species which was found in Ulugöl Natural Park are categorized as LC, EN, VU, EN and NT, respectively.

Determination of floristic characters and threat categories of Ulugöl Natural Park which has high natural resource and recreation values is very important. Because no specific studies have previously been conducted in this area in point of floristic aspects. For this reason, this research will be contributing the knowledge about Ordu's flora and shed light future studies in the region. However, the inventory of plants which are under the protected areas to be identified. Because, it is important to ensure the continuation of the descent, to make ecosystems are constantly and to protect the biodiversity on-site.

Floristic list of the study area;

ACERACEAE

Acer platanoides L., Mixed forests, Euro- Siberian, Ph.

ASTERACEAE

Achillea millefolium L., subsp. *millefolium* L., Mountain, grassland, Euro- Siberian, H., LC.

Anthemis cotula L., Grassland, roadside, empty area, sandy soils, Multiregional, Th., CR.

Centaurea salicifolia Bieb. Ex Willd. subsp. *salicifolia* Bieb. Ex Willd., Grassland, Euxine (Black Sea), H.

Cirsium vulgare (Savi) Ten., In the forest of *Pinus*, roadside, slope, riverside, canal, Pluriregionals, H, LC.

Lapsana communis L. subsp. *grandiflora* L., Deciduous forest, *Pinus* forest, bushes, roadside, Euxine (Black Sea), H.

Leontodon hispidus var. *hispidus* L., Forest, field, stacks, Euro- Siberian, G.

Mycelis muralis (L.) Dum. Close to forest area, shaded areas, Euro- Siberian, H., LC.

Petasites hybridus (L.) Gaertner, Mey. et Scherb., Wet areas, waterside Euro- Siberian, H., LC.

Senecio vernalis Waldst. et Kit., Sandy and empty areas, field, rocky slope, Multiregional, Th., LC.

Solidago virgaurea L. subsp. *virgaurea* L., Riverside and limestone rocky, many times groves, Euro- Siberian, H., LC.

Tanacetum parthenium (L.) Schultz Bip., Walls, empty areas, riverside, shady forests and rock bulges, Multiregional, H., LC.

ADIANTACEAE

Adiantum capillus-veneris L., Limestone rifts, grassplot, alkaline soil, Multiregional, G.

APIACEAE

Anthriscus nemorosa (Bieb.) Sprengel., Conifer ve deciduous forests, rocky slopes, wet grasslands, Multiregional, G.

Astrodaucus orientalis (L.) Drude, Fields, slopes, steppe, roadsides, Irano-Turanian, H.

Sanicula europaea L., Forests and shady areas, Euro- Siberian, H., LC.

Torilis arvensis (Huds.) Link subsp. *arvensis* (Huds.) Link., Slopes, rockies, barren places, Multiregional, H., EN.

AQUIFOLIACEAE

Ilex aquifolium L., Slopes, Multiregional, Ph., VU.

ASCLEPIADACEAE

Vincetoxicum fuscatum (Hornem.) Reichb.Fil. subsp. *fuscatum* (Hornem.) Reichb, Clear, rocky slopes, river valleys, Multiregional, H.

BERBERIDACEAE

Epimedium pubigerum (Dc.) Moren et Decaisne., In the forest-shade areas, Euxine (Black Sea), H.

BETULACEAE

Alnus glutinosa (L.) Gaertner subsp. *glutinosa* (L.) Gaertner, Deciduous forests, wet places, riverside, Euro- Siberian, Ph.

BORAGINACEAE

Cynoglossum montanum L., Steppe, rocky slopes, grasslands, roadsides, Euro- Siberian, H.

Echium vulgare L., Stony areas at the side of the road, Euro- Siberian, Th., LC.

Myosotis sparsiflora Mikan Ex Pohl., Wet places, Euro- Siberian, Th., VU.

Myosotis sylvatica Ehrh. Ex Hoffm. subsp. *rivularis*, Wet places, streams, Euro- Siberian, H., LC.

Symphytum bornmuelleri Bucknall, The shaded shores, *Fagus* groves, between cliffs, Euxine (Black Sea), H. **Endemic.**

Trachystemon orientalis (L.) G. Don., *Fagus* forest, shaded river coasts, Euxine (Black Sea), G.

BRASSICACEAE

Cardamine quinquefolia (Bieb.) Schmalh, Forest, the area bush, Euro- Siberian, H.

Capsella bursa-pastoris (L.) Medik., The area meadows, Multiregional, Th., LC.

CAMPANULACEAE

Campanula alliariifolia Willd., Roadside, sandy slopes Euxine (Black Sea), H.

Campanula sibirica L. subsp. *hohenackeri* (Fisch. Et Mey.) Damboldt., Roadside, sandy slopes, Euxine (Black Sea), H.

Campanula rapunculoides L. subsp. *rapunculoides* L., Forestsides, sloping meadows, Euro- Siberian, H., LC.

Campanula latifolia L., Forest, bushes, very wet meadows, Euro- Siberian, H.

Campanula lactiflora Bieb., Forests, bushes, subalpine meadows, Euro- Siberian, H.

CAPRIFOLIACEAE

Sambucus ebulus L., Deciduous forests, roadside, coasts, Euro- Siberian, Ch., LC.

CARYOPHYLLACEAE

Petrorhagia saxifraga (L.) Link., Grassland areas, Euro- Siberian, H.

Silene gallica L., Grassland areas, Multiregional, Th.

Silene italica (L.) Pers., Grassland areas, Multiregional, H.

Silene saxatilis Sims., Grassland areas, Multiregional, H.

Silene vulgaris (Moench) Garcke var. *vulgaris* (Moench) Garcke, Grassland areas, Multiregional, H.

Stellaria holostea L., Bushes, roadsides, wet places, Euro- Siberian, Ch., LC.

CONVOLVULACEAE

Calystegia silvatica (Kit.) Griseb., Forest side, groves, bushes, fences, Multiregional, H.

Convolvulus arvensis L., Lake sides, Multiregional, H., LC.

CORYLACEAE

Carpinus betulus L., Large deciduous forests, Euro- Siberian, Ph.

CRASSULACEAE

Sedum pallidum Bieb. var. *bitynicum* (Boiss.) Chamberlain, Deciduous forests, The main rocks, Euxine (Black Sea), H.

Sedum stoloniferum Gmelin., The edges of the road, close to the lake, Hyrcano-Euxine, H.

CUSCUTACEAE

Cuscuta epithymum (L.) var. *Epithymum*, One-year herbal, hemicriptophytes and in rare dwarf shrubs, Multiregional, Th., CR.

CYPERACEAE

Schoenoplectus lacustris (L.) Palla subsp. *tabernaemontani* (C. C. Gmelin) A. Et D. Löve, Morass areas, Multiregional, Hyd., CR.

DIPSACACEAE

Dipsacus laciniatus L. Roadsides, coasts, fields, Multiregional, H.

Scabiosa columbaria L. subsp. *columbaria* L. var. *columbaria*, Roadsides, waterless areas, rocky slopes, Multiregional, H., LC.

ERICACEAE

Rhododendron luteum Sweet., *Fagus-Pinus* ve *Abies* forest bottoms, grassy slopes, rarely above the tree limit, Euxine (Black Sea), Ph.

Rhododendron ponticum L., *Fagus-Pinus* ve *Abies* forest bottoms, grassy slopes, rarely above the tree limit, Euxine (Black Sea), Ph.

EUPHORBIACEAE

Euphorbia amygdaloides L. var. *amygdaloides* L. *Fagus* ve *Abies* forest, *Carpinus* grove, *Rhododendron*, *Laurus* ve *Rubus* shrub, coasts, Euro- Siberian, H., LC.

Euphorbia platyphyllos L., Sandy coasts, morasses, stream beds, ditches, roadsides, cultivated areas, Multiregional, Th., LC.

FABACEAE

Astragalus glycyphyllos L. subsp. *glycyphylloides* (DC.) Matthews., Euro- Siberian, H., LC.

Coronilla varia L. subsp. *varia* L., Stony places and deciduous groves and bushes, cultivated areas, Multiregional, H.

Lathyrus laxiflorus (Desf.) O. Kuntze subsp. *laxiflorus* (Desf.) O. Kuntze, Forest, bushes, shady coasts, Multiregional, H.

Lathyrus vernus (L.) Bernh., Forest, bushes, shady coasts, Euro- Siberian, H.

Lathyrus aureus (Stev.) Brandza., Forest and bushes, Euxine (Black Sea), H.

Lotus angustissimus L., Roadsides and grassland areas, Multiregional, Th.

Lotus corniculatus L. var. *corniculatus* (Bieb.) Arc., Mountainous slopes and grasslands, Multiregional, Th., LC.

Psoralea acaulis Stev., Rock figures and sides, Euxine (Black Sea), H.

Trifolium fragiferum L. var. *fragiferum*_Grassland areas, Multiregional, H.

Trifolium pannonicum Jacq. subsp. *elongatom* (Willd.) Zoh. Grasslands, openings in the forest, steppe, Multiregional, H., Endemic.

Trifolium pratense L. var. *pratense* Boiss. et Bal., Grassland, roadsides, openings in the forest, Multiregional, H., LC.

Trifolium repens L. var. *repens* L., Grassland areas, Multiregional, H.

Vicia cracca L. subsp. *cracca* L., Deciduous shrubs, fences, Euro- Siberian, Th., LC.

FAGACEAE

Fagus orientalis Lipsky, Deciduous and mixed forests, Euro- Siberian, Ph.

GENTIANACEAE

Centaurium erythraea Rafn subsp. *erythraea*, Sunny side, rocky slopes, shrubs and sparse forest, Euro- Siberian, H., VU.

Gentiana asclepiadea L., Grassy places and openings in the forest, Euro- Siberian, H.

GERANIACEAE

Geranium gracile Ledeb. Ex Nordm., Grassland areas, Euxine (Black Sea), G.

Geranium pyrenaicum Burm. Fil., Groves, grasses, coasts, rocky slopes, lakes, Multiregional, H., LC.

Geranium purpureum Vill. Rocky or shaded places, coasts, fields, Multiregional, Th.

GUTTIFERAE

Hypericum perforatum L., Stony areas, Multiregional, H., LC.

HYPOLEPIDACEAE

Pteridium aquilinum (L.) Kuhn., Cut forest, cut grove, dune, Multiregional, H., LC.

LAMIACEAE-LABIATEA

Ajuga reptans L., Forests, meadows, Euro- Siberian, H., LC.

Calamintha nepeta (L.) Savi. subsp. *glandulosa* (Req.) P. W. Ball., *Fagus-Castaneae* forests, sandy and rocky limestone slopes, fields and the edges of the river, Multiregional, H.

Calamintha sylvatica Bromf. subsp. *sylvatica* Bromf., Forests and flood deposits, Euro- Siberian, H.

Clinopodium vulgare L. subsp. *vulgare* L., Sparse forests, rocky slopes, Multiregional, H., LC.

Lamium album L., *Abies* forests, *Quercus* bush, rock slopes (often volcanic), riversides, Euro- Siberian, H., LC.

Lamium purpureum L. var. *purpureum* L., *Quercus* and *Abies* forests, ground slopes, gravelly river side's, fields and barren place, Euro- Siberian, Th, LC.

Lycopus europaeus L., Wet the edges of streams, pools, lakes and marshes, rate coasts, frequently shadows, Euro- Siberian, G., LC.

Mentha longifolia (L.) Hudson subsp. *longifolia* (L.) Hudson, Riversides and swamps, Euxine (Black Sea), H.

Origanum vulgare L. subsp. *vulgare* L., Dry hills and rocky slope, limy and calcareous soil, conifer and mixed forests, Euro- Siberian, H., LC.

Prunella vulgaris L., Fields, groves, roadsides and wet sides, rivers, Euro- Siberian, H., LC.

Salvia forskahlei L., Large and coniferous forests, grasslands, vertical edges, Euxine (Black Sea), H.

Salvia glutinosa L. , Deciduous forests (*Fagus, Alnus, Corylus*) and wet places in the bushes, Hyrcano-Euxine, H.

Salvia verticillata L. subsp. *amasiaca* (Freyn Et. Bornm.) Bornm., Rocky slopes, sandy coastss, *Quercus* ve *Pinus* forests, prairies, roadsides, Irano-Turanian, H., EN.

Stachys sylvatica L., Piceae ve *Fagus* forests, gravelly slopes, coasts, wet places, Euro- Siberian, H., LC.

LYTHRACEAE

Lythrum salicaria L. Wet areas of lake and stream, beds of dry river, Euro- Siberian, H., LC.

ONAGRACEAE

Circaea lutetiana L., The shaded slopes, coniferous or deciduous forests, Multiregional, H., LC.

Epilobium hirsutum L., Swamps, river side's, Multiregional, G., LC.

Epilobium parviflorum Schreber., Areas of streams and lakes, wet areas, Multiregional, H., LC.

ORCHIDACEAE

Cephalanthera rubra (L.) L. M. C. Richard., Steppe, *Quercus* bushes, coniferous and deciduous forests, Multiregional, H., VU.

Spiranthes spiralis (L.) Chevall, *Pinus* forests, grassland areas, Mediterranean, G.

OXALIDACEAE

Oxalis corniculata L. , Open areas, Multiregional, Th.

POACEAE

Aira elegantissima Schur subsp. *elegantissima* Schur., Coastal sand dunes, open forest, maquis of *Quercuscoccitera*, on volcanic accumulations, Mediterranean, Th.

Apera spica-venti (L.) P. Beauv. , Cultivated land, watery areas, sandy soil in the black pine forest, Euro- Siberian, Th., LC.

Dactylis glomerata L. subsp. *glomerata* L., Pinus forest, fields, Euro- Siberian, H., LC.

Poa pratensis L., Alpine meadows, wet grasslands, cleared areas of pine forests, stream, Multiregional, Th., LC.

POLYGONACEAE

Polygonum lapathifolium L., Swamp lands and water sides, Multiregional, Th.

Rumex scutatus L., Slopes, the edges of the hill, fields, Multiregional, G., EN.

PRIMULACEAE

Lysimachia verticillaris Sprengel., Wet places of forests and bushes, in the forest and bushes, Euxine (Black Sea), H.

RANUNCULACEAE

Helleborus orientalis Lam., Bushes, forest Euxine (Black Sea), H.

Ranunculus constantinopolitanus (Dc.) D'urv., Wet areas, swamp, meadows, Multiregional, H.

ROSACEAE

Crataegus monogyna Jacq. subsp. *monogyna* Jacq., The edges of the hill, steppe, the bushes of Quercus, mixed forests, roadsides, Multiregional, Ph.

Fragaria vesca L., Wet areas, especially forests, Multiregional, H., LC.

Geum urbanum L., The shaded edges of streams and lakes and forests, Euro- Siberian, H.

Potentilla reptans L. The edges of streams and lakes and wet shaded places, Multiregional, H., LC.

Rosa canina L., Coasts, rocky slopes, bushes, fences, forests, Multiregional, Ch., LC.

RUBIACEAE

Asperula taurina L. subsp. *taurina* L., Deciduous forests, between rocks, Multiregional, H.

SCROPHULARIACEAE

Digitalis ferruginea L. subsp. *ferruginea* L., Forests, rocky slopes, and the coast of roadsides, Euro- Siberian, H.

Pedicularis comosa L. var. *sibthorpii* (Boiss.) Boiss., Limestone and volcanic slopes, edge of forest, wet meadows, Multiregional, H.

Rhynchosorys elephas (L.) Griseb. subsp. *elephas* (L.) Griseb., Euro- Siberian, H.

Scrophularia scopoli [Hoppe Ex] Pers. var. *adenocalyx* Somm. Et Lev., Forests, wet rocky slopes, The edges of stream, bushes, Euxine (Black Sea), H.

Verbascum speciosum Schrader., Pinus forests, cereal fields, steppes, Irano-Turanian, H.

Verbascum thapsus L., The edges of the river, forests, Irano-Turanian, H., NT.

Veronica chamaedrys L., The soil of deciduous forests, road sides, bushes, Euro- Siberian, G., LC.

Veronica manga M. A. Fischer., Deciduous forests, the bushes of *Rhododendron*, coasts of stream, the mountainous meadows, H.

Veronica polita Fries., Bare soils of sparse forests, steppe, cultivated land, roadsides, Multiregional, Th., EN.

SOLANACEAE

Atropa belladonna L., Forested areas of *Fagus orientalis*, shaded areas, Euro- Siberian, H., LC.

Physalis alkekengi L., Groves, coasts of the river, Multiregional, H.

THYMELAEACEAE

Daphne pontica L. , On the volcanic rock, limestoneslopes, the forests of *Abies-Fagus*, *Rhododendron* ve *Corylus*, Euxine (Black Sea), Ph.

URTICACEAE

Urtica dioica L., Forests, the shaded coomb and rocks, the edges of water, Irano-Turanian, H., LC.

VIOLACEAE

Viola sieheana Becker., The shaded areas, the edges of water, Multiregional, H.

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