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PLANTS OF THE BULGARIAN FLORA PROTECTED BY THE BERN CONVENTION

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Abstract

The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) was adopted in Bern, Switzerland on 19.09.1979, and came into force in 1982. It was ratified on November 25, 1991 by a decision of the Great National Assembly of the Republic of Bulgaria and promulgated in 1995. The present work summarizes the systematic structure, ecological and biological characteristics of plants of the Bulgarian flora, included in Appendix I to the Convention, which was supplemented on March 5, 1998. Total 55 species from 47 genera and 34 families fall under the strictest protection of Bulgaria. The biological types, life forms, and geoelements of flora according to Walter are analyzed. The distribution of species in Bulgaria in relation to the altitude zones and floristic regions and subareas is presented, and the affiliation of these plants to different ecological groups is shown. The conservation significance of the studied species, developed on the basis of national and international documents and legislation, is presented. A complete systematic list of protected species of flora of Bulgaria included in Appendix I of the Berne Convention is presented.

Key words: Bulgaria, flora, Bern Convention, national and international law.

РАСТЕНИЯ ФЛОРЫ БОЛГАРИИ, ОХРАНЯЕМЫЕ БЕРНСКОЙ КОНВЕНЦИЕЙ

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Аннотация

Конвенция об охране дикой европейской флоры и фауны и природных местообитаний (Бернская конвенция) была составлена в Берне 19.09.1979 г. Она была ратифицирована 25.11.1991 г. решением Великого Народного Собрания Республики Болгарии и обнародована в 1995 г. В работе сделана характеристика систематической структуры и эколого-биологических особенностей растений флоры Болгарии, вошедших в Приложение I к Конвенции, которое было дополнено 5.03.1998 г. Установлено, что из высшей флоры Болгарии под строгую защиту попадают 55 видов из 47 родов и 34 семейств. Анализированы биологические типы, жизненные формы, геоэлементы флоры по Walter-у. Представлено распространение видов в Болгарии по высотным поясам и по воспринятым в стране флористическим районам и подрайонами, а также показана принадлежность этих растений к разным экологическим группам, Представлена консервационная значимость исследованных видов, разработанная на основе национальных и международных документов и законодательства. Представлен полный систематический список включенных в Приложение I Бернской конвенции охраняемых видов флоры Болгарии.

Ключевые слова: Болгария, флора, Бернская конвенция, национальное и международное законодательство.

БЕРН КОНВЕНЦИЯСЫМЕН ҚОРҒАЛАТЫН БОЛГАРИЯ ФЛОРАСЫ ӨСІМДІКТЕРІ

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Аңдатпа

1979 жылы 19 қыркүйекте жабайы еуропалық флора мен фаунаны және табиғи мекендейтін ортаны қорғау туралы конвенция (Берн конвенциясы) Бернде жасалды. Ол 1991 жылы 25 қарашада Болгария Республикасының Ұлы Ұлттық Жиналысының шешімімен бекітіліп, 1995 жылы жарияланды. Бұл жұмыста 1998 жылғы 5 наурызда Конвенцияның I қосымшасына енгізілген Болгария флорасының өсімдіктерінің жүйелік құрылымы мен экологиялық және биологиялық сипаттамалары толықтырылып сипатталған. 47 ұрпағы мен 34 отбасының 55 түрі Болгарияның ең жоғары флорасының қатаң қорғауына ие екендігі анықталды. Walter-у бойынша флораның биологиялық түрлері, тіршілік формалары және геоэлементтері талданады. Болгариядағы түрлердің биіктік белдеулері бойынша және елде қабылданатын флористикалық аймақтар мен субариялар бойынша таралуы ұсынылған, ал бұл өсімдіктердің әртүрлі экологиялық топтарға қатысы көрсетілген. Зерттелетін түрлердің сақталу маңыздылығы ұлттық және халықаралық құжаттар мен заңнама негізінде жасалынған.

Түйінді сөздер: Болгария, флора, Берн конвенциясы, ұлттық және халықаралық заңнамасы.

Introduction

The aim of this work is to analyze the ecological and biological structure and conservation significance of Bulgarian flora plants included in Appendix I of the Berne Convention at the national and international legislative level [1].

The Convention on the Conservation of European Wildlife and Natural Habitats is one of the most stringent environmental legislation ever implemented. Species included in its lists have a very high conservation status. The European species of higher plants strictly protected by the Berne Convention and included in its Appendix I are 529, belonging to 94 families. If the algae are included, then the total number of species increases to 541.

In determining the national nature conservation status of the plant species of Bulgarian flora protected by the Berne Convention the following resources were used: the Red Data Book of Bulgaria, volume 1, «Plants» [2], the Red Data Book of Bulgaria, Volume 1, «Plants and Fungi» [3] and national legislative documents related to the protection of plant species: Order No. 761 of the General Directorate of Forests [4], Order No. 718 of the Committee for the Protection of the Natural Environment (CEPP) [5], Order No. RD-402 of the Ministry of Environment (ME) [6], Law on biological diversity [7] and the Law on Amendment and Addition to the Law on Biological Diversity diversity [8].

The determination of the international status of the analyzed species was developed on the basis of the IUCN Red List of Threatened Plants [9], the «List of Rare Threatened and Endemic Plants in Europe» [10], «Convention on International Trade in Endangered Species (CITES) [11] and Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora [12]. It was the last document that became the basis for the establishment of the pan-European ecological network NATURA 2000. Geoelements of flora and vertical distribution of species were determined according to Assyov B. and Petrova A. [13]. Ecological groups of the analyzed species were determined according to Flora NR of Bulgaria [14, 15], Flora of NR Bulgaria [16, 17] and Guide to plants in Bulgaria [18]. Medicinal plants are determined according to Medicinal Plants Act [19].

Appendix 1 to the Convention includes the species of 2 divisions - Polypodiophyta and Magnoliophyta - 51 species of higher plants from 47 genera and 30 families out of the higher

vascular plants of the Bulgarian flora. Among them 3 species are ferns - *Botrychium matricariifolium* A. Braun ex Koch, *Marsilea quadrifolia* L. and *Salvinia natans* (L.) All. Also there are 48 species of angiosperms – *Achillea thracica* Velen., *Aldrovanda vesiculosa* L., *Alyssum borzaeanum* Nyár., *Astracantha arnacantha* (M. Bieb.) Podlech, *Astragalus alopecurus* Pall., A. *physocalyx* Fisch., *Apium repens* (Jacq.) Lag., *Aurinia uechtritziana* (Bornm.) Cullen & Dudley, *Bromus moesiacus* Velen., *Caldesia parnassifolia* (L.) Pall., *Campanula lanata* Friv., *C. patula* L., *Centranthus kellereri* (Stoj., Stef. & T. Georg.) Stoj. & Stef., *Colchicum davidovii* Stef., *Cyclamen coum* Mill., *Cypripedium calceolus* L., *Dianthus urumoffii* Stoj. & Acht., *Eleocharis carniolica* W. Koch., *Fritillaria drenovskyi* Degen & Stoj., *F. gussichiae* (Degen & Dörfl.) Rix, *F. scorpilii* Velen., *Galium rhodopeum* Velen., *Geum bulgaricum* Pančič, *Haberlea rhodopensis* Friv., *Himantoglossum caprinum* (M. Bieb.) Spreng., *Ligularia sibirica* (L.) Cass., *Lilium jankae* Kern., *L. rhodopaeum* Delip., *Lindernia procumbens* (Krock) Philcox, *Liparis loeselii* (L.) Rich., *Moehringia jankae* Griseb. ex Janka, *Orchis provincialis* Balb., *Paeonia tenuifolia* L., *Potentilla emilii-popii* Nyár., *Primula deorum* Velen., *P. frondosa* Janka, *Pulsatilla halleri* (All.) Willd., *Ramonda serbica* Pančič, *Ranunculus fontanus* C. Presl., *Rheum rhaponticum* L., *Teucrium lamiifolium* D'Urv., *Trapa natans* L., *Typha shuttleworthii* Koch & Sond., *Vaccinium arctostaphylos* L., *Veronica euxina* Turrill, *V. turrilliana* Stoj. et Stef., *Viola delphinantha* Boiss. and *Zostera marina* L.

Table 1 shows the ecological and biological features and the conservation status of the Bulgarian plant species, strictly protected and included in Appendix I to the Berne Convention. It demonstrates that the distribution of plants according to their biological types is as follows: 3 species are shrubs, 1 semi shrub, 45 perennial herbaceous plants, 2 species are annual or perennial grasses and one species is an annual plant. According to Raunkiaer [20], the biological spectrum of these species is as follows: 1 Therophyta (Th), 2 species – Therophyta (Th) to Hemicryptophyta (H), 15 Cryptophyta (Cr), 27 Hemicryptophyta (H), 1 Chamaephyta (Ch)and 3 species are Phanaerophyta (Ph).

Table 1 Ecological and biological characteristic of the conservation status of species in Flora of Bulgaria, strictly protected by Bern Convention

№	Speceas	Biological type	Life form (Raunkiaer)	Altitude, m	Floristic element (after Walter)	Red Data Book of Bulgaria (1984)	Medicinal Plants Act (2000)	National status					International status		
								Order 761 (1961)	Order 71 (1989)	Order RD-401 of MoE (1995)	Biodiversity Act (2002), App 3	Biodiversity Act – amended (2007)	1997 IUCN Red List (1998)	List of the rare, threatened and endemic plants in Europe (1983)	CITES, Appendix 2, amended 2003
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Polypodiophyta														
1	*Botrychium matricariifolium* A. Braun ex Koch	♃	H	1500–1500	Boreal	-	-	-	-	+	-	+	-	-	-
2	*Marsilea quadrifolia* L.	♃	Cr	0–200	Boreal	R	-	-	+	+	-	+	-	-	-
3	*Salvinia natans* (L.) All.	♃	H	0–2000	Boreal	-	-	-	-	-	-	+	-	-	-
	Magnoliophyta														
4	*Achillea thracica* Velen.	♃	H	0–300	Bul	R	–	–	+	+	+	+	R	–	–
5	*Aldrovanda vesiculosa* L.	♃	Cr	0–100	Kos	Ex	–	–	+	+	+	+	–	–	–
6	*Alyssum borzaeanum* Nyár.	♃	H	0–400	Pont–Med	–	–	–	–	–	+	+	–	+	–
7	*Astracantha arnacantha* (M. Bieb.) Podlech	♄	Ph	100–400	Bul	R	–	+	+	+	+	+	R	+	–
8	*Astragalus alopecurus* Pall.	♃	H	1000–2000	Alp	R	–	–	+	+	+	+	–	+	–

9	*Astragalus physocalyx* Fisch.	ћ	Ph	0–100	Bal–Anat	Ex	–	–	–	+	+	+	Ex–E	+	–
10	*Apium repens* (Jacq.) Lag.	↯	H	?		–	–	–	–	+	+	+	–	–	–
11	*Aurinia uechtritziana* (Bornm.) Cullen & Dudley	↯	H	0–100	Pont	–	–	–	+	+	+	+	–	–	–
12	*Bromus moesiacus* Velen.	↯	H	0–800	Bul	–	–	–	–	–	+	–	R	+	–
13	*Caldesia parnassifolia* (L.) Pall.	↯	H	0–500	Eur– As	Ex	–	–	–	+	+	+	–	+	–
14	*Campanula lanata* Friv.	↯	H	500–1500	Bal	–	+	–	–	–	+	+	R	–	–
15	*Campanula patula* L.	2	Th-H	500–2500	Eur	–	–	–	–	–	–	–	–	–	–
16	*Centranthus kellereri* (Stoj., Stef. & T. Georg.) Stoj. et Stef.	↯	H	1000–2400	Bul	–	–	–	+	+	+	+	R	–	–
17	*Colchicum davidovii* Stef.	↯	Cr	0–100	Bul	E	–	–	+	+	+	+	V	–	–
18	*Cyclamen coum* Mill.	↯	Cr	0–500	Pont–Med	R	+	–	+	+	+	+	–	–	+
19	*Cypripedium calceolus* L.	↯	Cr	800–1500	Eur– As	E	–	–	+	+	+	+	–	+	+
20	*Dianthus urumoffii* Stoj. & Acht.	↯	H	200–700	Bul	E	–	–	+	+	+	+	–	+	–
21	*Eleocharis carniolica* W. Koch.	↯	H	50–50	Eur	–	–	–	–	–	+	+	–	+	–
22	*Fritillaria drenovskyi* Degen & Stoj.	↯	Cr	1000–1800	Bal	R	–	+	+	+	+	+	R	+	–
23	*Fritillaria gussichiae* (Degen & Dörfl.) Rix	↯	Cr	1000–1500	Bal	–	–	–	–	+	+	+	R	+	–
24	*Fritillaria scorpilii* Velen.	↯	Cr	0–1500	Bal	R	–	–	+	+	+	–	–	–	–
25	*Galium rhodopeum* Velen.	↯	H	300–1400	Bal	R	–	–	–	–	+	+	–	–	–
26	*Geum bulgaricum* Pančič	↯	H	2000–2800	Bal	R	–	–	+	+	+	+	–	–	–
27	*Haberlea rhodopensis* Friv.	↯	H	800–2000	Bal	R	–	+	+	+	+	+	R	–	–
28	*Himantoglossum caprinum* (M. Bieb.) Spreng.	↯	Cr	0–1000	Med	–	–	–	+	+	+	+	–	–	+
29	*Ligularia sibirica* (L.) Cass.	↯	H	0–1000	Eur– Sib	E	–	–	–	+	+	+	–	+	–
30	*Lilium jankae* Kern.	↯	Cr	1500–2900	Bal	R	–	+	+	+	+	+	–	–	–
31	*Lilium rhodopaeum* Delip.	↯	Cr	1000–2900	Bal	R	–	+	+	+	+	+	R	+	–
32	*Lindernia procumbens* (Krock) Philcox	1	Th	0–100	Eur– As	R	–	–	–	+	+	+	–	+	–
33	*Liparis loeselii* (L.) Rich.	↯	Cr	0–500	Boreal	Ex	–	–	–	+	+	+	–	+	+
34	*Moehringia jankae* Griseb. ex Janka	↯	H	0–500	Bal	R	–	–	+	+	+	+	R	+	–
35	*Orchis provincialis* Balb.	↯	Cr	0–300	Med	R	+	–	+	+	+	+	–	–	+
36	*Paeonia tenuifolia* L.	↯	H	0–600	subMe d	E	–	–	–	–	+	+	–	–	–
37	*Potentilla emilii-popii* Nyár.	↯	H	150–300	Bal	R	–	–	+	+	+	+	R	–	–
38	*Primula deorum* Velen.	↯	H	1900–2800	Bul	R	–	+	+	+	+	+	R	+	–
39	*Primula frondosa* Janka	↯	H	900–2000	Bul	R	–	+	+	+	+	+	R	+	–
40	*Pulsatilla halleri* (All.) Willd.	↯	H	300–1400	Alp–Carp–Bal	R	–	–	+	+	+	+	–	–	–
41	*Ramonda serbica* Pančič	↯	H	600–1000	Bal	R	–	+	+	+	+	+	R	+	–
42	*Ranunculus fontanus* C. Presl.	1-↯	Th-H	0–2000	Med	–	–	–	–	+	+	+	–	–	–
43	*Rheum rhaponticum* L.	↯	H	1500–2000	Bul	R	–	+	+	+	+	+	R	+	–
44	*Teucrium lamiifolium* D'Urv.	↯	H	0–500	Med	R	–	–	+	+	+	+	–	+	–
45	*Trapa natans* L.	↯	Cr	0–500	Eur– As	R	–	+	+	+	+	+	–	+	–
46	*Typha shuttleworthii* Koch & Sond.	↯	Cr	0–500	Kos	R	–	–	–	+	+	+	–	+	–
47	*Vaccinium arctostaphylos* L.	ћ	Ph	150-300	Pont	E	-	+	+	+	+	+	-	+	-
48	*Veronica euxina* Turrill	↯	H	0-200	Bul	Ex	-	-	-	-	+	+	-	+	-
49	*Veronica turrilliana* Stoj. et Stef.	↯	H	0-500	Bal	R	-	-	-	+	+	+	-	+	-

50	*Viola delphinantha* Boiss.	ħ	Ch	950-1700	Bal	R	-	+	+	+	+	+	R	+	-
51	*Zostera marina* L.	♃	H	0-0	Kos	-	-	-	-	-	-	-	-	-	-

Footnotes:
Column 3: Biological type: ћ – shrub, ħ – semi shrub, ♃ – perennial herbaceous plant, 2 – biennial herbaceous plant, 1 – annual herbaceous plant;
Column 4: Life form (according to Raunkiaer): Ph – Phanaerophyta, Ch – Chamaephyta, H – Hemicryptophyta, Cr – Cryptophyta, Th – Therophyta;
Column 6: Geoelement of flora (according to Walter): Alp – Alpine, Anat – Anatolian, As – Asiatic, Bal – Balkan, Boreal – Boreal, Bul – Bulgarian endemic, Carp – Carpathian, Eur – European, Kos – Cosmopolitan, Med – Mediterranean, Pont – Pontic, Sib – Siberian.

The vertical distribution of species shows that 27 of them are found in the range from 0–500 m. a.s.l., 6 species - from 500 to 1000 m. a.s.l., 12 species - from 1000 to 1500 m. a.s.l., 4 species from 1500 to 2000 m. a.s.l., and habitats above 2000 m. a.s.l. have been found for only 2 species.

According to Walter's classification of flora geoelements adapted to the Bulgarian flora [13], the strictly protected species are represented by the following flora geoelements: 10 species are Bulgarian, 14 are Balkan endemic, 4 species are Boreal and Mediterranean geoelements, 3 species are Cosmopolitan, 2 species are European, and 2 species are Pontic, etc.

The ecological requirements and groups of plant communities, in which the species live, are very diverse. There are 5 species in forest communities alone, 13 species are in shrub-grass communities, 12 – In grass communities only, 19 are chasmophytes (occurring on rocks, screes and stones), and 12 species occur in riverine, river, lake and bog communities. Psammophytes growing on sands and dunes are five species. There are no protected species found in ruderal communities or in agrocoenoses.

In relation to the water regime of habitats, the species can be divided as follows: mesophytes and xerophytes predominate - 39% (20 species) and 37% (19 species, respectively). The percentage of hygrophytes is 16% (8 species), and that of hydrophytes is 8% or 4 species.

In relation to the thermal regime, plant species are almost evenly distributed in the three main groups: microtherms of 17 species, mesotherms of 16, and thermophytes of 18 species.

Relative to sunlight, heliophytes completely dominate - 80% (41 species), followed by shade-tolerant plants – 12% (6 species) and the least of sciophytes – 8% or 4 species. As a result of phylogenetic development many species have specific requirements to the bedrock chemical properties. 16 species out of the studied group of plants are calciphiles and are attached completely to the karst bedrock. Three species are found only on silicate bedrock. There are two species of psammophytes and chasmophytes among plants, and hydrophytes are represented by three species.

The analysis of the distribution of the target species in the floristic regions and sub-regions of Bulgaria [13, 21] shows that most of these species are very rare in Bulgaria and are found only in one (14 species or 27% of all species) or two floristic regions or sub-regions - 17 species (33%). Three species are found in three floristic regions (6%), and two species (4%) are found in five or six floristic regions, 4 species are found in seven floristic regions, etc. (Table 2). Along the Black Sea coast, in the

Rila and Central and Eastern Stara Planina Mountains there are 10 species in each. The smallest number of species protected by the Convention occur in the Mesta river valley and in the mountain massifs of Belasitsa (3 species each).

Table 2 Distribution by floristic regions in Bulgaria of the species protected by the Bern Convention

Number of floristic regions and sub-regions		1	2	3	4	5	6	7	8	9	11	28	29
Species	**Number**	14	17	3	1	2	2	4	2	2	1	1	1
	%	27	33	6	2	4	4	8	4	4	2	2	2

The national conservation status of the characterized group of plants is presented in Table 1. The first edition of the Red Data Book of Bulgaria, Volume 1, Plants [2], includes 37 species protected by the Berne Convention. 26 of them are with the «rare species» category, 6 - with the «endangered» category and 5 species - with the «extinct species» category. In the second edition of the «Red Data Book of Bulgaria, Volume 1, Plants and Fungi» [3], in which the international IUCN (2003) categories were used to characterize the degree of threat over populations of rare plants, the same group included 38 species, of which 3 species are with the category «regionally extinct» (RE), 17 species - with the category «critically endangered» (CR), 15 species - with the category «endangered» (EN) and three species are with the category «vulnerable species» (VU). Among these species there are 15 relic plants, 10 of them being tertiary and 5 – glacial relics [3]. It should be considered that in Bulgaria the Red Data Books are not a list of plants protected by the Law, as in most other countries, but information on the status of populations of plants that are rare for the country's flora. Nevertheless, this information has become the basis for the legislation related to species protection of plants.

In the period from 1960 to 2007, 6 legislative acts, that carried out species protection of rare plants of the Bulgarian flora, were published. Order No. 761 of the General Directorate of Forests [4] includes 12 species from the list in the Berne Convention. Since 1989, after the release of Order No. 718 of the Committee for the Protection of the Natural Environment (CEPP) [5], the number of legally protected species has reached 30. In 1995 Order No. RD-401 of the Ministry of the Environment (ME) [6] was issued and the other 11 species fell under the Law protection, thus, the total number of protected species has become 41. Appendix II to the global «Law on Biological Diversity» [7], which was published in 2002, included 46 species, and the list, amended in 2007, in the «Law on Amendments» and in addition to the «Law on Biological Diversity» [8] the number of species has reached 47. Therefore, at present, only 4 species strictly protected by the Berne Convention are not protected by the national legislation of Bulgaria. They are *Bromus moesiacus, Fritillaria scorpilii, Campanula patula* and *Zostera marina*. The first 2 species were protected by the Law in Bulgaria between 1989-2002 [5-7]. The absence of these species in the lists of protected plants in Bulgaria is an obvious flaw in the environmental legislation. It is also necessary to mention that the administrative penalties for damage or destruction of protected plant species in the form of fines in the country are just nominal. They are not able to stop potential intruders. Three of the characterized species fall into the list of medicinal plants in Bulgaria: *Campanula*

lanata, Cyclamen coum and *Orchis provincialis* [19].

The species of flora of Bulgaria strictly protected by the Berne Convention are included in other international documents, lists, agreements and conventions. The IUCN Red List of Threatened Plants [9] includes 16 species with the rare species category, 1 species with the vulnerable category and 1 - with the extinct category (*Astragalus physocalyx*). List of Rare Threatened and Endemic Plants in Europe [10] includes 27 species, and five species are included in Appendix II to the Convention on International Trade in Endangered Species (CITES) [11]. An important document related to the protection of rare plant species and their natural habitats in Europe is the «Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora» [12]. Based on this Directive, all countries that are members of the European Union have developed a network of protected areas in the territory of each country, called NATURA 2000. Among the strictly protected by the Directive species, the habitat of which must have entered the NATURA 2000 zones in each member country, there are 21 views from the highest flora of Bulgaria. Of these 14 are protected by the Berne Convention as well. They are *Marsilea quadrifolia, Caldesia parnassifolia, Ligularia sibirica, Moehringia jankae, Eleocharis carniolica Aldrovanda vesiculosa, Cypripedium calceolus, Himantoglossum caprinum, Liparis lorumelifentema lefentema lefentema lefentema emantema emantema serbica.*

The generalized characteristic of the strictly protected plant species of the Bulgarian flora included in Appendix I of the Berne Convention, based on the above analysis, shows that, first of all, these are species with a very limited distribution in Bulgaria, while almost half of them are endemic, and more than a third live on rocky groupings, talus and rocky habitats, and almost all species from the latter group are calciphils. Most of these plants are perennial herbaceous plants that are found up to 500 meters a.s.l. These are mainly heliophytes, among which xerophytes and mesophytes predominate. Most of these plants are protected by law in Bulgaria.

Conclusion

In conclusion, we believe that other rare and threatened species from the flora of Bulgaria that deserve to be included in Appendix I of the Berne Convention have similar characteristics, since they are part of the valuable phyto gene pool not only in Bulgaria but also in Europe, and in our opinion, they are also part of the global natural heritage. This group of species includes a unique *Quercus thracica* Stef. & Ned., tertiary relic and local endemic *Anthemis argyrophylla* (Halacsy & Georgiev) Velen., Bulgarian endemics *Alopecurus thracicus* Penev & Kožucharov, *Anthemis jordanovii* Stoj. & Acht., *A. sancti-joannis* Turrill, *A. orbelica* Pančič, *Arenaria rhodopaea* Delip., *Brassica jordanoffii* O.E. Schultz, *Colchicum diampolis* Delip.&Cheschm., *Eranthis bulgaricus* (Stef.) Stef., *Micromeria frivaldszzkyana* (Degen) Velen., *Oxytropis urumovii* Jav., *Papaver degenii* (Urum.&Jav.) Kuzmanov, *Secale rhodopaeum* Delip., *Sedum kostovii* Stef., *Seseli bulgaricum* P.W.Ball, *Silene caliacrae* Jordanov & Panov, *Thymus perinicus* (Velen.) Jalas, *Tulipa aureolina* Delip., *T. pirinica* Delip., *T. rhodopea* Velen., *T. splendens* Delip., *T. thracica* Davidov, *T. urumoffii* Hayek, *Verbascum davidoffii* Murb., *Viola balcanica* Delip., rare Balkan endemic species with main habitats in Bulgaria – *Geum rhodopaeum* Stoj.& Stef., *Lathraea rhodopaea* Dingl., *Onosma thracica* Velen., *Potentilla ničiči* Adam., *Pulsatilla slaviankae* (Zimm.) Jordanov & Kožucharov, *Salix xanticola*

Christensen, *Saponaria stranjensis* Jordanov, *Scabiosa rhodopensis* Stoj. & Stef., *Sedum stefco* Stef., *Sideritis scardica* Griseb, etc.

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