Flora and vegetation of the Dervisha Managed Reserve, Bulgaria*

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Abstract. Three hundred and twenty-two species of vascular plants, belonging to 219 genera and 68 families have been recorded in the Dervisha Managed Reserve. As compared to earlier investigations, 61 species, 25 genera and two families have been added. Among the seven identified types of floristic elements, the Circumboreal (33.23 %), European (25.78 %) and Mediterranean (20.19 %) types dominate. Seven Balkan endemics and 20 relict species have been found. Analysis of life forms has shown that cryptophytes (119 species) dominate, followed by hemicryptophytes (62), therophytes (54) and phanerophytes (48). Herbaceous perennials showed the greatest abundance of species (183 species), followed by the annuals (54), trees (22) and shrubs (16). There was a significant number of anthropophytes: 192 (59.63 %). Composition of the herbaceous layer of the *Aesculus hippocastanum* community has proved much richer, as compared to the previously available data. Four new species have been recorded for the floristic region of Northeast Bulgaria.

Key words: Bulgarian flora, endemics, floristic analysis, plants with protection status, relicts, vegetation

Introduction

Dervisha Managed Reserve is situated in the NE part of Bugaria, close to the Veliki Preslav town in Mt Preslavska (Eastern Balkan Range). Its altitude ranges between 180 m and 600 m a.s.l. River Dervishka crosses its territory. The Reserve covers 11.2136 ha of the State forest fund. It was founded with the sole purpose of protecting the only natural habitat of the Balkan endemic *Aesculus hippocastanum* in Bulgaria (Decree 1342/23.10.1948 of the Ministry of Agriculture and Forestry). Subsequently, its category was changed to a Managed Reserve (Regulation RD 361/15.11.1999 of the Ministry of Environment and Waters) under the Protected Areas Act (Darzhaven Vestnik 135/1998).

According to earlier studies (Marcheva 1966; Kochev & Gorunova 1972), the flora of the Reserve comprised 261 vascular plant species, referred to 194 genera and 66 families. Kochev & Gorunova (1972) identified three associations: ass. *Aesculus hippocastanum subnudum*, ass. *Aesculus hippocastanum-Carpinus betulus* and ass. *Aesculus hippocastanum-Aegopodium podagraria*. Descriptions of the first two associations included eight tree species and six species of the undergrowth. Only eight herbaceous species were mentioned. Association *Aesculus hippocastanum-Aegopodium podagraria* had most limited distribution, comprising only four

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trees and two species in the undergrowth in its composition. The herbaceous cover was described with 10 species. The authors doubted the natural character of those chestnut communities. In his notes on the large plant formations in Bulgaria, Velenovský (1898) was the first to report the forest of Horse Chestnut trees near Preslav and was inclined to think that it resulted from self-distributed originally cultivated trees. Subsequently, Davidov (1905) reported the exact location of the forest – the valley of river Dervishka, agreeing with Velenovský on its origin. Adamović (1907) visited the same region, provided a full description of the forest composition and put in the conclusion his opinion of its natural, relict origin (an opinion shared by later authors). Avtzis & al. (2007) discovered 37 new natural locations of this Balkan paleoendemic in Greece – in the Epirus and Thessaly regions – and laid emphasis on the *Cameraria ohridella* Deschka & Dimic parasitizing on the leaves of the Horse Chestnut. Stojanov (1941) dwelt on ass. *Hippocastanetum* along the river Dervishka valley in the Preslav Divide. He reported the accompanying species, such as *Carpinus betulus*, *Ulmus minor*, *U. montana*, *Tilia grandiflora*, *Sorbus torminalis*, *Prunus avium*, *Acer pseudoplatanus*, *A. platanoides*, etc. The species *Crataegus monogyna*, *Cornus sanguinea*, *Corylus avellana*, etc. were mentioned as participating in the undergrowth. The Submediterranean element was represented by *Jasminum fruticans*, *Paliurus spina-christi*, *Staphyllea pinnata*, etc. Herbaceous vegetation included *Buglossoides purpurocaerulea*, *Symphytum tuberosum*, *Euphorbia polychroma*, etc. That association was vicariant of ass. *Carpinetum betuli*.

The purpose of the present study was to provide an upgraded inventory of the flora and vegetation in the Dervisha Managed Reserve.

Material and methods

The investigation was carried out in the period 2010–2011. Transect method was used for inventory of the flora. The taxa were determined according to Kozhuharov (1992), Delipavlov & Cheshmedzhiev (2003) and the *Flora of PR Bulgaria* (Jordanov 1963–1979; Velčev 1982, 1989; Kožuharov 1995). Life forms were given according to the system of Raunkiaer (Pavlov 2006). The *Flora of PR Bulgaria* (Jordanov 1963–1979; Velčev 1982, 1989; Kožuharov 1995) was used for their determination. Biological types were given according to Kozhuharov (1992). Floristic elements were determined according to the *Conspectus of the Bulgarian Vascular Flora* (Assyov & Petrova 2006). Balkan endemics followed Petrova & Vladimirov (2010) and relicts followed Gruev & Kuzmanov (1994), Peev & al. (1998), Boža & al. (2005). Anthropophytes were determined after Stefanov & Kitanov (1962). The conservation status was defined on the basis of Directive 92/43/EEC, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), *Red Book of PR Bulgaria* (Velchev 1984), Red List of Bulgarian vascular plants (Petrova & Vladimirov 2009), and the Biological Diversity Act (BDA).

Results

The authors identified 322 vascular plant species belonging to 219 genera and 68 families. They account for 8.42 % of the species, 24.63 % of the genera and 40.24 % of the families in Bulgaria. Our results showed a change in the number of taxa identified during earlier investigations (Marcheva 1966; Kochev & Gorunova 1972), according to which the flora of the Reserve comprised 261 vascular plant species belonging to 194 genera and 66 families. New 61 species, 25 genera and two families have been added. In our opinion, the difference was due to some rather complex reasons: both to a difference in the skills for field work of the various researchers, and to some current changes in the floristic composition, considering the fact that a period of 40 years spans the two investigations.

Most of the families, 57 (83.82 %), are represented by one to four genera. Only 11 (16.18 %) of them comprise five or more genera. The families with the greatest number of genera were: *Asteraceae* (29), *Poaceae* (20), *Apiaceae* (18), *Lamiaceae* (18), *Fabaceae* (13), and *Rosaceae* (12). Most families, 54 (79.41 %), have one to four species. Only 14 (20.59 %) families are represented by five or more species. The families with the greatest number of species are: *Asteraceae* (44), *Poaceae* (28), *Lamiaceae* (24), *Apiaceae* (22), *Fabaceae* (22), *Rosaceae* (19), and *Scrophulariaceae* (12). Most genera, 215 (98.17 %), are represented by one to four species. Only four genera (1.83 %) have five or more species: *Centaurea* (6), *Trifolium* (6), *Acer* (5), and *Rumex* (5).

The specific physical and geographic conditions determine the considerable diversity of floristic elements. Seven types of floristic elements have

been identified: Mediterranean (20.19 %), European (25.78 %), Pontic (7.14 %), Circumboreal (33.23 %), Cosmopolitan (7.76 %), Adventive (1.24 %), and Balkan Endemic and Subendemic (4.35 %). This division could be explained by the Reserve's location in the Transitional Continental Climate Zone. Seven Balkan endemics have been identified: *Acer heldreichii*, *Achillea clypeolata*, *Aesculus hippocastanum*, *Genista rumelica*, *Pastinaca hirsuta*, *Salvia ringens*, and *Scabiosa triniifolia*. Proximity to the Temperate Continental Zone explains the prevalence of Circumboreal and European floristic elements. On the other hand, the influence of the Continental Mediterranean Zone in the direction of the city of Varna creates conditions for development of a large number of Mediterranean species.

A considerable number of relict species has been identified: 20 (6.21 %). Most were Tertiary relicts: *Acer campestre*, *A. hyrcanum*, *A. pseudoplatanus*, *Aesculus hippocastanum*, *Carpinus betulus*, *C. orientalis*, *Cercis siliquastrum*, *Clematis vitalba*, *Corylus avellana*, *Cotinus coggygria*, *Fraxinus ornus*, *Hedera helix*, *Pastinaca umbrosa*, *Phragmites australis*, *Ruscus aculeatus*, *R. hypoglossum*, *Salix fragilis*, *U. laevis*, and *Ulmus minor*. There was also one Quaternary relict species: *Galanthus nivalis*.

All life forms are represented on the territory of the Reserve. Most taxa are cryptophytes – 119 species (36.96 %). This could be explained with prevalence of forest habitats, where most plants forming the herbaceous floor are cryptophytes. The great proportion of hemicryptophytes – 62 species (19.25 %) – is analogically explained, as well as of phanerophytes – 48 species (14.91 %). There was also a considerable number of therophytes – 54 species (16.77 %), owing to the fact that vegetation in some regions was changed by anthropomogen activity.

All biological types are represented in the Reserve, as well as almost all possible transitions between them. The results showed prevalence of herbaceous perennials – 183 species (56.83 %). They are followed by the annuals – 54 species (16.77 %), trees – 22 (6.83 %) and shrubs – 16 (4.97 %). Biennial species and transitional forms between the main biological types are represented by a lower number of species.

The species with a conservation status or regulated use from natural populations are 16 (4.97 %). Three species – *Anacamptis pyramidalis*, *Galanthus elwesii* and *G. nivalis* – are covered by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Red List of Bulgarian vascular plants (Petrova & Vladimirov 2009) includes: Endangered (EN) – three species (*Aesculus hippocastanum*, *Galanthus elwesii* and *G. nivalis*); Vulnerable (VU) – three species: *Acer heldreichii*, *Anacamptis pyramidalis* and *Pastinaca umbrosa*; Near Threatened (NT) – one species: *Cercis siliquastrum*. Three species has been evaluated as Least Concern (LC) – *Acanthus balcanicus*, *Fritillaria pontica* and *Pulmonaria mollis*. Five species are included in the *Red Book of the PR Bulgaria* (Velchev 1984): two 'Endangered' species – *Aesculus hippocastanum* and *Galanthus nivalis*; three 'Rare' species – *Cercis siliquastrum*, *Fritillaria pontica* and *Pulmonaria mollis*. The Biological Diversity Act covers five species in the Protected Species category (Annex 3): *Aesculus hippocastanum*, *Anacamptis pyramidalis*, *Fritillaria pontica*, *Galanthus elwesii*, and *G. nivalis*. There are seven species under protection regime and regulated use from natural localities (Biological Diversity Act, Annex 4): *Bupleurum praealtum*, *Echinops sphaerocephalus*, *Polygonatum odoratum*, *Polystichum setiferum*, *Ruscus aculeatus*, *R. hypoglossum*, and *Scilla bifolia* L.

Four new species for the floristic region of Northeast Bulgaria have been recorded: *Achnatherum bromoides*, *Elymus elongatus*, *Festuca altissima*, and *Hieracium racemosum*.

As a result of intensive human activity in the past and presently, there is a considerable presence of anthropophytes – 192 (59.63 %): six tree species, nine shrub species, four species of the transitional shrub-trees group, and 173 herbaceous species. The Reserve is in close proximity to the villa zone of Veliki Preslav town and a micro dam. During our field investigations, we have found out that logging is under way nearby, as well as grazing of sheep and goats. Because of logging, the bed of river Dervishka was corrected in 2011, which led to silting up of part of its flow.

The *Aesculus hippocastanum* community lies mainly on the right-hand bank of river Dervishka, on a slope with western exposition and incline of 30 degrees. The community comprises the following tree and shrub species: *Acer pseudoplatanus*, *Carpinus betulus*, *C. orientalis*, *Cornus mas*, *Fraxinus ornus*, *Hedera helix*, *Rosa canina*, *Sambucus nigra*, *Sorbus torminalis*, and *Tilia tomentosa*. The gramineous are represented by *Bromus benekenii*, *Dactylis glomerata*, *Melica uniflora*, and *Poa nemoralis*. The herbage consists of: *Achillea collina*, *Aegopodium podag-*

raria, *Alliaria petiolata*, *Anemone ranunculoides*, *Arabis turrita*, *Aremonia agrimonoides*, *Arum maculatum*, *Asplenium trichomanes*, *A. adianthum-nigrum*, *Buglossoides purpurocaerulea*, *Calamintha grandiflora*, *Calystegia sepium*, *Campanula persicifolia*, *C. rapunculus*, *Cardamine bulbifera*, *Corydalis bulbosa*, *C. solida*, *Fritillaria pontica*, *Galanthus elwesii*, *G. nivalis*, *Geranium robertianum*, *Geum urbanum*, *Inula conyza*, *Isopyrum thalictroides*, *Lamium maculatum*, *Lathyrus laxiflorus*, *Myrrhoides nodosa*, *Phyllitis scolopendrium*, *Polygonatum multiflorum*, *Polypodium vulgare*, *Ranunculus ficaria*, *Ruscus aculeatus*, *R. hypoglossum*, *Salvia glutinosa*, *Scilla bifolia*, *Sedum maximum*, *Stellaria media*, *Tamus communis*, and *Tussilago farfara*. Of the mosses, *Homalothecium lutescens* (Hedw.) Robins. and *Plagiomnium undulatum* (L.) Hedw. have been identified. The obtained results show a considerably richer species composition of the herbaceous floor of the community, as compared with the earlier data.

The authors of the article are unanimous that the community on the territory of the Dervisha Managed Reserve is of a natural relict origin.

We have found out that the health status of the Horse Chestnut individuals is not good. The reason is defoliation of the tree crowns already in the first decade of August. That forced and premature defoliation before autumn sets in is due to injury of the leaves – starting from chlorosis and ending with complete necrosis, drying out and falling, as a consequence of the parasitizing *Cameraria ohridella* Deschka & Dimic., also described for the natural chestnut communities in Greece (Avtzis & al. 2007). The early leaf fall prompts secondary development of leaves from the dormant buds, which prior to reaching their full size are also attacked by the parasite and already in September are spattered with necrotic spots. Secondary blossoming has been observed in some trees, but with few and very loose racemes, with very few and often underdeveloped flowers, which had no time to develop and start fruiting. That secondary development of leaves and flowers made the Horse Chestnut trees use prematurely (prior to the next vegetation period) part of the stored plastic substances and weakened the protective powers of the plant organisms, causing exhaustion, withering and even premature death. The situation calls for prompt measures, preferably for biological control of the pest, so as to protect this only location of valuable and decoratively beautiful Horse Chestnut.

Annex 1. List of the recorded species (families and species listed alphabetically)

Polypodiophyta

I. *Aspidiaceae*

1. *Polystichum setiferum* (Forssk.) Woyn.

II. *Aspleniaceae*

2. *Asplenium adianthum-nigrum* L.
3. *A. ruta-muraria* L.
4. *A. trichomanes* L.
5. *Phyllitis scolopendrium* (L.) Newman

III. *Athyriaceae*

6. *Cystopteris fragilis* (L.) Bernh.

IV. *Polypodiaceae*

7. *Polypodium vulgare* L.

Magnoliophyta

V. *Acanthaceae*

8. *Acanthus balcanicus* Heywood & I. Richardson

VI. *Aceraceae*

9. *Acer campestre* L.
10. *A. heldreichii* Orph.
11. *A. hyrcanum* Fisch & C.A. Mey.
12. *A. platanoides* L.
13. *A. pseudoplatanus* L.

VII. *Amaryllidaceae*

14. *Galanthus elwesii* Hook. f.
15. *G. nivalis* L.

VIII. *Amaranthaceae*

16. *Amaranthus retroflexus* L.

IX. *Anacardiaceae*

17. *Cotinus coggygria* Scop.

X. *Apiaceae*

18. *Aegopodium podagraria* L.
19. *Angelica sylvestris* L.
20. *Bupleurum praealtum* L.
21. *Berula erecta* (Huds.) Coville
22. *Chaerophyllum bulbosum* L.
23. *Ch. byzantinum* Boiss.
24. *Conium maculatum* L.
25. *Daucus carota* L.

Annex 1. Continuation.

26. *Eryngium campestre* L.
27. *Heracleum sibiricum* L.
28. *H. ternatum* Velen.
29. *Myrrhoides nodosa* (L.) Cannon
30. *Orlaya grandiflora* (L.) Hoffm.
31. *Pastinaca hirsuta* Pančić
32. *P. umbrosa* Steven & DC.
33. *Peucedanum arenarium* Waldst. & Kit.
34. *P. alsaticum* L.
35. *Physospermum cornubiense* (L.) DC.
36. *Sanicula europaea* L.
37. *Seseli tortuosum* L.
38. *Tordylium maximum* L.
39. *Torilis arvensis* (Huds.) Link

XI. *Araceae*

40. *Arum maculatum* L.

XII. *Araliaceae*

41. *Hedera helix* L.

XIII. *Aristolochiaceae*

42. *Aristolochia clematitis* L.

XIV. *Asclepiadaceae*

43. *Vincetoxicum hirundinaria* Medik.

XV. *Asteraceae*

44. *Achillea clypeolata* Sm.
45. *A. collina* Rchb.
46. *A. millefolium* L.
47. *Anthemis tinctoria* L.
48. *Arctium lappa* L.
49. *Artemisia vulgaris* L.
50. *Bellis perennis* L.
51. *Bidens tripartitus* L.
52. *Carduus acanthoides* L.
53. *Carlina vulgaris* L.
54. *Centaurea calcitrapa* L.
55. *C. cuneifolia* Sm.
56. *C. jacea* L.
57. *C. phrygia* ssp. *moesiaca* (Urum. & J. Wagner) Hayek
58. *C. rutifolia* Sm.
59. *C. scabiosa* L.
60. *Cichorium intybus* L.
61. *Cirsium ligulare* Boiss.
62. *Crepis biennis* L.
63. C. *setosa* Haller
64. *Crupina vulgaris* Cass.
65. *Echinops sphaerocephalus* L.
66. *Erigeron annuus* (L.) Pers.
67. *E. acer* L.
68. *E. sumatrensis* Retz.
69. *Eupatorium cannabinum* L.
70. *Hieracium racemosum* Waldst. & Kit.
71. *Inula bifrons* (L.) L.
72. *I. britannica* L.
73. *I. conyza* L.
74. *I. ensifolia* L.
75. *Lactuca quercina* L.
76. *L. serriola* L.
77. *L. viminea* (L.) J. & C. Presl
78. *Lapsana communis* L.
79. *Matricaria trichophylla* (Boiss.) Boiss.
80. *Mycelis muralis* (L.) Dumort.
81. *Picris hieracioides* L.
82. *Sonchus oleraceus* L.
83. *Tanacetum parthenium* (L.) Sch.Bip.
84. *Taraxacum officinale* L.
85. *Tussilago farfara* L.
86. *Xanthium strumarium* L.
87. *Xeranthemum annuum* L.

XVI. *Betulaceae*

88. *Carpinus betulus* L.
89. *C. orientalis* Mill.
90. *Corylus avellana* L.

XVII. *Boraginaceae*

91. *Anchusa procera* Besser
92. *Buglossoides purpurocaerulea* (L.) I.M. Johnst.
93. *Echium vulgare* L.
94. *Pulmonaria mollis* Hornem.
95. *P. officinalis* L.
96. *Symphytum ottomanum* Friv.

XVIII. *Brassicaceae*

97. *Alliaria petiolata* (M. Bieb.) Cavara & Grande
98. *Arabis turrita* L.
99. *Capsella bursa-pastoris* (L.) Medik.
100. *Cardamine bulbifera* (L.) Crantz
101. *C. graeca* L.
102. *Erysimum cuspidatum* (M. Bieb.) DC.
103. *Lunaria annua* L.
104. *Rorippa sylvestris* (L.) Besser
105. *Thlaspi perfoliatum* L.

XIX. *Campanulaceae*

106. *Campanula persicifolia* L.
107. *C. rapunculus* L.
108. *C. sibirica* L.
109. *C. trachelium* L.

Annex 1. Continuation.

XX. *Caprifoliaceae*
110. *Sambucus ebulus* L.
111. *S. nigra* L.
XXI. *Caryophyllaceae*
112. *Cucubalus baccifer* L.
113. *Dianthus giganteus* D'Urv.
114. *Petrorhagia prolifera* (L.) P.W. Ball & Heywood
115. *Saponaria officinalis* L.
116. *Silene dichotoma* Ehrh.
117. *S. vulgaris* (Moench) Garcke
118. *Stellaria media* (L.) Vill.
119. *S. neglecta* Weihe
120. *S. nemorum* L.
XXII. *Chenopodiaceae*
121. *Chenopodium album* L.
XXIII. *Convolvulaceae*
122. *Calystegia sepium* (L.) R. Br.
123. *Convolvulus arvensis* L.
124. *C. cantabrica* L.
XXIV. *Cornaceae*
125. *Cornus mas* L.
126. *C. sanguinea* L.
XXV. *Cuscutaceae*
127. *Cuscuta approximata* Bab.
XXVI. *Cyperaceae*
128. *Carex muricata* L.
129. *C. pendula* Huds.
XXVII. *Dioscoreaceae*
130. *Tamus communis* L.
XXVIII. *Dipsacaceae*
131. *Cephalaria transsylvanica* (L.) Roem. & Schult.
132. *Dipsacus laciniatus* L.
133. *Scabiosa hispidula* Boiss.
134. *S. triniifolia* Friv.
XXIX. *Euphorbiaceae*
135. *Euphorbia amygdaloides* L.
136. *E. marginata* Pursh.
137. *E. serrulata* Thuill.
138. *Mercurialis perennis* L.
XXX. *Fabaceae*
139. *Bituminaria bituminosa* (L.) Stirt.
140. *Cercis siliquastrum* L.
141. *Colutea arborescens* L.
142. *Coronilla varia* L.
143. *Dorycnium herbaceum* Vill.
144. *Galega officinalis* L.
145. *Genista rumelica* Velen.
146. *G. tinctoria* L.
147. *Lathyrus laxiflorus* (Desf.) O. Kuntze
148. *Lotus corniculatus* L.
149. *L. tenuis* Waldst. & Kit.
150. *Medicago falcata* L.
151. *M. lupulina* L.
152. *M. sativa* L.
153. *Melilotus officinalis* (L.) Pall.
154. *Robinia pseudoacacia* L.
155. *Trifolium arvense* L.
156. *T. dubium* Sibth.
157. *T. echinatum* M. Bieb.
158. *T. medium* L. ssp. *medium*
159. *T. pratense* L.
160. *T. repens* L.
XXXI. *Fagaceae*
161. *Fagus sylvatica* ssp. *moesiaca* (K. Malý) Hjelmq.
162. *Quercus frainetto* Ten.
163. *Q. pubescens* Willd.
XXXII. *Fumariaceae*
164. *Corydalis bulbosa* (L.) DC.
165. *C. slivenensis* Velen.
166. *C. solida* (L.) Swartz
167. *Fumaria rostellata* Knaf
XXXIII. *Gentianaceae*
168. *Centaurium erythraea* Raf.
XXXIV. *Geraniaceae*
169. *Geranium columbinum* L.
170. *G. lucidum* L.
171. *G. pyrenaicum* Burm. f.
172. *G. robertianum* L.
XXXV. *Hippocastanaceae*
173. *Aesculus hippocastanum* L.
XXXVI. *Hypericaceae*
174. *Hypericum perforatum* L.
XXXVII. *Juglandaceae*
175. *Juglans regia* L.
XXXVIII. *Juncaceae*
176. *Juncus effusus* L.
177. *J. inflexus* L.
XXXIX. *Lamiaceae*
178. *Ajuga reptans* L.
179. *Ballota nigra* L.
180. *Calamintha sylvatica* ssp. *ascendens* (Jord.) P.W. Ball

Annex 1. Continuation.

181. *Clinopodium vulgare* L.
182. *Glechoma hirsuta* Waldst. & Kit.
183. *Galeopsis speciosa* Mill.
184. *Lamiastrum galeobdolon* (L.) Ehrend. & Polatschek
185. *Lamium maculatum* L.
186. *L. purpureum* L.
187. *Lycopus europaeus* L.
188. *Melissa officinalis* L.
189. *Mentha spicata* L.
190. *Origanum vulgare* L.
191. *Prunella vulgaris* L.
192. *Salvia glutinosa* L.
193. *S. ringens* Sm.
194. *S. verticillata* L.
195. *Scutellaria altissima* L.
196. *Sideritis montana* L.
197. *Stachys annua* (L.) L.
198. *S. atherocalyx* K. Koch.
199. *S. germanica* ssp. *heldreichii* (Boiss.) Hayek
200. *Teucrium chamaedris* L.
201. *T. polium* L.

XL. *Liliaceae*

202. *Allium paniculatum* L.
203. *A. ursinum* L.
204. *Fritillaria pontica* Wahlenb.
205. *Polygonatum multiflorum* (L.) All.
206. *P. odoratum* (Mill.) Druce
207. *Ruscus aculeatus* L.
208. *R. hypoglossum* L.
209. *Scilla bifolia* L.

XLI. *Linaceae*

210. *Linum hirsutum* L.
211. *L. tenuifolium* L.

XLII. *Lythraceae*

212. *Lythrum salicaria* L.

XLIII. *Malvaceae*

213. *Malva sylvestris* L.

XLIV. *Oleaceae*

214. *Fraxinus ornus* L.
215. *Jasminum fruticans* L.
216. *Ligustrum vulgare* L.
217. *Syringa vulgaris* L.

XLV. *Onagraceae*

218. *Circaea luteciana* L.
219. *Epilobium roseum* Schreb.

XLVI. *Orchidaceae*

220. *Anacamptis pyramidalis* (L.) Rich.

XLVII. *Papaveraceae*

221. *Chelidonium majus* L.

XLVIII. *Plantaginaceae*

222. *Plantago lanceolata* L.
223. *P. major* L.
224. *P. media* L.

XLIX. *Poaceae*

225. *Agrostis capillaris* L.
226. *Bothriochloa ischaemum* (L.) Keng
227. *Brachypodium pinnatum* (L.) P. Beauv.
228. *B. sylvaticum* (Huds.) P. Beauv.
229. *Briza media* L.
230. *Bromus arvensis* L.
231. *B. ramosus* Huds.
232. *B. sterilis* L.
233. *Calamagrostis arundinacea* (L.) Roth.
234. *Cynodon dactylon* (L.) Pers.
235. *Cynosurus echinatus* L.
236. *Dactylis glomerata* L.
237. *Echinochloa crus-galli* (L.) P. Beauv.
238. *Elymus elongatus* (Host) Runemark ssp. *elongatus*
239. *Erianthus strictus* (Host) Bluff & al.
240. *Festuca altissima* All.
241. *F. gigantea* (L.) Vill.
242. *Hordelymus europaeus* (L.) Harz
243. *Melica ciliata* L.
244. *M. uniflora* Retz.
245. *Phragmites australis* (Cav.) Steud.
246. *Piptatherum holciforme* (M. Bieb.) Roem. & Schult.
247. *Poa annua* L.
248. *P. compressa* L.
249. *P. nemoralis* L.
250. *Setaria pumila* (Poir.) Roem. & Schult.
251. *S. viridis* (L.) P. Beauv.
252. *Achnatherum bromoides* (L.) L. Beauv.

L. *Polygalaceae*

253. *Polygala major* Jacq.

LI. *Polygonaceae*

254. *Polygonum aviculare* L.
255. *Rumex acetosa* L.
256. *R. crispus* L.
257. *R. obtusifolius* L.

Annex 1. Continuation.

258. *R. pulcher* L.
259. *R. sanguineus* L.

LII. *Portulacaceae*
260. *Portulaca oleracea* L.

LIII. *Primulaceae*
261. *Anagalis arvensis* L.
262. *Lysimachia nummularia* L.

LIV. *Ranunculaceae*
263. *Anemone ranunculoides* L.
264. *Clematis vitalba* L.
265. *Isopyrum thalictroides* L.
266. *Nigella arvensis* L.
267. *Ranunculus fallax* (Wimm. & Grab.) A. Kern.
268. *R. ficaria* L.
269. *R. polyanthemos* L.

LV. *Rhamnaceae*
270. *Paliurus spina-christi* Mill.

LVI. *Rosaceae*
271. *Agrimonia eupatoria* L.
272. *Aremonia agrimonoides* (L.) DC.
273. *Crataegus monogyna* Jacq.
274. *C. pentagyna* Waldst. & Kit.
275. *Fragaria moschata* Duchesne
276. *F. vesca* L.
277. *Geum urbanum* L.
278. *Potentilla obscura* Willd.
279. *P. argentea* L.
280. *P. reptans* L.
281. *Cerasus avium* Moench
282. *Prunus insititia* L.
283. *P. spinosa* L.
284. *Rosa canina* L.
285. *Rubus caesius* L.
286. *R. sanguineus* L.
287. *Sanguisorba minor* Scop.
288. *Sorbus aucuparia* L.
289. *S. torminalis* (L.) Crantz

LVII. *Rubiaceae*
290. *Cruciata laevipes* Opiz
291. *Galium album* Mill.
292. *G. aparine* L.

LVIII. *Salicaceae*
293. *Populus nigra* L.
294. *Salix fragilis* L.

LIX. *Scrophulariaceae*
295. *Digitalis ferruginea* L.
296. *D. lanata* Ehrh.
297. *Lathraea squamaria* L.
298. *Linaria genistifolia* (L.) Mill.
299. *L. vulgaris* Mill.
300. *Odontites vernus* (Bellardi) Dumort.
301. *Scrophularia nodosa* L.
302. *Verbascum blattaria* L.
303. *V. crenatifolium* Boiss.
304. *V. speciosum* Schrad.
305. *Veronica hederifolia* L.
306. *V. persica* Poir.

LX. *Solanaceae*
307. *Solanum nigrum* L.

LXI. *Staphylleaceae*
308. *Staphyllea pinnata* L.

LXII. *Tiliaceae*
309. *Tilia tomentosa* Moench
310. *T. cordata* Mill.
311. *T. rubra* DC.

LXIII. *Typhaceae*
312. *Typha latifolia* L.

LXIV. *Ulmaceae*
313. *Ulmus laevis* Pall.
314. *U. minor* Mill.

LXV. *Urticaceae*
315. *Urtica dioica* L.
316. *U. urens* L.
317. *Parietaria officinalis* L.

LXVI. *Valerianaceae*
318. *Valeriana officinalis* L.

LXVII. *Verbenaceae*
319. *Verbena officinalis* L.

LXVIII. *Violaceae*
320. *Viola hirta* L.
321. *V. reichenbachiana* Boreau
322. *V. riviniana* Rchb.

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