

Floristic analysis of Mt Slivenska (Eastern Stara Planina, Bulgaria)

Alexandra Alexandrova, Alexander Tashev,
Marius Dimitrov & Nadejda Apostolova-Stoyanova

University of Forestry, Sofia, 10 Kliment Ohridski Blvd., 1756 Sofia, Bulgaria;
e-mail: a.v.alexandrova@abv.bg, altashev@abv.bg (corresponding author),
mariusdimitrov@abv.bg, apostolova_nadejda@abv.bg

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Abstract. Investigation of biological diversity is an important prerequisite for environment protection and is particularly topical in the context of the ongoing climate changes and altering public awareness of the strong connection between Man and Nature. The paper presents floristic diversity of Mt Slivenska. Presence of 1217 species has been identified, belonging to 458 genera, 95 families, five classes, and four divisions. Criteria for the elementary flora have been met. The great number of endemics, relicts and conservationally important taxa, and a comparative analysis with other similar regions, define the importance of the territory for the protection of floristic diversity. For the achievement of this goal, it will be necessary to create a monitoring system in the protected territories and areas of the region.

Key words: biological spectrum, biological type, conservation, floristic element, life forms

Introduction

Investigation of biological diversity constitutes an important part of environmentalist efforts. This is particularly topical in the context of the ongoing climate changes and altering public awareness of the strong connection between Man and Nature.

Such investigations have been carried out within the framework of the management plans of the Central Balkan National Park (Goussev & al. 2016) and Vrachanski Balkan Nature Park (Assyov & Goranova 2011), as well as by Stanev (1976), Pachedjieva (2011), Apostolova-Stoyanova & Stoyanov (2009), Asenov (2015), Marinov & al. (2015), etc.

Mt Slivenska is part of the Stara Planina Range. So far its flora has been studied fragmentarily, within the framework of greater-scale or regional projects. Some of the first investigations were carried out on the territory of the entire Eastern Stara Planina (Stanev 1981; Panov 1987; Cheshmedjiev 1988;

Vutov & Dimitrov 2000). After announcement of the Sinite Kamani Nature Park, its territory became the main site of investigation and the well-known literary data refer particularly to it (Andreev 1981; Sopotlieva 2000; Sopotlieva & Petrova 2001; Stoeva ed. 2002, 2004; Valkova & al. 2005; Georgieva & Dohchev 2008; Tashev & Alexandrova 2009, 2010, 2012a, 2012b, 2012c). Additional data have been given in some of the floristic records: Sopotlieva & Petrova (2002), Petrova (2004), Grozeva & Georgieva (2005), Petrova & al. (2009, 2011), Tashev & al. (2010), Tashev (2011), Grozeva & al. (2014a, b), Tashev (2017). The latest data about the flora in the region of Mt Slivenska are reported from the territory of Kutelka Reserve (Sopotlieva & al. 2016).

Most of Mt Slivenska is covered by the Natura 2000 European ecological network and the Important Plant Area (IPA) program. It contains four target species and 13 natural habitats under the Habitats Directive (Directive 92/43/EEC).

The purpose of this study is to investigate and assess the vascular flora on the territory of Mt Slivenska (Eastern Stara Planina).

Material and methods

Mt Slivenska is situated in Southeast Bulgaria. It lies in the westernmost part of Eastern Stara Planina (Stefanov, 2002). In the north, it borders on river Luda Kamchiya, which separates it from Mt Kotlenska; in the south, it borders on river Asenovska and Slivenska Plain. In the west, Vratnik Pass divides it from Mt Eleno-Tvardishka and Central Stara Planina, and in the east, Icherenski Pass divides it from Mt Stidovska. Grebenets Ridge is situated in the southeast, bordered by Ovcharitsa and Marash rivers from the north and the east, and with Sliven Plain in the south. The total area of Mt Slivenska amounts to 21 226.7 ha.

Morphographically, the relief is not very rugged. Lower Cretaceous sandstones and marls merge into Upper Cretaceous and Paleogene flish formations with strongly smoothed relief. The soils are Distric-Eutric Cambisols, Chromic Luvisols and Rendzinas.

The study area is in the European-Continental Climatic Zone and Transitional-Continental Climate Subzone, with its lowest belt falling into the climatic area of Eastern Central Bulgaria, characteristic with a comparatively warm winter and hot summer, with a marked drought period. Precipitation minimum is in the second part of the summer, and precipitation maximum is in May–June, with a marked secondary maximum in November. Spring and autumn are slightly longer at the expense of winter. Altitudinally, the territory falls into the Behind-Balkan Fore-Mountainous and Low-Mountainous Climatic Zone, characteristic with higher humidity and lower temperatures. The highest ridge stretches of the region (above 1000 m a.s.l.) are in the central mountainous part of the Mountainous Climatic Zone. Temperatures there are comparatively lower, with January and February as the coldest months and July and August the warmest. During all seasons, precipitation is higher than in the adjacent flatlands and snow cover stays longer (Sabev & Stanev, 1960).

According to the geobotanical regionalization of Bulgaria (Bondev, 2002), Mt Slivenska lies in the European Broad-Leaved Forest Zone, Illiryan (Balkan) Province, Kotel and Preslav district. In that district,

mesophytic and xeromesophytic forest ecosystems prevail, dominated by *Fagus sylvatica* ssp. *moesiaca*, *Carpinus betulus*, *Quercus dalechampii*, *Quercus polycarpa*, and *Tilia tomentosa*. In the lower areas, the xerothermic forest ecosystems are dominated by *Quercus frainetto* and *Quercus cerris*, and there are secondary forest ecosystems of *Carpinus orientalis* on the sunny slopes. Vegetation is mostly relatively old in origin, with a great number of relicts. Euxinian floristic elements, such as *Corylus colurna*, have also penetrated into the study area. Balkan and Bulgarian endemics have been identified too: *Tulipa urumoffi*, *Hypericum rumeliacum*, etc. The rock crowns are overgrown occasionally by the Balkan subendemic species *Syringa vulgaris*. There is a relatively strong presence of steppe floristic elements, which have penetrated into the drier spots, sparse woods and open rocky spaces, as well as grassy coenoses of secondary origin, replacing the forests destroyed by man in the past.

Mt Slivenska comprises the following protected territories: part of the Sinite Kamani Nature Park; Kutelka Reserve; Lale Bair, Orlite and Trakiyski Klin protected areas; and the natural highlights Halkata, Zmeevi Dupki, Three Caves – Haidushka, Bachvata, Pyasachnik, and Kushbunar Old-Growth Beech Forest. The study area falls into the territory of the protected zones Sinite Kamani (BG0000164) and Grebenets (BG0000420) under the Habitats Directive, and into Sinite Kamani – Grebenets (BG0002058) under the Birds Directive. Sinite Kamani are part of the international IPA program, with code BGIPA101 and an area of 12 280 ha (Peev & al., 2012).

During the field studies, the transect method was applied in the period 2014–2016 (Kamelin 1973; Tolmachev 1974; Pavlov & Dimitrov 2012), covering almost entirely the territory of the investigated region, with the exception of the eastern parts, where the territory was fenced for military purposes. The transects were set down from water catchments to the valleys, for the purpose of establishing the floristic and plant diversity and its connection with the various ecological conditions. Floristic data also comprise the generalized information from the botanical and phytocoenological literature available on the study area (Sopotlieva 2000; Sopotlieva & Petrova 2001; Sopotlieva & Petrova 2002; Stoeva 2002, 2004; Petrova 2004; Grozeva & Georgieva 2005; Valkova & al. 2005; Georgieva & Dohchev 2008; Petrova & al. 2009, 2011; Tashev & al. 2010; Tashev 2011, 2017;

Tashev & Alexandrova 2009, 2010, 2012a,b, Grozeva & al. 2014a,b; Sopotlieva & al. 2016;). A complete list of the vascular plants is given in Appendix 1. Species unconfirmed during the field studies are marked with *. Artificially introduced species are not included in the list.

The floristic analysis follows the principles of Tolmachev (1974) and Novosad (1992). The nomenclature and biological type of the species are determined according to Delipavlov & Cheshmedzhiev (2011). Determination of life forms follows the classification of Raunkiaer (1934), and floristic elements are given after Assyov & Petrova (2012). Data for Bulgaria used in the comparisons also follow Assyov & Petrova (2012).

The study area was compared with the following sites: Central Balkan National Park (Gusev & al. 2016), Vrachanski Balkan Nature Park (Assyov & Goranova 2011), central part of Mt Shipchenska (Marinov & al. 2015) Kamenshtitsa Reserve with adjacent territories (Pachedjieva 2011), which are all also part of Stara Planina. The region was also compared with Mt Zemen (Asenov 2015), Mt Golo Bardo (Apostolova-Stoyanova unpublished), and Besaparki Hills (Stanev 1976), owing to similarity with their habitats. These sites were selected because of their close geographic proximity, or close climatic and edaphic characteristics.

The species included in Appendix 1 of the Medicinal Plants Act (amend. SG, No 96 of 01.12.2017) are regarded as medicinal plants.

Balkan and Bulgarian endemics have been determined mainly after Petrova & Vladimirov (2010), with information supplemented from Petrova & Velchev (2006) and Velchev & al. (1992). Relicts are given after Zahariev (2016).

The conservation status of the species is given according to Petrova & Vladimirov (2009) and the *Red Data Book of the Republic of Bulgaria, vol. I: Plants and Fungi* (Peev & al. 2015), Appendix 3 to the Biological Diversity Act (amend. and suppl. SG No 76 of 19.09.2017), and the EU Council Directive 92/43 EEC on the conservation of natural habitats and of wild fauna and flora (21.05.1992). Of the internationally important documents, were taken into consideration CITES (1975), Appendix No 1 to the Bern Convention (1979), *European Red List of Vascular Plants* (Bilz & al., 2011), and *IUCN Red List of Threatened Plants* (2017). The threat categories from the respective documents are mentioned for all species.

Results and discussion

As a result of the conducted investigations, it has been established that the flora of Mt Slivenska comprises 1217 vascular plant species, belonging to 458 genera, 95 families, five classes and four divisions (Appendix 1). Their percentage participation in the Bulgarian flora is 29.7% for the species, 50.1% for the genera and 61.3% for the families.

Taxonomic structure of the flora shows that Magnoliophyta division claims the greatest share, with 86 families (90.5% of the total number of families in the study area), 445 genera (97.2% of the total number of genera) and 1194 species (98.1% of the total number of species), and is represented by its two classes of Magnoliopsida and Liliopsida (Table 1). On the other hand, Magnoliopsida comprises 75 families (78.9%), 350 genera (76.4%) and 939 species (77.2%), while Liliopsida comprises 11 families (11.6%), 95 genera (20.7%) and 255 species (21.0%). The Pinophyta division is represented by Pinopsida class, which participates with two families (2.1%) – *Cupressaceae* and *Pinaceae*, two genera (0.4%) and four species (0.3%). Mention deserves the fact that representatives of the genus *Pinus* had been artificially introduced at first, but subsequently proliferated on their own. The Polypodiophyta division is represented by Polypodiopsida class, which includes six families (6.3%), 10 genera (2.2%) and 16 species (1.3%). Equisetophyta division also participates with one class – Equisetopsida, one family (1.1%) – *Equisetaceae*, one genus (0.2%) – *Equisetum* and three species (0.2%) (Table 1). No representatives of the Lycopodiophyta division have been identified on the territory of Mt Slivenska. The reason for that are the lower altitudes and the limited presence of wet habitats.

The Liliopsida/Magnoliopsida ratio is 1:3.7 – relatively similar and representative, as compared to the ratio for the country (1:4).

After the analysis of literary data and the authors' own investigations, 84 species so far undescribed for the region of Mt Slivenska have been identified. Also, 80 species given for the area of Sinite Kamani Nature Park have not been confirmed during the investigations. This is probably due to their more restricted populations and the fact that they did not fall into the transects during the field work.

A comparison of the families with the greatest number of species in the study area with those in Bulgaria in general has shown that the first three families topping

Table 1. Distribution of the species and genera in the 15 richest families, their relative participation in the flora of Mt Slivenska and the 15 richest families in Bulgaria.

The 15 richest families in the flora of the study area	Species		Genera		The 15 richest families in the flora of Bulgaria
	Number of species in the research area	% of the total number of species in the research area	Number of genera in the research area	% of the total number of genera in the research area	
1 <i>Asteraceae</i>	143	11.8	46	10.0	1 <i>Asteraceae</i>
2 <i>Fabaceae</i>	114	9.4	23	5.0	2 <i>Poaceae</i>
3 <i>Poaceae</i>	112	9.2	47	10.3	3 <i>Fabaceae</i>
4 <i>Lamiaceae</i>	70	5.8	25	5.5	4 <i>Caryophyllaceae</i>
5 <i>Caryophyllaceae</i>	67	5.5	20	4.4	5 <i>Rosaceae</i>
6 <i>Rosaceae</i>	53	4.4	18	3.9	6 <i>Brassicaceae</i>
7 <i>Apiaceae</i>	50	4.1	30	6.6	7 <i>Scrophulariaceae</i>
8 <i>Liliaceae</i>	47	3.9	19	4.1	8 <i>Apiaceae</i>
9 <i>Scrophulariaceae</i>	43	3.5	12	2.6	9 <i>Lamiaceae</i>
10 <i>Brassicaceae</i>	40	3.3	21	4.6	10 <i>Liliaceae</i>
11 <i>Orchidaceae</i>	38	3.1	13	2.8	11 <i>Cyperaceae</i>
12 <i>Boraginaceae</i>	32	2.6	15	3.3	12 <i>Ranunculaceae</i>
13 <i>Ranunculaceae</i>	32	2.6	16	3.5	13 <i>Boraginaceae</i>
14 <i>Cyperaceae</i>	31	2.5	6	1.3	14 <i>Orchidaceae</i>
15 <i>Rubiaceae</i>	21	1.7	5	1.1	15 <i>Rubiaceae</i>
In the first three families	369	30.3	116	25.3	–
In the first ten families	739	60.7	261	57.0	–
In the first fifteen families	893	73.4	316	69.0	–

the list are the same: *Asteraceae*, *Fabaceae* and *Poaceae* (Table 1). *Lamiaceae* ranks fourth in the region and ninth in the country. This is typical for floras with marked Mediterranean influence (Pachedjieva, 2011) and only emphasizes again the warmer climate in the region. The *Caryophyllaceae* and *Rosaceae* families rank in the next two places. More than 60% of the genera and 20% of the species of these two families occurring in Bulgaria have been identified in the region. The *Apiaceae* family ranks seventh. It is characteristic of the Holarctic Floristic Kingdom, whose representatives inhabit the broad-leaved forests, forest clearings and wet places (Pachedjieva 2011). The families *Liliaceae*, *Scrophulariaceae*, *Brassicaceae*, *Ranunculaceae*, *Cyperaceae*, and *Rubiaceae* retain their approximate ratio, which resembles that for the flora of Bulgaria. Rather more impressive is the family *Orchidaceae*, which is characteristic of the mountainous regions and conserved primary habitats, such as lowland hay meadows, dry herbaceous communities, marshes, etc. (Pachedjieva, 2011). Such habitats are well represented in the study area, which probably is the main reason for its being among the areas with richest in species families. *Boraginaceae* originates from the

subtropics. In Mt Slivenska, this family occupies a more foremost place than generally in the country, which emphasizes the Mediterranean influence in the region. Diversity of conditions and the transitional-continental climate with Mediterranean influence determine the great species variety on the territory of Mt Slivenska.

The first three leading families account for 30.3% of the total number of species and 25.3% of the genera; the first ten families account for 60.7% of the species and 57.0% of the genera; while the first fifteen families account for 73.4% of the species and 69.0% of the genera. These data show the species concentration in some of the families. Outside the first fifteen, most families have from one to three genera and less than five species.

Table 2 presents the richest in species genera in the study area. It shows the leading participation of genus *Carex*, which rates second in the country (Petrova 2001). Its representatives occur mainly in moister habitats with distribution in the mountain belt. The great number of springs and glens in the beech phytocoenoses of Mt Slivenska favour its distribution. Second is genus *Trifolium*, which rates fourth in the country. It is rich in

Table 2. Richest genera in the flora of Mt Slivenska.

No.	Genera	Number of species	No.	Genera	Number of species
1	<i>Carex</i>	25	12	<i>Geranium</i>	13
2	<i>Trifolium</i>	24	13	<i>Silene</i>	13
3	<i>Centaurea</i>	18	14	<i>Euphorbia</i>	12
4	<i>Vicia</i>	17	15	<i>Galium</i>	12
5	<i>Campanula</i>	16	16	<i>Orchis</i>	12
6	<i>Potentilla</i>	15	17	<i>Achillea</i>	11
7	<i>Bromus</i>	14	18	<i>Hypericum</i>	11
8	<i>Festuca</i>	14	19	<i>Lathyrus</i>	11
9	<i>Hieracium</i>	14	20	<i>Ranunculus</i>	11
10	<i>Veronica</i>	14	21	<i>Poa</i>	10
11	<i>Viola</i>	14	22	<i>Thymus</i>	10

xerophytic species of Mediterranean origin. The great number of species from the genera *Vicia*, *Euphorbia*, *Veronica* (10th for the country), *Geranium*, and *Hypericum* is explained by the strong anthropogenic pressure in the region. Some of the leading genera are typical for the Mediterranean: *Centaurea* (third and third for the country), *Potentilla*, *Silene* (fifth for the country), and *Galium*. It is characteristic of the representatives of genus *Potentilla* to grow in various habitats, which probably explains its strong participation (Pachedjieva 2011). Genus *Silene* is represented mainly by chasmophytic species. Genus *Campanula* is interesting; it rates fifth in the species richness. The richest genus for the country, *Hieracium*, rates ninth in the study area. It is characteristic of the mountainous regions. Of the genera from family *Poaceae*, *Bromus* and *Festuca* are the richest in species. Their representatives play a leading role in the grass coenoses.

Distribution of the taxa by biological types is shown in Table 3.

Analysis of the biological spectrum has elucidated the specific climatic conditions are needed for the development of floristic complexes. In Mt Slivenska, hemicryptophytes prevail, followed by cryptophytes, therophytes, and phanerophytes (Table 4). This biological spectrum is similar to the biological spectra of two types of vegetation: Forests in the Temperate Cold Zone and Dry Grassy Communities with Prevalence of *Poaceae* (Pavlov & Dimitrov 2012). Most of the plant species are hemicryptophytes (42.4%), which is characteristic of the temperate geographical latitudes and typical for the biological spectra of the above-mentioned two types of vegetation. Second come cryptophytes (24.2%),

Table 3. Distribution of species by biological type and their relative participation in the flora of Mt Slivenska.

Biological types	Number of species	% of the total number of species
Annual	218	17.9
Annual-biennial	44	3.6
Annual-biennial-perennial	1	0.1
Annual-perennial	7	0.6
Biennial	34	2.8
Biennial-perennial	24	2.0
Perennial	756	62.1
Perennial-semishrub	1	0.1
Semishrub	3	0.2
Semishrub-perennial	3	0.2
Shrub	60	4.9
Shrub-tree	22	1.8
Tree	39	3.2
Tree-shrub	5	0.4

Table 4. Biological spectrum of the flora of Mt Slivenska as compared to the vegetation types Forests in the Temperate Cold Zone and Dry Grassy Communities with prevalence of *Poaceae*.

Vegetation types	Life forms (%)				
	Ph	Ch	H	G	Th
Mt Slivenska	8.7	2.5	42.4	24.2	22.2
Forests in the Temperate Cold Zone	10	17	54	12	7
Dry Grassy Communities with prevalence of <i>Poaceae</i>	1	12	63	10	14

Legend: Ph – Phanerophytes, Ch – Chamaephytes, H – Hemicryptophytes, G – Geophytes, Th – Therophytes.

which is characteristic of the mesotrophic forests in the central part of the temperate zone, but percentage participation of the other life forms does not correspond to that type. Third come therophytes (22.2%), which are characteristic of the biological spectrum of the vegetation type of Dry Grassy Communities with Prevalence of *Poaceae*, typical for the Mediterranean. Also, mention deserves the relatively great participation of phanerophytes (8.7%), characteristic of Forests in the Temperate Cold Zone developing in the temperate continental climate. Similarity of the biological spectrum of Mt Slivenska with the biological spectra of these two types of vegetation is explained by the geographical location of the Mountain: it lies in the Transitional-Continental Climate Zone, but experiences marked climatic influence of the Mediterranean. Similarity with the vegetation type Dry Grassy Communities with Prevalence of *Poaceae* is due to the typical for the study area xerophytic and mesophytic grassy communities, with strong participation of therophytes. Some parts of the Mountain offer suitable conditions for the

development of mesophytic forests, which in turn explains similarity of the biological spectrum with that of the Forests in the Temperate Cold Zone. The biological spectrum of Mt Slivenska differs from the two vegetation types in the smaller percentage of chamaephytes, which are characteristics of a colder climate.

Table 5 shows distribution of the plant species by floristic elements and reveals the great diversity in the origin of identified species. The transitional-continental climate favours the species typical for the forests of Central Europe and Asia. Mediterranean influence, in turn, is favourable for southern species.

Distribution of floristic elements of different origin confirms the diversity of conditions in the region. There are forest plantations, pastures, barrens, meadows, etc.

Table 5. Floristic elements (Assyov & Petrova, 2012) in the flora of Mt Slivenska.

No.	Floristic elements		Number of species	% of the total number of species
1	Submediterranean	<i>subMed</i>	197	16.2
2	Eurasian	<i>Eur-As</i>	151	12.4
3	Euro-Mediterranean	<i>Eur-Med</i>	145	11.9
4	European	<i>Eur</i>	83	6.8
5	Euro-Siberian	<i>Eur-Sib</i>	79	6.5
6	Mediterranean	<i>Med</i>	69	5.7
7	Pontic-Mediterranean	<i>Pont-Med</i>	64	5.3
8	Boreal	<i>Boreal</i>	62	5.1
9	Sub-Boreal	<i>subBoreal</i>	52	4.3
10	Balkan	<i>Bal</i>	43	3.5
11	Cosmopolitan	<i>Kos</i>	39	3.2
12	Euro-Submediterranean	<i>Eur-subMed</i>	24	2.0
13	Balkan-Anatolian	<i>Bal-Anat</i>	23	1.9
14	Pontic	<i>Pont</i>	19	1.6
15	Bulgarian	<i>Bul</i>	14	1.2
16	Balkan-Dacian	<i>Bal-Dac</i>	12	1.0
17	Mediterranean-Central Asiatic	<i>Med-CAs</i>	11	0.9
18	Carpathian-Balkan	<i>Carp-Bal</i>	10	0.8
19	South Pontic	<i>SPont</i>	10	0.8
20	Euro-Oriental Turanian	<i>Eur-OT</i>	9	0.7
21	Pontic-Submediterranean	<i>Pont-subMed</i>	7	0.6
22	Alpo-Carpathian-Balkan	<i>Alp-Carp-Bal</i>	5	0.4
23	Mediterranean-Asiatic	<i>Med-As</i>	5	0.4
24	Sub-Balkan	<i>subBal</i>	5	0.4
25	Adventive	<i>Adv</i>	4	0.3
26	Alpo-Mediterranean	<i>Alp-Med</i>	4	0.3
27	Apenninian-Balkan	<i>Ap-Bal</i>	4	0.3
28	Mediterranean-Oriental Turanian	<i>Med-OT</i>	4	0.3
29	Pannonian-Balkan	<i>Pann-Bal</i>	4	0.3

Table 5. Continuation.

No.	Floristic elements		Number of species	% of the total number of species
30	Pontic-Central Asiatic	<i>Pont-CAs</i>	4	0.3
31	Pontic-Siberian	<i>Pont-Sib</i>	4	0.3
32	Submediterranean-Asiatic	<i>subMed-As</i>	4	0.3
33	Euro-Central Asiatic	<i>Eur-CAs</i>	3	0.2
34	South Siberian	<i>SSib</i>	3	0.2
35	Arctic-Alpine	<i>Arct-Alp</i>	2	0.2
36	Balkan-Carpathian	<i>Bal-Carp</i>	2	0.2
37	Eastern Mediterranean	<i>EMed</i>	2	0.2
38	Euro-Mediterranean-Central Asiatic	<i>Eur-Med-CAs</i>	2	0.2
39	Euro-North American	<i>Eur-NAm</i>	2	0.2
40	Pontic-Balkan	<i>Pont-Bal</i>	2	0.2
41	Mediterranean-Submediterranean	<i>Med-subMed</i>	2	0.2
42	Submediterranean-Central Asiatic	<i>subMed-CAs</i>	2	0.2
43	Adventive (American)	<i>Adv (Am)</i>	1	0.1
44	Adventive (Central Asiatic)	<i>Adv (CAs)</i>	1	0.1
45	Adventive (Mediterranean)	<i>Adv (Med)</i>	1	0.1
46	Adventive (North American)	<i>Adv (NAm)</i>	1	0.1
47	Alpo-Balkan	<i>Alp-Bal</i>	1	0.1
48	Alpo-Carpathian	<i>Alp-Carp</i>	1	0.1
49	Asiatic	<i>As</i>	1	0.1
50	Balkan-Aegean	<i>Bal-Aeg</i>	1	0.1
51	Balkan-Anatolian-Caucasian	<i>Bal-Anat-Cauc</i>	1	0.1
52	Balkan-Dacian-Anatolian	<i>Bal-Dac-Anat</i>	1	0.1
53	Bulgarian-Dacian	<i>Bul-Dac</i>	1	0.1
54	Central South European	<i>CSEur</i>	1	0.1
55	Eurasian/Paleo	<i>Eur-As/Paleo</i>	1	0.1
56	Euro-Pontic	<i>Eur-Pont</i>	1	0.1
57	Euro-West Asiatic	<i>Eur-WAs</i>	1	0.1
58	Euxinian	<i>Eux</i>	1	0.1
59	Hybrid	<i>Hybr</i>	1	0.1
60	Mediterranean-Central Asiatic	<i>Med-CAs</i>	1	0.1
61	Mediterranean-North American	<i>Med-NAm</i>	1	0.1
62	Pontic-South Asiatic	<i>Pont-SAs</i>	1	0.1
63	South Eastern European	<i>SEEur</i>	1	0.1
64	South European-Anatolian	<i>SEur-Anat</i>	1	0.1
65	South European	<i>SEux</i>	1	0.1
66	Submediterranean-Anatolian	<i>subMed-Anat</i>	1	0.1
67	Submediterranean-Siberian	<i>subMed-Sib</i>	1	0.1
Total:			1217	100.0

Of the vascular plants in Mt Slivenska (Table 6), 81.6% (993 species according to Tashev & Alexandrova 2009) are distributed on the territory of Sinite Kamani Nature Park, and 39.7% (483 species according to Sopotlieva & al. 2016) are distributed in the Kutelka Reserve. Irrespective of their smaller area, they preserve a considerable part of the floristic diversity in the study area.

Table 6. Comparison of the floras of Mt Slivenska, Sinite Kamani Nature Park and Kutelka Reserve.

Divisions	Number of species		
	Mt Slivenska	Sinite Kamani Nature Park	Kutelka Reserve
Equisetophyta	3	3	0
Polypodiophyta	16	16	7
Pinophyta	4	5	3
Magnoliophyta	1194	969	473
Total:	1217	993	483

A comparison of the number of species by divisions in Mt Slivenska and other investigated regions, as well as with the data for Bulgaria is shown in Table 7.

The Central Balkan National Park is the richest in species, followed by Mt Zemenska, Mt Slivenska, Vrachanski Balkan Nature Park, Mt Golo Bardo, Kamenshtitsa Reserve, central part of Mt Shipchenska, and finally, Besaparski Hills. The compared sites differ in area, but as it is seen from Table 7, floristic richness does not depend proportionally on the area. Of the investigated sites in the Balkan Range, the leading place of the Central Bal-

kan National Park is due to its greatest diversity of habitats, because of the vast territory of the Park, great difference of altitudes, varied relief, and climatic conditions. Second ranks Mt Slivenska, outstripping the Vrachanski Balkan Nature Park, despite of the fact that its territory is smaller by one-third and the smaller difference in altitudes. Irrespective of the varied conditions, location of the Vrachanski Balkan Nature Park further to the north explains its smaller number of species. Much lower is the species richness of Kamenshtitsa Reserve and the central part of Mt Shipchenska. This is explained by their smaller territories and less varied conditions: mainly forest habitats. A comparison with sites outside the Balkan Range has shown that Mt Zemenska and Mt Slivenska are closest in floristic richness, with almost the same number of species on approximately equal territories. Similarity of habitats diversity and influence of the Mediterranean (more marked in Mt Zemenska) are probably the reason for such close values. The number of species in Mt Golo Bardo is close to them, irrespective of the smaller territory of that mountain and the less varied habitats, but again with marked Mediterranean influence. The flora of Besaparski Hills is represented with the least number of species, irrespective of their southernmost location and territory similar in area with Mt Golo Bardo. The place has a little over the half of the number of species of Mt Golo Bardo. The probable reason here, on the one hand, are the environmental conditions – low altitude, not very rugged relief, prevalence of grassy vegetation;

Table 7. Comparison of the taxonomic structure of Mt Slivenska's flora with other areas and generally with Bulgaria.

Divisions and Clasis	Slivenska Mountain (number of species)	Central Balkan National Park (number of species)	Vrachanski Balkan National Park (number of species)	Central Shipchenska Mountain (number of species)	Kamenshtitsa Reserve and adjacent territories (number of species)	Zemenska Mountain (number of species)	Golo Bardo Mountain (number of species)	Besaparski Hills (number of species)	Bulgaria (number of species)
Area (ha)	21 226.7	72 021.1	28 803.9	200	4800	17 000	10 000	11 200	11 099 400
Lycopodiophyta	0	3	1	0	0	0	0	0	8
Equisetophyta	3	4	3	2	2	4	1	0	8
Polypodiophyta	16	27	15	16	13	7	7	3	47
Pinophyta	4	10	11	5	6	4	3	1	19
Magnoliophyta	1194	1634	1052	598	694	1339	1035	564	4020
• Class Liliopsida	255	353	187	111	132	240	201	108	804
• Class Magnoliopsida	939	1281	865	487	562	1099	834	456	3216
Total	1217	1679	1082	621	716	1354	1046	568	4102

and on the other, the limited scope of investigation (exclusion of weeds and representatives of the ruderal flora).

Taxonomic structure of the compared sites has shown both similarities and differences. The Lycopodiophyta division is represented on the territory of Central Balkan National Park and Vrachanski Balkan Nature Park, owing to higher altitudes. Equisetophyta has not been recorded only on the Besapar Hills, where there are xerophytic conditions. Polypodiophyta are well represented in all Stara Planina sites, with the greatest number again in the National Park. The Pinophyta division has shown the greatest number of species in the Vrachanski Balkan Nature Park, its representatives being mainly high-mountain species. The leading participation of Magnoliophyta in all compared sites is characteristic of these geographic latitudes.

Generally, distribution of the higher taxa in the flora of Mt Slivenska is close to their distribution on the territory of the entire country.

A comparison of the biological spectrum of Mt Slivenska with those of Mt Zemenska, Mt Golo Bardo, Besaparski Hills, and Kamenshtitsa Reserve with the territories adjacent to it has shown that their values are close, which is explained by the environmental conditions (Table 8). The values of Mt Zemenska and Mt Golo Bardo are the closest to those of the study area. This probably is due to the similar natural habitats and Mediterranean influence. The biological spectrum of Kamenshtitsa Reserve and Besaparski Hills are also close to the obtained data, which probably could be explained by their close proximity and similar environmental conditions, respectively.

Table 8. Biological spectra of the floras of Mt Slivenska, Mt Zemenska, Mt Golo Bardo, Kamenshtitsa Reserve with adjacent territories, and Besaparski Hills.

Compared areas	Life forms (%)				
	Ph	Ch	H	G	Th
Mt Slivenska	8.7	2.5	42.4	24.2	22.2
Mt Zemenska	7.1	2.1	59.4	6.2	24.5
Mt Golo Bardo	8.7	2.0	58.3	9.5	21.5
Kamenshtitsa Reserve with adjacent territories	10	4	57	10	19
Besaparski Hills	6.5	8	41	11.9	32

Of the 1217 plant species identified in Mt Slivenska, 374 are included in Appendix 1 to the Medicinal Plants Act (amend. SG No. 96, of 01.12.2017). These species account for 30.7 % of all plants.

Endemic species in the flora of the study area constitute 4.3 % of the total number of plants. Of these, 38

species are Balkan endemics and 14 species are Bulgarian endemics. Their total number accounts for 31.5 % of the endemics distributed on the territory of Stara Planina (165 species) and for 11.7 % of all endemics in Bulgaria (446 species). This prompts the conclusion that Mt Slivenska is rich in endemics.

There have been identified 83 relict species in the flora of Mt Slivenska, which account for 24 % of all relicts in Bulgaria. Of these, 69 are Tertiary relicts, and the remaining 14 are Quaternary relicts. On the other hand, Quaternary relicts divide into Glacial – eight species, Interglacial – five species, and Post-Glacial – one species. Distribution of these species of olden epochs testifies how old and preserved the investigated flora is.

There have been identified 181 conservationally important species, or 14.9 % of the entire flora (Appendix 2). The *Red List of Bulgarian Vascular Plants* includes 79 species. Of these, 20 species are rated as Endangered (EN), five species (*Aethionema arabica*, *Colchicum davidovii*, *Dactylorhiza kalopisii*, *Orchis spitzelii*, *Veronica multifida*), as Critically Endangered (CR), 11 species as Near Threatened (NT), 29 species as Vulnerable (VU), 11 species as Least Concern (LC), and three species (*Cleome ornithopodioides*, *Koeleria brevis*, *Sempervivum leucanthum*) as Data Deficient (DD).

The *Red Data Book of the Republic of Bulgaria, vol. 1. Plants and Fungi* comprises 31 species, of which five species are rated as Critically Endangered (CR). There are also 18 Endangered (EN) and eight Vulnerable (VU) species.

Forty-three species or 3.5 % of the flora of Mt Slivenska are listed in Appendix 3 to the Biological Diversity Act (amend. and suppl. in SG No. 76 of 19.09.2017).

There have been identified four species included in Appendix 4 to Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. These are: *Anacamptis pyramidalis*, *Dactylorhiza kalopisii*, *Himantoglossum caprinum*, and *Moehringia jankae*.

Appendix 2 to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1975), supplemented in 2003, features 41 species, and seven species of the flora of Mt Slivenska are covered by the Bern Convention (1979): *Bromus moesiacus*, *Campanula lanata*, *Colchicum davidovii*, *Cyclamen coum*, *Himantoglossum caprinum*, *Moehringia jankae*, and *Pulsatilla halleri*.

Appendix 2 to the *European Red List of Vascular Plants* features 110 species, which account for 9.0% of the investigated flora. Of these, there are one Endangered species (EN) – *Dactylorhiza kalopisii*, three Nearly Threatened (NT) species – *Allium melantherum*, *Epipactis microphylla*, *Orchis spitzelii*, and one Vulnerable (VU) species – *Epipactis pontica*; 95 species are rated as Least Concern (LC), and 10 species are Data Deficient (DD).

The flora of Mt Slivenska also includes 12 world threatened species (IUCN, 2017): one of Least Concern (LC) – *Spiranthes spiralis*, nine Rare (R), and two Vulnerable (V) – *Colchicum davidovii*, *Tulipa urumofii*.

The obtained results on the conservationally important species confirm how valuable the studied flora is. When referred to the area of Mt Slivenska, their number is extremely high. Some of them have great decorative value and are potentially more vulnerable, owing to the attention of tourists. It is recommendable to monitor their populations and record the factors that affect them negatively, in order to undertake steps for their environmental protection.

Conclusion

About one-third of all plant species in Bulgaria have been identified in Mt Slivenska. The main reasons for this are the varied geological base, soils and climatic conditions – the transitional-continental cli-

mate with Mediterranean influence, and mountain climate in the highest parts.

Its comparison with other investigated floras places it among the leading floras in floristic richness, after the Central Balkan National Park and Mt Zemenska. It manifests the greatest similarity with Mt Zemenska in area and number of species. Taxonomic structure of Mt Slivenska shows greater resemblance to the other Stara Planina sites. Its greatest variety of Pteridophytes and Gymnosperms is referred particularly to the mountainous conditions. Along with this, the flora of Mt Slivenska is influenced by the Mediterranean, which is supported by the similarity of its biological spectrum to those of Mt Zemenska and Mt Golo Bardo.

Generally, taxonomical analysis has shown that the flora of the study area could be regarded as an elementary (concrete) flora, according to the requirements of Tolmachev (1974) and Novosad (1992).

The great richness of the identified species on such a comparatively small territory, the high percentage of endemic, relict and protected species emphasize the high conservation status of the region and the need in its proper and effective management for protection of biological diversity. All protected zones in the region have been announced for this purpose.

It is recommendable to create a system for monitoring the status of the populations of the protected species and to investigate further of the region.

Appendix 1. Systematic list of vascular plants in Mt Slivenska (Eastern Stara Planina, Bulgaria).

Legend: M – medical plant; Bul – Bulgarian endemic; Bal – Balcan endemic; T – tertiary relict; G – glacial relict.

Divisio Equisetophyta

Classis Equisetopsida

Equisetaceae: *Equisetum arvense* L. (M), *E. hiemale* L., *E. telmateia* Ehrh. (M)

Divisio Polypodiophyta

Classis Polypodiopsida

Aspidiaceae: *Dryopteris filix-mas* (L.) Schott (M), *Polystichum setiferum* (Forssk.) Moore; **Aspleniaceae:** *Asplenium adiantum-nigrum* L. (M), *A. ruta-muraria* L. (M), *A. septentrionale* (L.) Hoffm. (M), *A. trichomanes* L. (M), *A. viride* Huds., *Asplenium x germanicum* auct., *Ceterach officinarum* DC. (M), *Phyllitis scolopendrium* (L.) Newman (M); **Athyriaceae:** *Athyrium filix-femina* (L.) Roth (M), *Cystopteris fragilis* (L.) Bernh.; **Hypolepidaceae:**

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Pteridium aquilinum (L.) Kuhn (M, T); **Polypodiaceae:** *Polypodium vulgare* L. (M); **Sinopteridaceae:** *Cheilanthes maranthae* (L.) Domin., *Ch. persica* (Bory) Mett. ex Kuhn.

Divisio Pinophyta**Classis Pinopsida**

Cupressaceae: *Juniperus communis* L. (T), *J. deltoides* R. P. Adams (T); **Pinaceae:** *Pinus nigra* Arnold (T), *P. sylvestris* L. (M, T)

Divisio Magnoliophyta**Classis Dicotyledonae (Magnoliopsida)**

Acanthaceae: *Acanthus balcanicus* Heywood & I. Richardson (M); **Aceraceae:** *Acer campestre* L. (T), *A. hyrcanum* Fisch & C. A. Mey. (T), *A. monspessulanum* L. (T), *A. platanoides* L. (M), *A. pseudoplatanus* L. (T), *A. tataricum* L. (M, T); **Amaranthaceae:** *Amaranthus retroflexus* L.; **Anacardiaceae:** *Cotinus coggygria* Scop. (M, T), *Pistacia terebinthus* L. (T); **Apiaceae:** *Aegopodium podagraria* L., *Angelica sylvestris* L. (M), *Anthriscus nemorosa* (M. Bieb.) Spreng., *A. sylvestris* (L.) Hoffm., *Bupleurum falcatum* L., *B. praealtum* L., *B. sibthorpiatum* Sm., *B. tenuissimum* L., *Carum carvi* L., *C. graecum* Boiss. & Heldr. (M, Bal), *Caucalis platycarpus* L., *Chaerophyllum aureum* L., *Ch. bulbosum* L. (M), *Ch. byzantinum* Boiss., *Ch. hirsutum* L., *Ch. temulentum* L. (M), *Conium maculatum* L. (M), *Daucus carota* L., *Eryngium campestre* L. (M), *Ferulago campestris* (Besser) Grecescu, *F. sylvatica* (Besser) Rchb. (M), *Heptaptera triquetra* (Vent.) Tutin (Bal), *Heracleum sibiricum* L. (M), *Laser trilobum* (L.) Borkh. (M), *Laserpitium siler* L. (M), *Myrrhoides nodosa* (L.) Cannon, *Opopanax chironium* (L.) Koch (M), *Orlaya daucoidea* (L.) Greuter, *O. daucorlaya* Murb., *O. grandiflora* (L.) Hoffm., *Pastinaca hirsuta* Pančič (Bal), *Peucedanum alsaticum* L., *P. officinale* L. (M), *P. vittijugum* Boiss. (Bal), *Physospermum cornubiense* (L.) DC., *Pimpinella saxifraga* L. (M), *P. tragium* Vill., *Sanicula europaea* L. (M), *Seseli libanotis* (L.) Koch, *S. peucedanoides* (M. Bieb.) Koso-Pol., *S. rigidum* Waldst. & Kit. (M), *Smyrniium perfoliatum* L., *Tordylium maximum* L. (M), *Torilis arvensis* (Hudson) Link (M), *T. japonica* (Houtt.) DC., *T. leptophylla* (L.) Rchb. f., *Trinia glauca* (L.) Dumort., *T. ramosissima* (Fisch. ex Trev.) Koch, *Turgenia latifolia* (L.) Hoffm.; **Apocynaceae:** *Vinca herbacea* Waldst. & Kit. (M); **Araliaceae:** *Hedera helix* L. (M, T); **Aristolochiaceae:** *Aristolochia clematitis* L. (M), *Asarum europaeum* L. (M); **Asclepiadaceae:** *Cynanchum acutum* L., *Vincetoxicum hirundinaria* Medicus (M); **Asteraceae:** *Achillea ageratifolia* (Sm) Boiss (Bal), *A. clypeolata* Sm. (M, Bal), *A. coarctata* Poir., *A. collina* J. Becker ex Rchb., *A. crithmifolia* Waldst. & Kit., *A. distans* Waldst. & Kit. ex Willd., *A. grandifolia* Friv. (M), *A. millefolium* L. (M), *A. multifida* (DC.) Boiss., *A. nobilis* L. (M), *A. setacea* Wadst. & Kit., *Anthemis arvensis* L., *A. austriaca* Jacq., *A. carpatica* Willd., *A. cotula* L., *A. rumelica* (Velen.) Stoj. & Acht. (Bul), *A. ruthenica* M. Bieb., *A. tenuiloba* (DC.) R. Fern., *A. virescens* Velen. (Bul), *Arctium lappa* L., *A. minus* Bernh. (M), *A. nemorosum* Lej. (M), *Artemisia absinthium* L. (M), *A. vulgaris* L. (M), *Aster amellus* L., *Carduus acanthoides* L. (M), *C. candicans* Waldst. & Kit., *C. hamulosus* Ehrh., *C. nutans* L., *C. thracicus* (Velen.) Hayek (Bal), *Carlina acanthifolia* All. (M), *C. vulgaris* L. (M), *Carthamus lanatus* L. (M), *Centaurea affinis* Friv., *C. apiculata* Ledeb., *C. chrysolepis* Vis. (Bal), *C. diffusa* Lam., *C. euxina* Velen. (Bul), *C. gracilentata* Velen., *C. jacea* L., *C. napulifera* Rochel, *C. orientalis* L., *C. pallidior* Halácsy (Bal), *C. phrygia* L., *C. rutifolia* Sm. (Bal), *C. salonitana* Vis., *C. scabiosa* L., *C. stenolepis* A. Kern., *C. stoebe* L., *C. thirkei* Sch. Bip., *C. triumfetti* All., *Cephalorrhynchus tuberosus* (Steven) Schchian, *Chondrilla juncea* L., *Cichorium inthybus* L. (M), *Cirsium appendiculatum* Griseb. (Bal), *C. arvense* (L.) Scop., *C. ligulare* Boiss., *C. oleraceum* (L.) Scop., *C. pannonicum* (L. f.) Link, *C. vulgare* (Savi) Ten., *Cota tinctoria* L. (M), *Crepis biennis* L., *C. foetida* L., *C. sancta* (L.) Babc., *C. setosa* Haller f., *Crupina vulgaris* Cass., *Doronicum columnae* Ten. (M), *D. hungaricum* Rchb., *D. orientale* Hoffm., *Echinops ritro* L., *E. sphaerocephalus* L. (M), *Erigeron annuus* (L.) Pers., *Eupatorium cannabinum* L., *Filago eriocephala* Guss., *F. vulgaris* Lam. (M), *Hieracium cymosum* L., *H. echioides* Lumn., *H. gentile* Jord. ex Boreau, *H. hoppeanum* Schult., *H. murorum* L., *H. olympicum* Boiss., *H. pilosella* L. (M), *H. pilo-*

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selloides Vill., *H. pilosissimum* Friv., *H. praealtum* Vill. ex Goch., *H. racemosum* Waldst. & Kit., *H. sparsum* Friv., *H. umbellatum* L., *H. viosum* Pall., *Hypochaeris glabra* L., *H. maculata* L. (M), *H. radicata* L. (M), *Inula ascher-soniana* Janka (M), *I. britannica* L., *I. coryza* L., *I. ensifolia* L. (M), *I. germanica* L. (M), *I. hirta* L., *I. oculus-chris-ti* L., *I. salicina* L., *Jurinea consanguinea* DC., *J. mollis* (L.) Rchb., *Lactuca aurea* (Sch. Bip. ex Pančič) Stebbins, *L. perennis* L., *L. quercina* L., *L. serriola* L. (M), *L. viminea* (L.) J. & C. Presl., *Lapsana communis* L., *Leontodon au-tumnalis* L., *L. crispus* Vill., *L. hispidus* L., *Leucanthemum vulgare* Lam. (M), *Logfia arvensis* (L.) Holub, *L. mini-ma* (Sm.) Dumort., *Matricaria chamomilla* L., *M. perforata* Mérat, *Mycelis muralis* (L.) Dumort., *Petasites hybri-dus* (L.) Gaertn. (M), *Prenanthes purpurea* L., *Scorzonera austriaca* Willd., *S. hispanica* L. (M), *S. lanata* (L.) Hoffm., *S. mollis* M. Bieb., *Senecio jacobaea* L. (M), *S. nemorensis* L. (M), *S. papposus* (Rchb.) Less., *S. vernalis* Waldst. & Kit., *Serratula tinctoria* L., *Solidago virgaurea* L. (M), *Sonchus oleraceus* L., *Tanacetum corymbosum* (L.) Sch. Bip., *T. parthenium* (L.) Sch. Bip., *T. vulgare* L. (M), *Taraxacum officinale* L. (M), *Telekia speciosa* (Schreb.) Baumg. (M), *Tragopogon balcanicum* Velen., *T. dubius* Scop., *T. porrifolius* L., *T. pratensis* L. (M), *Tussilago farfara* L. (M), *Xanthium spinosum* L. (M), *Xeranthemum annuum* L. (M), *X. cylindraceum* Sm.; **Berberidaceae:** *Berberis vulgaris* L. (M); **Betulaceae:** *Alnus glutinosa* (L.) Gaertn. (M, T), *Betula pendula* Roth (M, T), *Carpinus betulus* L. (M, T), *C. orientalis* Mill. (T), *Corylus avellana* L. (M, T), *C. colurna* L.; **Boraginaceae:** *Anchusa barrelieri* (All.) Vitman, *A. hybrida* Ten., *A. procera* Besser, *Buglossoides arvensis* (L.) I. M. Johnst. (M), *B. purpureoacerulea* (L.) I. M. Johnst. (M), *B. sibthorpiana* (Griseb.) Czerep., *Cerinthe minor* L. (M), *Cynoglossum montanum* L., *C. officina-le* L. (M), *Echium vulgare* L. (M), *Heliotropium europaeum* L. (M), *Lappula marginata* (M. Bieb.) Gürke, *L. squar-rosa* (Retz.) Dumort., *Lithospermum officinale* L. (M), *Myosotis arvensis* (L.) Hill, *M. nemorosa* Besser, *M. ramo-sissima* Rochel, *M. scorpioides* L., *M. stricta* Link ex Roem. & Schult., *M. sylvatica* Ehrh. ex Hoffm., *Neatostema apulum* (L.) I. M. Johnst., *Nonea atra* Griseb., *N. pulla* (L.) DC., *Onosma arenaria* Waldst. & Kit., *O. aucherana* DC., *O. thracica* Velen. (Bal), *O. visianii* Clementi, *Pulmonaria officinalis* L. (M), *Symphytum bulbosum* Schim., *S. ottomanum* Friv., *S. tuberosum* L., *Trachystemon orientalis* (L.) G. Don; **Brassicaceae:** *Aethionema arabicum* (L.) Andr. ex O. E. Schulz (T), *A. saxatile* (L.) R. Br., *Alliaria petiolata* (M. Bieb.) Cavara & Grande (M), *Alys-soides utriculata* (L.) Moench, *Alyssum alyssoides* (L.) L. (M), *A. hirsutum* M. Bieb., *A. montanum* L., *A. murale* Waldst. & Kit., *A. rostratum* Steven, *A. strigosum* Banks & Sol., *A. tortuosum* Willd., *A. turkestanicum* Regel & Schmalh., *Arabis auriculata* Lam., *A. glabra* (L.) Bernh., *A. nova* Vill., *A. sagittata* (Bertol.) DC., *A. turrita* L., *Au-rynina saxatilis* (L.) Desv., *Camelina sativa* (L.) Crantz, *Capsella bursa-pastoris* (L.) Medicus (M), *Cardamine bul-bifera* (L.) Crantz (M), *Cardaria draba* (L.) Desv., *Clypeola jonthlaspi* L., *Draba lasiocarpa* Rochel, *Erophila verna* (L.) Chevall., *Erysimum cuspidatum* (M. Bieb.) DC., *E. diffusum* Ehrh., *Fibigia clypeata* (L.) Medicus, *Iberis sax-atilis* L. (T), *Lunaria annua* L., *L. rediviva* L. (M), *Neslia paniculata* (L.) Desv., *Rorippa pyrenaica* (L.) Rchb., *R. thracica* (Griseb.) Fritsch, *Sisymbrium altissimum* L., *S. orientale* L., *Thlaspi goesingense* Halácsy, *T. kovatsii* Heuff., *T. perfoliatum* L., *T. praecox* Wulfen; **Campanulaceae:** *Asyneuma anthericoides* (Janka) Bornm. (Bal), *A. canes-cens* (Waldst. & Kit.) Griseb. et Schenk, *A. limonifolium* (L.) Janch., *Campanula bononiensis* L., *C. cervicaria* L., *C. glomerata* L., *C. grossekii* Heuff., *C. jordanovii* Ančev & Kovanda (Bal), *C. lanata* Friv. (M, Bal, T), *C. lingula-ta* Waldst. & Kit., *C. macrostachya* Waldst. & Kit., *C. persicifolia* L. (M), *C. phrygia* Jaub. & Spach, *C. rapuncu-loides* L., *C. rapunculus* L., *C. rotundifolia* L. (G), *C. sibirica* L., *C. sparsa* Friv., *C. trachelium* L., *Jasione heldreichii* Boiss. & Orph.; **Capparidaceae:** *Cleome ornithopodioides* L.; **Caprifoliaceae:** *Lonicera nigra* L. (T), *Sambucus eb-ulus* L. (M), *S. nigra* L. (M), *Viburnum lantana* L. (T), *V. opulus* L. (M); **Caryophyllaceae:** *Arenaria leptoclados* (Rchb.) Guss., *A. serpyllifolia* L., *Bufonia tenuifolia* L., *Cerastium banaticum* (Rochel) Heuff., *C. brachypetalum* Pers., *C. fontanum* Baumg., *C. glomeratum* Thuill., *C. perfoliatum* L., *C. pumilum* Curtis, *C. rectum* Friv. (Bal), *C. tauricum* Spreng., *C. velenovskyi* Hayek (Bul), *Dianthus cartusianorum* L., *D. cruentus* Griseb., *D. giganteus* D'Urv., *D. moesiacus* Vis. & Pančič (Bal), *D. petraeus* Waldst. & Kit., *D. pinifolius* Sm., *D. superbus* L., *Gypsophi-la glomerata* Pall. ex M. Bieb., *G. muralis* L., *Herniaria hirsuta* L. (M), *H. incana* Lam. (M), *Holosteum umbella-tum* L., *Lychnis coronaria* (L.) Desr. (M), *Minuartia bulgarica* (Velen.) Graebn. (Bal), *M. caespitosa* (Ehrh.) De-gen, *M. garckeana* (Asch. & Graebn.) Mattf., *M. glomerata* (M. Bieb.) Degen, *M. hirsuta* (M. Bieb.) Hand.-Mazz., *M. hybrida* (Vill.) Schischk., *M. recurva* (All.) Schinz. & Thell., *M. setacea* (Thuill.) Hayek (M), *M. viscosa*

Appendix 1. Continuation.

(Schreb.) Schinz & Thell., *Moehringia grisebachii* Janka (Bal), *M. jankae* Griseb. ex. Janka (Bal), *M. trinervia* (L.) Clairv., *Moenchia mantica* (L.) Bartl., *Paronychia cephalotes* (M. Bieb.) Besser, *P. kapela* (Hacq.) A. Kern., *Petrorhagia prolifera* (L.) P. W. Ball & Heywood, *Queria hispanica* L., *Saponaria glutinosa* M. Bieb., *S. officinalis* L. (M), *Scleranthus annuus* L. (M), *S. dichotomus* Schur, *S. perennis* L. (M), *Silene alba* (Mill.) E. Krause, *S. bupleuroides* Chater & Walters, *S. compacta* Fisch., *S. dichotoma* Ehrh., *S. flavescens* Waldst. & Kit., *S. italica* (L.) Pers., *S. lerchenfeldiana* Baumg., *S. otites* (L.) Wibel (M), *S. saxifraga* L., *S. supina* M. Bieb., *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. waldsteinii* Griseb. (Bal), *Spergula arvensis* L., *Stellaria alsine* Grimm, *S. graminea* L. (M), *S. holostea* L., *S. media* (L.) Vill. (M), *S. nemorum* L., *Viscaria vulgaris* Röhl. (M); **Celastraceae:** *Euonymus europaeus* L. (M), *E. latifolius* (L.) Mill., *E. verrucosus* Scop. (M); **Chenopodiaceae:** *Atriplex hastata* L., *Chenopodium album* L. (M), *Ch. botrys* L. (M), *Ch. foliosum* Asch. (M), *Ch. rubrum* L. (M); **Cistaceae:** *Fumana procumbens* (Dunal) Gren. & Godr., *Helianthemum nummularium* (L.) Mill., *H. salicifolium* (L.) Mill., *Rhodax canus* (L.) Fuss; **Convolvulaceae:** *Calystegia sepium* (L.) R. Br. (M), *C. silvatica* (Kit.) Griseb., *Convolvulus arvensis* L. (M), *C. cantabrica* L.; **Cornaceae:** *Cornus mas* L. (M), *C. sanguinea* L.; **Crassulaceae:** *Sedum acre* L. (M), *S. album* L. (M), *S. anopetalum* DC., *S. caespitosum* (Cav.) DC., *S. hispanicum* L., *S. maximum* (L.) Suter (M), *S. pallidum* M. Bieb., *S. rubens* L., *S. urvillei* DC., *Sempervivum erythraeum* Velen., *S. leucanthum* Pančič (Bul), *S. marmoreum* Griseb. (M), *S. zeleborii* Schott; **Cuscutaceae:** *Cuscuta approximata* Bab., *C. europaea* L. (M), *C. lupuliformis* Krock., *C. monogyna* Vahl, *C. planiflora* Ten.; **Dipsacaceae:** *Cephalaria uralensis* (Murr.) Roem. & Schult., *Dipsacus laciniatus* L., *Knautia arvensis* (L.) Coult. (M), *K. macedonica* Griseb., *K. orientalis* L., *Pterocephalus papposus* (L.) Coult., *Scabiosa columbaria* L., *S. ochroleuca* L. (M), *S. triniifolia* Friv. (Bal); **Elaeagnaceae:** *Elaeagnus angustifolia* L. (M); **Euphorbiaceae:** *Euphorbia agraria* M. Bieb., *E. amygdaloides* L. (M), *E. cyparissias* L. (M), *E. esula* L., *E. helioscopia* L., *E. myrsinites* L. (M), *E. nicaeensis* All., *E. plathyphyllos* L., *E. polychroma* A. Kern., *E. salicifolia* Host, *E. serrulata* Thuill., *E. taurinensis* All., *Mercurialis ovata* Sternb. & Hoppe, *M. perennis* L. (M); **Fabaceae:** *Amorpha fruticosa* L., *Anthyllis montana* L., *A. vulneraria* L. (M), *Astracantha thracica* (Griseb.) Podl. (T), *Astragalus angustifolius* Lam., *A. depressus* L., *A. glycyphyllos* L. (M), *A. hamosus* L., *A. monspessulanus* L., *A. onobrychis* L., *A. spruneri* Boiss., *Bituminaria bituminosa* (L.) Stirt. (M), *Chamaecytisus albus* (Hack.) Rothm. (M), *Ch. calcareus* (Velen.) Kuzmanov (Bal, T), *Ch. ciliatus* (Wahlenb.) Rothm., *Ch. frivaldszkyanus* (Degen) Kuzmanov (Bul, T), *Ch. hirsutus* (L.) Link (M), *Ch. polytrichus* (M. Bieb.) Rothm., *Ch. pygmaeus* (Willd.) Rothm., *Ch. supinus* (L.) Link, *Chamaespartium sagittale* (L.) Gibbs (M), *Colutea arborescens* L. (M, T), *Coronilla elegans* L., *C. emerus* L., *C. scorpioides* (L.) C. Koch (M), *C. varia* L. (M), *Corothamnus rectipilosus* (Adamović) Skalická (T), *Dorycnium herbaceum* Vill., *Genista carinalis* Griseb., *G. depressa* M. Bieb., *G. januensis* Viv., *G. lydia* Boiss., *G. ovata* Waldst. & Kit. (M), *G. rumelica* Velen. (Bal, T), *G. sessilifolia* DC., *G. tinctoria* L. (M), *Hippocrepis comosa* L., *Lathyrus aphaca* L., *L. aureus* (Steven) Brândză, *L. digitatus* (M. Bieb) Fiori, *L. hirsutus* L., *L. laxiflorus* (Desf.) Kuntze, *L. niger* (L.) Bernh. (M), *L. nissolia* L., *L. pratensis* L. (M), *L. sphaericus* Retz., *L. venetus* (Mill.) Wohlf., *L. vernus* Bernh. (M), *Lembotropis nigricans* (L.) Griseb., *Lotus angustissimus* L., *L. corniculatus* L. (M), *Medicago arabica* (L.) Huds., *M. falcata* L., *M. lupulina* L., *M. minima* (L.) Bartal., *M. orbicularis* All., *M. rhodopea* Velen. (Bul), *M. rigidula* (L.) All., *M. sativa* L., *Melilotus alba* Medicus (M), *M. neapolitana* Ten., *M. officinalis* (L.) Pall. (M), *Onobrychis alba* (Waldst. & Kit.) Desv., *O. arenaria* (Kit.) DC., *O. degenii* Dörfl. (Bal), *O. gracilis* Besser, *O. lasiostachya* Boiss., *O. viciifolia* Scop., *Ononis adenotricha* Boiss., *O. arvensis* L., *O. pusilla* L., *O. spinosa* L. (M), *Robinia pseudoacacia* L., *Trifolium alpestre* L. (M), *T. angustifolium* L., *T. arvense* L. (M), *T. aureum* Pollich, *T. campestre* Schreb., *T. dubium* Sibth., *T. echinatum* M. Bieb., *T. heldreichianum* Hausskn., *T. hirtum* All., *T. hybridum* L., *T. incarnatum* L., *T. medium* L., *T. michelianum* Savi, *T. montanum* L., *T. ochroleucon* Huds., *T. pallidum* Waldst. & Kit., *T. pannonicum* Jacq. (M), *T. patens* Schreb., *T. pratense* L. (M), *T. purpureum* Loisel., *T. repens* L. (M), *T. scabrum* L., *T. striatum* L., *T. strictum* L., *Vicia bythinica* (L.) L., *V. cassubica* L., *V. cracca* L. (M), *V. dalmatica* A. Kern., *V. grandiflora* Scop. (M), *V. hirsuta* (L.) Gray, *V. laeta* Ces., *V. lathyroides* L., *V. narbonensis* L., *V. pannonica* Crantz, *V. sativa* L. (M), *V. sepium* L., *V. striata* M. Bieb., *V. tenuifolia* Roth, *V. tetrasperma* (L.) Schreb., *V. varia* Host, *V. villosa* Roth; **Fagaceae:** *Fagus sylvatica* L. (M), *Quercus cerris* L. (T), *Q. coccifera* L. (M, T), *Q. dalechampii* Ten. (T), *Q. frainetto* Ten. (M), *Q. petraea* (Mattuschka) Liebl., *Q. pubescens* Willd. (T), *Q.*

Appendix 1. Continuation.

robur L. (M); **Gentianaceae:** *Centaurium erythraea* Raf. (M), *Gentiana asclepiadea* L. (M), *G. cruciata* L. (M), *Gentianella bulgarica* (Velen.) Holub (M); **Geraniaceae:** *Erodium cicutarium* (L.) L'Hér. (M), *Geranium columbinum* L., *G. dissectum* L., *G. divaricatum* Ehrh., *G. lucidum* L., *G. macrorrhizum* L. (M), *G. molle* L., *G. phaeum* L., *G. purpureum* Vill., *G. pyrenaicum* Burm. f. (M), *G. robertianum* L. (M), *G. rotundifolium* L., *G. sanguineum* L. (M), *G. sylvaticum* L. (M); **Globulariaceae:** *Globularia aphyllanthes* Crantz (M); **Hypericaceae:** *Hypericum aucheri* Jaub. & Spach, *H. hirsutum* L., *H. hyssopifolium* Chaix, *H. maculatum* Crantz (M), *H. montbretii* Spach, *H. olympicum* L., *H. perforatum* L. (M), *H. richerii* Vill., *H. rumeliacum* Boiss., *H. tetrapterum* Fr., *H. umbellatum* A. Kern.; **Juglandaceae:** *Juglans regia* L. (T); **Lamiaceae:** *Acinos alpinus* (L.) Moench, *A. arvensis* (Lam.) Dandy (M), *A. rotundifolius* Pers., *Ajuga chamaepitys* (L.) Schreb. (M), *A. genevensis* L., *A. laxmanii* (L.) Benth. (M), *A. reptans* L., *Ballota nigra* L. (M), *Betonica bulgarica* Degen & Nejceff (Bul), *B. officinalis* L. (M), *Calamintha nepeta* (L.) Savi (M), *C. sylvatica* Bromf., *Clinopodium vulgare* L. (M), *Galeopsis speciosa* Mill. (M), *G. tetrahit* L. (M), *Glechoma hederacea* L. (M), *G. hirsuta* Waldst. & Kit. (M), *Lamium amplexicaule* L., *L. galeobdolon* (L.) L., *L. garganicum* L., *L. maculatum* L. (M), *L. purpureum* L. (M), *Marrubium peregrinum* L. (M), *M. vulgare* L. (M), *Melissa officinalis* L., *Melittis melissophyllum* L. (M), *Mentha aquatica* L. (M), *M. arvensis* L. (M), *M. longifolia* (L.) Huds. (M), *M. spicata* L. (M), *Micromeria frivaldszkyana* (Degen) Velen. (Bul), *Nepeta cataria* L. (M), *N. nuda* L., *Origanum vulgare* L. (M), *Phlomis tuberosa* L. (M), *Prunella grandiflora* (L.) Scholler, *P. laciniata* (L.) L., *P. vulgaris* L. (M), *Salvia amplexicaulis* Lam., *S. glutinosa* L. (M), *S. nemorosa* L. (M), *S. pratensis* L. (M), *S. ringens* Sm. (Bal), *S. sclarea* L. (M), *S. verticillata* L. (M), *S. viridis* L., *Satureja coerulea* Janka, *S. montana* L. (M), *Scutellaria albida* L., *S. altissima* L. (M), *S. columnae* All., *S. orientalis* L., *Sideritis montana* L. (M), *Stachys angustifolia* M. Bieb., *S. germanica* L. (M), *S. recta* L. (M), *S. sylvatica* L. (M), *Teucrium chamaedrys* L. (M), *T. montanum* L. (M), *T. polium* L. (M), *Thymus callieri* Borbás ex Velen. (M), *T. jankae* Čelak, *T. leucotrichus* Halácsy, *T. longedentatus* (Degen & Urum.) Ronniger (M, Bal, T), *T. moesiacus* Velen., *T. pulegioides* L. (M), *T. sibthorpii* Benth. (M), *T. sibthorpii x pannonicus*, *T. striatus* Vahl (M), *T. zygoides* Griseb.; **Linaceae:** *Linum austriacum* L., *L. catharticum* L. (M), *L. hirsutum* L., *L. tenuifolium* L.; **Lythraceae:** *Lythrum salicaria* L. (M); **Malvaceae:** *Alcea heldreichii* (Boiss.) Boiss., *Lavatera thuringiaca* L. (M), *Malva sylvestris* L. (M); **Monotropaceae:** *Monotropa hypopitys* L. (M); **Oleaceae:** *Fraxinus excelsior* L. (M, T), *F. ornus* L. (M, T), *Jasminum fruticans* L. (T), *Ligustrum vulgare* L. (M), *Syringa vulgaris* L. (M, T); **Onagraceae:** *Circaea luteciana* L., *Epilobium angustifolium* L. (G), *E. hirsutum* L., *E. montanum* L., *E. tetragonum* L.; **Orobanchaceae:** *Orobanche alba* Stephan ex Willd., *O. arenaria* Borkh., *O. lutea* Baumg.; **Paeoniaceae:** *Paeonia peregrina* Mill. (M); **Papaveraceae:** *Chelidonium majus* L. (M), *Corydalis marschalliana* (Pall.) Pers., *C. slivenensis* Velen., *C. solida* (L.) Schwarz. (M), *Fumaria vaillantii* Loisel. (M), *Papaver dubium* L., *P. laevigatum* M. Bieb.; **Plantaginaceae:** *Plantago argentea* Chaix, *P. coronopus* L. (M), *P. lanceolata* L. (M), *P. major* L. (M), *P. media* L. (M), *P. subulata* L. (M); **Plumbaginaceae:** *Goniolimon collinum* (Griseb.) Boiss., *Plumbago europaea* L. (M); **Polygalaceae:** *Polygala comosa* Schkuhr, *P. major* Jacq. (M), *P. oxyptera* Rchb., *P. rhodopea* (Velen.) Janch. (Bal); **Polygonaceae:** *Bilderdykia convolvulus* (L.) Dumort., *B. dumetorum* (L.) Dumort., *Bistorta major* Gray (M, G), *Persicaria hydropiper* (L.) Opiz (M), *Polygonum aviculare* L. (M), *Rumex acetosa* L. (M), *R. acetosella* L. (M), *R. pulcher* L. (M), *R. sanguineus* L., *R. tuberosus* L.; **Portulacaceae:** *Portulaca oleracea* L. (M); **Primulaceae:** *Anagalis arvensis* L. (M), *Androsace maxima* L., *Cyclamen coum* Mill. (M), *Lysimachia atropurpurea* L., *L. nummularia* L. (M), *L. punctata* L., *L. vulgaris* L., *Primula acaulis* (L.) L. (M), *P. veris* L. (M); **Pyrolaceae:** *Orthilia secunda* (L.) House (M), *Pyrola minor* L.; **Ranunculaceae:** *Aconitum lycoctonum* L. (M), *Actaea spicata* L. (M), *Adonis vernalis* L. (M), *Anemone nemorosa* L. (M), *A. ranunculoides* L. (M), *A. sylvestris* L. (M), *Aquilegia nigricans* Baumg. (M), *Clematis recta* L. (M, T), *C. vitalba* L. (M, T), *Consolida hispanica* (Costa) Greuter & Burdet (M), *Delphinium fissum* Waldst. & Kit., *Helleborus odorus* Waldst. & Kit. (M), *Hepatica nobilis* Mill. (M), *Isopyrum thalictroides* L. (M), *Myosurus minimus* L., *Nigella arvensis* L. (M), *Pulsatilla halleri* (All.) Willd., *P. montana* (Hoppe) Rchb., *Ranunculus acris* L., *R. auricomus* L., *R. bulbosus* L., *R. ficaria* L. (M), *R. illyricus* L., *R. millefoliatus* Vahl, *R. pedatus* Waldst. & Kit., *R. polyanthemus* L. (M), *R. repens* L. (M), *R. velutinus* Ten., *R. villosus* DC., *Thalictrum aquilegifolium* L. (M), *T. minus* L. (M), *T. simplex* L.; **Resedaceae:** *Reseda lutea* L. (M); **Rhamnaceae:** *Frangula alnus* Mill. (M), *Paliurus spina-christi* Mill. (M, T), *Rhamnus catharticus* L. (M), *R. saxa-*

Appendix 1. Continuation.

tilis Jacq.; **Rosaceae:** *Agrimonia eupatoria* L. (M), *Amelanchier ovalis* Medicus, *Amygdalus nana* L., *Aremonia agrimonoides* (L.) DC., *Cotoneaster integerrimus* Medicus, *C. nebrodensis* (Guss.) C. Koch, *C. niger* (Thunb.) Fr., *Crataegus monogyna* Jacq. (M), *C. pentagyna* Waldst. & Kit. (M), *Filipendula vulgaris* Moench (M), *Fragaria vesca* L. (M), *F. viridis* Duchesne, *Geum urbanum* L. (M), *Malus sylvestris* Mill. (M), *Mespilus germanica* L. (T), *Potentilla argentea* L. (M), *P. astracantha* Jacq., *P. erecta* (L.) Raeusch. (M), *P. inclinata* Vill., *P. laciniata* Waldst. & Kit. ex Nestl., *P. micrantha* Ramond ex DC., *P. mollicrinis* (Borbás) Stankov, *P. neglecta* Baumg., *P. obscura* Willd., *P. pedata* Willd., *P. pilosa* Willd., *P. pindicola* (Nyman) Hauskn., *P. reptans* L. (M), *P. rupestris* L. (M), *P. sulphurea* Lam., *Prunus avium* L., *P. cerasifera* Ehrh. (T), *P. mahaleb* L. (M, T), *P. spinosa* L. (M), *Pyrus amygdaliformis* Vill., *P. pyraster* Burgsd., *Rosa canina* L., *R. glauca* Pourret, *R. micrantha* Borrer ex Sm., *R. pimpinellifolia* L., *Rubus caesius* L. (M), *R. canescens* DC., *R. hirtus* Waldst. & Kit. (M), *R. idaeus* L. (M), *R. sanguineus* Friv., *R. thyranthus* Focke, *Sanguisorba minor* Scop. (M), *Sorbus aria* (L.) Crantz, *S. aucuparia* L. (M), *S. domestica* L. (M), *S. graeca* (Spach) Kotschy, *S. torminalis* (L.) Crantz (M), *S. umbellata* (Desf.) Fritsch; **Rubiaceae:** *Asperula cynanchica* L., *A. purpurea* (L.) Ehrend., *A. rumelica* Boiss., *A. tenella* Heuff. ex Degen, *Crucianella angustifolia* L., *Cruciata glabra* (L.) Ehrend., *C. laevipes* Opiz (M), *C. pedemontana* (Bellardi) Ehrend., *Galium album* Mill., *G. aparine* L. (M), *G. divaricatum* Pourret ex Lam., *G. flavescens* Borbás, *G. glaucum* L., *G. lovicense* Urum., *G. octonarium* (Klokov) Sóo, *G. odoratum* (L.) Scop. (M), *G. paschale* Forssk., *G. pseudoaristatum* Schur, *G. tenuissimum* M. Bieb., *G. verum* L. (M), *Sherardia arvensis* L.; **Rutaceae:** *Dictamnus albus* L. (M); **Salicaceae:** *Populus alba* L. (T), *P. nigra* L. (M, T), *P. tremula* L. (M, T), *Salix alba* L. (M, T), *S. caprea* L. (M, T), *S. elaeagnos* Scop., *S. triandra* L. (T); **Santalaceae:** *Comandra elegans* (Rochel ex Rchb.) Rchb. f., *Thesium bavarum* Schrank, *T. divaricatum* Jan ex Mert & Koch, *T. dollineri* Murb.; **Saxifragaceae:** *Chrysosplenium alternifolium* L. (M), *Ribes uva-crispa* L. (M), *Saxifraga marginata* Sternb., *S. rotundifolia* L. (M), *S. tridactylites* L.; **Scrophulariaceae:** *Antirrhinum majus* L., *Digitalis grandiflora* Mill. (M), *D. lanata* Ehrh. (M), *D. viridiflora* Lindl. (Bal), *Euphrasia minima* Jacq. ex DC., *E. pectinata* Ten., *E. salisburgensis* Funck, *Lathraea squamaria* L. (M), *Linaria genistifolia* (L.) Mill., *L. pelisseriana* (L.) Mill., *L. vulgaris* Mill. (M), *Melampyrum arvense* L., *M. cristatum* L., *M. pratense* L., *M. sylvaticum* L., *Odontites serotina* (Lam.) Dumort., *Pedicularis comosa* L., *P. moesiaca* Standl. (Bal), *Rhinanthus minor* L. (M), *R. rumelicus* Velen., *R. wagneri* Degen, *Scrophularia canina* L. (M), *S. nodosa* L. (M), *S. umbrosa* Dumort., *Verbascum abietinum* Borbás, *V. adrianopolitanum* Podp. (Bal), *V. densiflorum* Bertol. (M), *V. humile* Janka (Bal), *V. phoeniceum* L. (M), *Veronica acinifolia* L., *V. arvensis* L. (M), *V. austriaca* L. (M), *V. chamaedrys* L. (M), *V. cymbalaria* Bernh., *V. hederifolia* L., *V. montana* L., *V. multifida* L., *V. officinalis* L. (M), *V. orchidea* Crantz, *V. prostrata* L. (M), *V. teucrium* L., *V. triphyllus* (Opiz) A. Kern., *V. verna* L.; **Simaroubaceae:** *Ailanthus altissima* (Mill.) Swingle; **Solanaceae:** *Atropa bella-donna* L. (M), *Datura stramonium* L. (M), *Hyoscyamus niger* L. (M), *Physalis alkekengii* L. (M), *Solanum dulcamara* L. (M), *S. nigrum* L. (M); **Staphyleaceae:** *Staphylea pinnata* L. (T); **Tamaricaceae:** *Tamarix tetrandra* Pall. ex M. Bieb. (M); **Thymelaeaceae:** *Thymelaea bulgarica* Cheskm. (Bul), *T. passerina* (L.) Coss. & Germ.; **Tiliaceae:** *Tilia cordata* Mill. (M), *T. platyphyllos* Scop. (M), *T. tomentosa* Moench (M); **Ulmaceae:** *Celtis australis* L. (M, T), *Ulmus glabra* Huds. (M), *U. laevis* Pall. (T), *U. minor* Mill. (M, T); **Urticaceae:** *Parietaria lusitanica* L. (M), *Urtica dioica* L.; **Valerianaceae:** *Valeriana officinalis* L. (M), *Valerianella coronata* (L.) DC. (M), *V. costata* (Steven) Betcke, *V. pumila* (L.) DC.; **Verbenaceae:** *Verbena officinalis* Voss. (M); **Violaceae:** *Viola aetolica* Boiss. & Heldr. (Bal), *V. alba* Besser, *V. ambigua* Waldst. & Kit., *V. arvensis* Murr., *V. canina* L., *V. dacica* Borbás, *V. hirta* L. (M), *V. kitaibeliana* Schult., *V. mirabilis* L., *V. odorata* L. (M), *V. reichenbachiana* Jord. ex Boreau, *V. riviniana* Rchb., *V. sieheana* Becker, *V. tricolor* L. (M); **Vitaceae:** *Vitis sylvestris* C. C. Gmel. (T)

Classis Monocotyledonae (Liliopsida)

Amaryllidaceae: *Galanthus elwesii* Hook. f. (M); **Araceae:** *Arum maculatum* L. (M), *A. orientale* M. Bieb.; **Cyperaceae:** *Carex acutiformis* Ehrh., *C. caryophyllea* Latourr., *C. depauperata* Curtis ex With., *C. digitata* L., *C. distans* L., *C. divulsa* Stokes, *C. flacca* Schreb., *C. hallerana* Asso, *C. hirta* L., *C. humilis* Leyss., *C. liparocarpos* Gaudin, *C. melanostachya* M. Bieb. ex Willd., *C. montana* L., *C. otrubae* Podp., *C. ovalis* Good., *C. pallascens*

Appendix 1. Continuation.

L., *C. panicea* L., *C. paniculata* L., *C. pendula* Huds., *C. pilosa* Scop., *C. praecox* Schreb., *C. remota* L., *C. spicata* Huds., *C. sylvatica* Huds., *C. tomentosa* L., *Eleocharis palustris* (L.) R. Br., *E. uniglumis* (Link) Schult., *Eriophorum latifolium* Hoppe (M), *Holoschoenus vulgaris* Link, *Schoenoplectus mucronatus* (L.) Palla, *Scirpus sylvaticus* L.; **Dioscoreaceae:** *Tamus communis* L. (M); **Iridaceae:** *Crocus biflorus* Mill., *C. flavus* Weston, *C. olivieri* J. Gay, *C. pallasi* Goldb. (M), *Gladiolus illyricus* Koch, *G. imbricatus* L. (M), *Iris graminea* L. (M), *I. reichenbachii* Heuff., *I. sintenisii* Janka, *I. suaveolens* Boiss. & Reut., *I. variegata* L.; **Juncaceae:** *Juncus conglomeratus* L., *J. effusus* L., *J. inflexus* L. (M), *Luzula campestris* (L.) Lam & DC., *L. forsteri* (Sm.) DC., *L. italica* Parl., *L. luzulina* (Vill.) Dalla Torre & Sarnth., *L. luzuloides* (Lam.) Dandy, *L. multiflora* (Retz.) Lej., *L. sylvatica* (Hudson) Gaudin; **Liliaceae:** *Allium albidum* Fisch. ex M. Bieb., *A. carinatum* L., *A. flavum* L., *A. guttatum* (Steven) Regel, *A. melanatherum* Pančič (Bal), *A. paniculatum* L., *A. sphaerocephalon* L., *A. vineale* L., *Anthericum ramosum* L., *Asparagus officinalis* L. (M), *A. tenuifolius* Lam., *Asphodeline liburnica* (Scop.) Rchb., *A. lutea* (L.) Rchb., *Colchicum autumnale* L. (M), *C. davidovii* Stef. (Bul), *Convallaria majalis* L. (M), *Erythronium dens-canis* L., *Fritillaria pontica* Wahlenb., *F. skorpilii* Velen. (Bul), *Gagea lutea* (L.) Ker Gawl., *G. minima* (L.) Ker Gawl., *Hyacinthella leucophaea* (Steven ex Kunth) Schur, *Lilium martagon* L. (M), *Muscari armeniacum* Leichtlin ex Baker, *M. botryoides* (L.) Mill., *M. comosum* (L.) Mill., *M. neglectum* Guss. ex Ten., *M. tenuiflorum* Tausch, *Nectaroscordum siculum* (Ucria) Lindl. (M), *Ornithogalum comosum* L., *O. kochii* Parl., *O. montanum* Cyr., *O. nutans* L., *O. oligophyllum* Clarke, *O. pyrenaicum* L., *O. sibthorpii* Greuter, *O. umbellatum* L., *Polygonatum latifolium* (Jacq.) Desf., *P. multiflorum* (L.) All. (M), *P. odoratum* (Mill.) Druce (M), *P. verticillatum* (L.) All., *Ruscus aculeatus* L. (M, T), *Scilla autumnalis* L., *S. bifolia* L. (M), *Tulipa australis* Link, *T. urumoffii* Hayek (Bul), *Veratrum lobelianum* Bernh. (M, G); **Orchidaceae:** *Anacamptis pyramidalis* (L.) Rich. (M), *Cephalanthera damasonium* (Mill.) Druce, *C. longifolia* (L.) Fritsch, *C. rubra* (L.) Rich., *Dactylorhiza cordigera* (Fries) Sóo, *D. incarnata* (L.) Sóo, *D. kalopisii* E. Nelson (Bal), *D. saccifera* (Brongn.) Sóo, *D. sambucina* (L.) Sóo, *Epipactis atrorubens* (Hoffm.) Besser, *E. exilis* Delforge, *E. helleborine* (L.) Crantz, *E. microphylla* (Ehrh.) Sw., *E. palustris* (L.) Crantz, *E. pontica* Taubenheim, *Gymnadenia conopsea* (L.) R. Br. (M, G), *Himantoglossum caprinum* (M. Bieb.) Spreng., *Limodorum abortivum* (L.) Schwarz, *Listera ovata* (L.) R. Br., *Neottia nidus-avis* (L.) Rich., *Ophrys apifera* Huds., *O. cornuta* Steven, *O. mammosa* Desf., *Orchis coriophora* L. (M), *O. elegans* Heuff., *O. laxiflora* Lam. s. str. (M), *O. militaris* L. (M), *O. morio* L. (M), *O. pallens* L. (M), *O. pinetorum* Boiss. & Kotschy, *O. purpurea* Huds. (M), *O. simia* Lam. (M), *O. spitzelii* Saut. ex Koch (M), *O. tridentata* Scop. (M), *O. ustulata* L. (M), *Platanthera bifolia* (L.) Rich. (M), *P. chlorantha* (Custer) Rchb. (M), *Spiranthes spiralis* (L.) Chevall.; **Poaceae:** *Aegilops cylindrica* Host, *A. geniculata* Roth, *A. triuncialis* L., *Agrostis capillaris* L., *A. castellana* Boiss. & Reut., *A. gigantea* Roth, *A. stolonifera* L., *Aira elegantissima* Schur, *Alopecurus pratensis* L., *Anthoxanthum aristatum* Boiss., *A. odoratum* L. (M), *Apera spica-venti* (L.) P. Beauv., *Arrhenatherum elatius* (L.) P. Beauv. ex J. & C. Presl, *A. palaestinum* Boiss., *Avenula compressa* (Heuffel) Sauer & Chmelitschek, *A. pubescens* (Huds.) Dumort., *Bellardiochloa violacea* (Bellardi) Chiov., *Brachypodium pinnatum* (L.) P. Beauv., *B. sylvaticum* (Huds.) P. Beauv., *Briza humilis* M. Bieb., *B. media* L. (M), *Bromus arvensis* L., *B. barcensis* Simonk., *B. commutatus* Schrad., *B. inermis* Leyss., *B. japonicus* Thunb., *B. moesiacus* Velen. (Bul), *B. mollis* L., *B. racemosus* L., *B. ramosus* Huds., *B. riparius* Rehmman, *B. secalinus* L., *B. squarrosus* L., *B. sterilis* L., *B. tectorum* L., *Calamagrostis arundinacea* (L.) Roth, *C. epigeios* (L.) Roth, *Chrysopogon gryllus* (L.) Trin., *Cleistogenes serotina* (L.) Keng, *Cynodon dactylon* (L.) Pers., *Cynosurus cristatus* L., *C. echinatus* L., *Dactylis glomerata* L., *Danthonia alpina* Vest, *Dasypyrum villosum* (L.) Cand., *Dichanthium ischaemum* (L.) Roberty, *Echinochloa crus-galli* (L.) P. Beauv., *Elymus caninus* (L.) L., *E. repens* (L.) Gould., *Festuca altissima* All., *F. arundinacea* Schreb., *F. dalmatica* (Hack.) K. Richt., *F. drymeja* Mert & Koch, *F. gigantea* (L.) Vill., *F. heterophylla* Lam., *F. nigrescens* Lam., *F. pratensis* L., *F. pseudodalmatica* Krajina ex Domin, *F. pseudovina* Hack. ex Wiesb., *F. rubra* L., *F. rupicola* Heuff., *F. thracica* (Acht.) Markgr.-Dann. (Bal), *F. valesiaca* Schleich. ex Gaudin, *Hainardia cyllindrica* (Willd.) Greuter, *Holcus lanatus* L., *H. mollis* L., *Hordelymus europaeus* (L.) Harz, *Hordeum bulbosum* L., *Koeleria brevis* Steven, *K. macrantha* (Ledeb.) Schult., *K. mitruschii* Ujhelyi, *K. nitidula* Velen., *K. simonkaii* Adamović (Bal), *Lerchenfeldia flexuosa* (L.) Schur, *Lolium perenne* L., *Melica ciliata* L., *M. nutans* L., *M. uniflora* Retz., *Micropyrum tenellum* Link, *Milium effusum* L., *M. vernale* M. Bieb., *Molinia coerulea* (L.) Moench, *Nardus stricta* L., *Phleum montanum* C.

Koch, *P. phleoides* (L.) Karst., *P. pratense* L., *Phragmites australis* (Cav.) Trin. ex. Steud., *Piptatherum holciforme* (M. Bieb.) Roem. & Schult., *Poa alpina* L. (G), *P. angustifolia* L., *P. annua* L., *P. badensis* Haenke ex Willd., *P. bulbosa* L., *P. compressa* L., *P. nemoralis* L., *P. pratensis* L., *P. sylvicola* Guss., *P. trivialis* L., *Psilurus incurvus* (Gouan) Schinz & Thell., *Sesleria bielzii* Schur, *S. coeruleans* Friv., *S. latifolia* (Adamović) Degen (Bal), *S. rigida* Heuffel ex Rchb., *Setaria viridis* (L.) P. Beauv., *Sieglingia decumbens* (L.) Bernh., *Stipa capillata* L., *S. epilosa* Martinovský, *S. pennata* L., *S. pontica* P. A. Smirn., *S. pulcherrima* Koch, *Trachynia distachya* (L.) Link, *Vulpia myurus* (L.) C. C. Gmel.; **Smilacaceae**: *Smilax excelsa* L. (M, T); **Typhaceae**: *Typha angustifolia* L. (T)

Appendix 2. Conservation status of the species in Mt Slivenska's flora.

Legend:

Column 3: Ratings according to the Red List of Bulgarian Vascular Plants (Petrova & Vladimirov eds. 2009): CR – Critically Endangered; DD – Data Deficient; EN – Endangered; LC – Least Concern; NT – Nearly Threatened; VU – Vulnerable.

Column 4: Ratings according to the Red Data Book of R. Bulgaria (Peev, ed. 2011), vol. I, Plants and Fungi: EN – Endangered; CR – Critically Endangered; VU – Vulnerable.

Columns 5–8: Taxa marked with (+) are included in Appendix 3 to the Supplement Act to the Biological Diversity Act (amend. and suppl. in SG No. 76 of 19.09.2017), Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, Appendix 2 to CITES (1973), suppl. 2003, and Appendix 1 to Bern Convention (1979). Taxa marked with (–) are not listed there, respectively.

Column 9: European Red List of Vascular Plants, Appendix 2 (Bilz et al. & al. 2011): CR – Critically Endangered; DD – Data Deficient; EN – Endangered; LC – Least Concern; NT – Nearly Threatened; VU – Vulnerable.

Column 10: IUCN Red List of Threatened Plants (2017): I – Indefinite; LC – Least Concern; R – Rare; V – Vulnerable.

№	Species	Red List of BG (2009)	RDB of RB (2011)	BDA (2002, 2017)	Directive 92/43/EEC	CITES (1975)	BERN (1979)	Eur Red List (2011)	IUCN (1997)	№	Species	Red List of BG (2009)	RDB of RB (2011)	BDA (2002, 2017)	Directive 92/43/EEC	CITES (1975)	BERN (1979)	Eur Red List (2011)	IUCN (1997)
		3	4	5	6	7	8	9	10			3	4	5	6	7	8	9	10
1	<i>Acanthus balcanicus</i>	LC	-	-	-	-	-	-	-	17	<i>Anthemis rumelica</i>	VU	VU	+	-	-	-	-	R
2	<i>Adonis vernalis</i>	-	-	-	-	+	-	LC	-	18	<i>Anthemis virescens</i>	EN	EN	+	-	-	-	-	R
3	<i>Aegilops geniculata</i>	LC	-	-	-	-	-	-	-	19	<i>Apium graveolens</i>	-	-	-	-	-	-	LC	-
4	<i>Aethionema arabicum</i>	CR	CR	+	-	-	-	-	-	20	<i>Aquilegia nigricans</i>	VU	-	+	-	-	-	-	-
5	<i>Agrostis stolonifera</i>	-	-	-	-	-	-	LC	-	21	<i>Arabis nova</i>	VU	-	+	-	-	-	-	-
6	<i>Allium albidum</i>	-	-	-	-	-	-	DD	-	22	<i>Arrhenatherum elatius</i>	-	-	-	-	-	-	LC	-
7	<i>Allium carinatum</i>	-	-	-	-	-	-	LC	-	23	<i>Asparagus officinalis</i>	-	-	-	-	-	-	LC	-
8	<i>Allium flavum</i>	-	-	-	-	-	-	LC	-	24	<i>Asparagus tenuifolius</i>	-	-	-	-	-	-	LC	-
9	<i>Allium guttatum</i>	-	-	-	-	-	-	LC	-	25	<i>Astracantha thracica</i>	VU	VU	+	-	-	-	-	-
10	<i>Allium melanantherum</i>	-	-	-	-	-	-	NT	-	26	<i>Atropa bella-donna</i>	VU	-	-	-	-	-	-	-
11	<i>Allium paniculatum</i>	-	-	-	-	-	-	LC	-	27	<i>Betonica bulgarica</i>	EN	EN	+	-	-	-	-	-
12	<i>Allium sphaerocephalon</i>	-	-	-	-	-	-	LC	-	28	<i>Bromus moesiacus</i>	NT	-	-	-	-	+	DD	R
13	<i>Allium vineale</i>	-	-	-	-	-	-	LC	-	29	<i>Buglossoides sibthorpiana</i>	VU	-	-	-	-	-	-	-
14	<i>Alopecurus pratensis</i>	-	-	-	-	-	-	LC	-	30	<i>Camelina sativa</i>	-	-	-	-	-	-	DD	-
15	<i>Anacamptis pyramidalis</i>	VU	-	+	+	+	-	LC	-	31	<i>Campanula jordanovii</i>	VU	VU	+	-	-	-	-	-
16	<i>Anemone sylvestris</i>	NT	-	+	-	-	-	-	-	32	<i>Campanula lanata</i>	VU	VU	+	-	-	+	DD	R
										33	<i>Carduus thracicus</i>	VU	VU	+	-	-	-	-	R

Appendix 2. Continuation.

N ^o	Species	Red List of BG (2009)	RDB of RB (2011)	BDA (2002, 2017)	Directive 92/43/EEC	CITES (1975)	BERN (1979)	Eur Red List (2011)	IUCN (1997)
1	2	3	4	5	6	7	8	9	10
101	<i>Medicago rhodopea</i>	VU	VU	-	-	-	-	-	R
102	<i>Medicago rigidula</i>	-	-	-	-	-	-	LC	-
103	<i>Medicago sativa</i>	-	-	-	-	-	-	LC	-
104	<i>Melilotus alba</i>	-	-	-	-	-	-	LC	-
105	<i>Melilotus officinalis</i>	-	-	-	-	-	-	LC	-
106	<i>Mentha aquatica</i>	-	-	-	-	-	-	LC	-
107	<i>Mentha spicata</i>	-	-	-	-	-	-	LC	-
108	<i>Mespilus germanica</i>	LC	-	-	-	-	-	-	-
109	<i>Micromeria frivaldszkyana</i>	EN	EN	+	-	-	-	-	-
110	<i>Micropyrum tenellum</i>	NT	-	-	-	-	-	-	-
111	<i>Minuartia bulgarica</i>	VU	-	-	-	-	-	-	-
112	<i>Minuartia garckeana</i>	VU	-	-	-	-	-	-	-
113	<i>Moehringia grisebachii</i>	EN	EN	-	-	-	-	-	-
114	<i>Moehringia jankae</i>	EN	EN	+	+	-	+	DD	R
115	<i>Myosotis scorpioides</i>	-	-	-	-	-	-	LC	-
116	<i>Neottia nidus-avis</i>	-	-	-	-	+	-	LC	-
117	<i>Onobrychis degenii</i>	NT	-	-	-	-	-	-	-
118	<i>Onobrychis viciifolia</i>	-	-	-	-	-	-	LC	-
119	<i>Ononis adenotricha</i>	NT	-	-	-	-	-	-	-
120	<i>Ophrys apifera</i>	EN	EN	+	-	+	-	LC	-
121	<i>Ophrys cornuta</i>	VU	-	+	-	+	-	-	-
122	<i>Ophrys mammosa</i>	VU	-	+	-	+	-	-	-
123	<i>Orchis coriophora</i>	-	-	-	-	+	-	-	-
124	<i>Orchis elegans</i>	-	-	-	-	+	-	-	-
125	<i>Orchis laxiflora</i>	VU	-	+	-	+	-	-	-
126	<i>Orchis militaris</i>	EN	EN	+	-	+	-	LC	-
127	<i>Orchis morio</i>	-	-	-	-	+	-	-	-
128	<i>Orchis pallens</i>	-	-	-	-	+	-	LC	-
129	<i>Orchis pinetorum</i>	-	-	-	-	+	-	-	-
130	<i>Orchis purpurea</i>	-	-	-	-	+	-	LC	-
131	<i>Orchis simia</i>	-	-	-	-	+	-	LC	-
132	<i>Orchis spitzelii</i>	CR	CR	+	-	+	-	NT	-
133	<i>Orchis tridentata</i>	-	-	-	-	+	-	-	-
134	<i>Orchis ustulata</i>	VU	-	-	-	+	-	-	-
135	<i>Peucedanum vittijugum</i>	VU	-	-	-	-	-	-	-
136	<i>Phleum pratense</i>	-	-	-	-	-	-	LC	-
137	<i>Phragmites australis</i>	-	-	-	-	-	-	LC	-
138	<i>Platanthera bifolia</i>	-	-	-	-	-	-	+	LC
139	<i>Platanthera chlorantha</i>	-	-	-	-	-	-	+	LC
140	<i>Poa alpina</i>	-	-	-	-	-	-	-	LC
141	<i>Poa pratensis</i>	-	-	-	-	-	-	-	LC
142	<i>Polygala rhodopea</i>	NT	-	-	-	-	-	-	-
143	<i>Prunus avium</i>	-	-	-	-	-	-	-	LC
144	<i>Prunus cerasifera</i>	-	-	-	-	-	-	-	DD
145	<i>Prunus mahaleb</i>	-	-	-	-	-	-	-	LC
146	<i>Prunus spinosa</i>	-	-	-	-	-	-	-	LC
147	<i>Pulsatilla halleri</i>	EN	EN	+	-	-	-	+	-
148	<i>Quercus coccifera</i>	EN	EN	+	-	-	-	-	-
149	<i>Ranunculus repens</i>	-	-	-	-	-	-	-	LC
150	<i>Rorippa pyrenaica</i>	-	-	-	-	-	-	-	LC
151	<i>Rorippa thracica</i>	-	-	-	-	-	-	-	LC
152	<i>Ruscus aculeatus</i>	-	-	-	-	-	-	-	LC
153	<i>Saxifraga marginata</i>	VU	-	+	-	-	-	-	-
154	<i>Schoenoplectus mucronatus</i>	-	-	-	-	-	-	-	LC
155	<i>Scirpus sylvaticus</i>	-	-	-	-	-	-	-	LC
156	<i>Sempervivum erythraeum</i>	LC	-	-	-	-	-	-	-
157	<i>Sempervivum leucanthum</i>	DD	-	-	-	-	-	-	-
158	<i>Spiranthes spiralis</i>	VU	-	+	-	+	-	-	LC
159	<i>Thymelaea bulgarica</i>	EN	EN	-	-	-	-	-	-
160	<i>Trachystemon orientalis</i>	NT	-	-	-	-	-	-	-
161	<i>Tragopogon balcanicum</i>	LC	-	-	-	-	-	-	-
162	<i>Trifolium alpestre</i>	-	-	-	-	-	-	-	LC
163	<i>Trifolium angustifolium</i>	-	-	-	-	-	-	-	LC
164	<i>Trifolium arvense</i>	-	-	-	-	-	-	-	LC
165	<i>Trifolium hybridum</i>	-	-	-	-	-	-	-	LC
166	<i>Trifolium incarnatum</i>	-	-	-	-	-	-	-	LC
167	<i>Trifolium pallidum</i>	-	-	-	-	-	-	-	LC
168	<i>Trifolium pratense</i>	-	-	-	-	-	-	-	LC
169	<i>Trifolium repens</i>	-	-	-	-	-	-	-	LC
170	<i>Trinia glauca</i>	-	-	+	-	-	-	-	-
171	<i>Tulipa australis</i>	NT	-	+	-	-	-	-	-
172	<i>Tulipa urumoffii</i>	VU	VU	+	-	-	-	-	V

Appendix 2. Continuation.

N ^o	Species	Red List of BG (2009)	RDB of RB (2011)	BDA (2002, 2017)	Directive 92/43/EEC	CITES (1975)	BERN (1979)	Eur Red List (2011)	IUCN (1997)
1	2	3	4	5	6	7	8	9	10
173	<i>Typha angustifolia</i>	-	-	-	-	-	-	LC	-
174	<i>Urtica dioica</i>	-	-	-	-	-	-	LC	-
175	<i>Verbascum adrianopolitanum</i>	EN	EN	+	-	-	-	-	-
176	<i>Verbascum humile</i>	LC	-	-	-	-	-	-	-
177	<i>Veronica multifida</i>	CR	CR	+	-	-	-	-	-
178	<i>Vicia bythinica</i>	-	-	-	-	-	-	LC	-
179	<i>Vicia lathyroides</i>	-	-	-	-	-	-	LC	-
180	<i>Vicia pannonica</i>	-	-	-	-	-	-	LC	-
181	<i>Vicia sativa</i>	-	-	-	-	-	-	LC	-

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