



Original article

## Flora of the Yelanetsky Steppe Nature Reserve, Mykolaiv Oblast, Ukraine: a diversity and structural analysis

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### ABSTRACT

The aim of the study is to inventory the current composition of the flora of the Yelanetsky Steppe Nature Reserve, Mykolaiv Oblast, Ukraine, to analyze its structure for the first time, and to characterize the role of the reserve in conserving the floristic diversity of the steppe zone of Ukraine. It was established that the reserve's spontaneous flora includes 692 species and subspecies, of which 542 are native and 150 are alien. The systematic, geographical, biomorphological, and ecologico-coenotic structures of the flora were analyzed, and found to reflect the steppe nature of the reserve's vegetation cover. The geographical spectrum of the native flora was dominated by Eurasian Steppe (26.3%), Mediterranean (18.8%), and Eurasian (17.9%) geographical elements. Twenty-four species and subspecies are endemic. Most alien plant species (54.0%) originate from the Mediterranean region. In the biomorphological structure of the native plants, hemicryptophytes dominate (57.2%); among alien plants, therophytes prevailed (50.7%). The greatest threat to the reserve's steppe ecosystems is posed by high-impact invasive woody species: *Acer negundo*, *Amorpha fruticosa*, *Elaeagnus angustifolia*, *Fraxinus pennsylvanica*, *Robinia pseudoacacia*, and *Ulmus pumila*. The Yelanetsky Steppe Nature Reserve was shown to play a crucial role in conserving forb-grass steppe ecosystems in southern Ukraine.

KEY WORDS: biodiversity, steppe zone of Ukraine, endemic species, rare plants

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### 1. Introduction

Protected areas are key sites for biodiversity conservation and research, with inventory and monitoring of floristic composition being core priorities (LYSENKO & KOLOMIYCHUK, 2015; WESCHE ET AL., 2016; HAIGHT & HAMMILL, 2020). The Yelanetsky Steppe Nature Reserve comprises two tracts of largely virgin steppe in the north-western Black Sea region (3,010.65 ha) and is one of several nature

reserves in Ukraine where undisturbed steppe ecosystems have been preserved. It has not been occupied or directly affected by military action during the Russo-Ukrainian war. As of June 2025, only three steppe nature reserves in Ukraine remained outside occupation – Mykhailivska Tsilyna (Sumy Oblast), the Chalk Flora Department of the Ukrainian Steppe Nature Reserve (Donetsk Oblast), and Yelanetsky Steppe – whereas Askania-Nova, the Ukrainian Steppe Nature Reserve (several departments), Opuk, and

the Luhansk Nature Reserve were under occupation with documented breaches of the protection regime (PARKHOMENKO & VASYLIUK, 2022; BONDAR ET AL., 2024). This context further underscores the conservation significance of Yelanetsky Steppe. Today, it is one of the principal centres of floristic and phytocoenotic diversity in Ukraine, making its monitoring especially valuable for steppe conservation under current conditions.

The Palaearctic steppes constitute one of the largest continuous natural habitats on Earth, forming the Eurasian Grassland Belt from eastern Central Europe to northern China and occurring, in a wider sense, also in North Africa, Anatolia and Iran (WESCHE ET AL., 2016). They harbour high beta- and gamma-diversity with numerous endemics (DENGLER ET AL., 2014), yet have suffered extensive conversion owing to the fertility of Chernozem soils. Temperate grasslands rank among the world's most threatened biomes (TÖRÖK ET AL., 2016). Within the European Union, steppe and steppe-like grasslands are explicitly protected under the Habitats Directive via the Natura 2000 network (<https://www.eea.europa.eu/themes/biodiversity/natura-2000>).

The aim of the study was to inventory the current composition of the Yelanetsky Steppe Nature Reserve vascular flora, analyze its structure, and characterize the role of the reserve in preserving the floristic diversity of Ukraine's steppe zone.

## 2. Location of the nature reserve

According to the physical-geographical zoning of Ukraine, the studied nature reserve is located in the Southern Dnipro slope upland area in the northern steppe subzone of the steppe zone (MARYNYCH ET AL., 2003). Biogeographically, the nature reserve belongs to the Pontic steppe of the terrestrial ecoregion of Ukraine within the steppe biogeographic region of the Palearctic ecozone

(THE INDICATIVE MAP, 2006). According to floristic zoning, the area of study is located in the Western Black Sea-Crimean Plain District of the Black Sea-Don Province of the Pannonian-Black Sea-Caspian Region (ZAVERUKHA, 1985). Geobotanically, the nature reserve is situated in the Southern Bug-Dnipro geobotanical district of grass-forb steppe, bayrach forests, and vegetation of granite outcrops within the Black Sea (Pontic) Steppe Province in the Eurasian Steppe Region (DIDUKH & SHELYAG-SOSONKO, 2003).

The nature reserve currently comprises two scientific research departments within the Voznesensk and Mykolaiv Districts of the Mykolaiv Region (Oblast) (Fig. 1). The Yelanetsky Department covers 1,675.7 ha (coordinates: 47.567°N, 32.012°E), while the Mykhailivsky Department covers 1,334.95 ha (coordinates: 47.4°N, 31.62°E).

The territory of the reserve is a landscape complex of ravines and dry valleys with preserved steppe, petrophyte-steppe and shrubby plant communities (Fig. 2). In the Yelanetsky Department there are large steppe ravines: Roza, Orlova and Prusakova. In the Mykhailivsky Department there are steppe ravines: Gorskina, Divka, Velyka Divka, Kemlycha and Hnyla.



Fig. 1. Location of scientific research departments of the Yelanetsky Steppe Nature Reserve in the territory of Mykolaiv Oblast



Fig. 2. Landscapes of the Yelanetsky Steppe Nature Reserve: A – Prusakova ravine, B – Orlova ravine

### 3. Materials and methods

Field floristic research was conducted between 2021 and 2024. The desk-based phase included the study of herbarium specimens at the National Herbarium of Ukraine, M.G. Kholodny Institute of Botany, NAS of Ukraine (KW), and at the herbarium of the M.M. Gryshko National Botanical Garden, NAS of Ukraine (KWH). The nomenclature of taxa is primarily based on the World Checklist of Vascular Plants (GOVAERTS, 2024; <http://powo.science.kew.org>), with the involvement of numerous sources on vascular plant taxonomy and systematics (FLORA URSR, 1936-1965; PROKUDIN ET AL., 1987; BOIKO, 2011; SOŁTYS-LELEK, 2012; ROTHMALER, 2017; VOJTĚCHOVÁ ET AL., 2023; <https://www.europlusmed.org>; etc.). Several species not recognized as independent taxa but listed in the Red Data Book of Ukraine (ORDER OF THE MINISTRY OF ENVIRONMENTAL PROTECTION AND NATURAL RESOURCES OF UKRAINE, 2021) were also included in the flora inventory since their conservation is within the reserve's objectives: *Allium sphaeropodum*, *Astragalus odessanus*, *Genista scythica*, *Scutellaria verna*, and *Tulipa hypanica*. Illustrations of many plant species were presented in the iNaturalist observation database (<https://www.inaturalist.org/projects/pryrodneyi-zapovidnyk-yelanetskyi-step>).

Analysis of the spontaneous flora was conducted using the generally accepted structural floristics framework (ZAVERUKHA, 1985; NOVOSAD, 2003-2004; MOYSIYENKO, 2011). Species and subspecies were categorized into native and alien taxa, with alien taxa further subdivided into xenophytes and ergasiophygophytes (NAEGELI & THELLUNG, 1905; PYŠEK ET AL., 2004). Geographic analysis was conducted using botanical-geographical principles, classifying native species into geographical elements of the flora (geoelements) and alien species by regions of origin (SZAFER, 1952; MEUSEL ET AL., 1965; KLEPOV, 1990; PROTOPOPOVA, 1991; NOVOSAD, 2003-2004). The biomorphological analysis of the flora was performed using Raunkiaer's ecological-biomorphological classification (RAUNKIAER, 1934). Ecological-coenotic analysis was based on an adapted classification of coenomorphs by O.L. Belgard (BARANOVSKI ET AL., 2018). Invasive plants were evaluated according to the list of highly invasive plant species for the flora of Ukraine (PROTOPOPOVA & SHEVERA, 2019). In addition to spontaneously occurring wild plants, the inventory includes

cultivated plants found within the reserve's territory, as well as acclimatized ergasiophytes that formed self-seeding populations or spread vegetatively in cultivation areas. However, cultivated plants were not analyzed, as they were intentionally planted and do not represent a spontaneous element of the flora. Recording such cases of incipient naturalization among hemerophytes is very relevant today in the context of active synanthropization of plant cover (KELLER ET AL., 2011; SHYNDER, 2019; CHORNA ET AL., 2021; SHYNDER ET AL., 2022).

### 4. Research history

The first, although fragmented, references regarding the current territory of the Yelanetsky Steppe Nature Reserve appeared in the works of PACZOSKI (1914, 2008). He reported about 40 plant species in the area of the Mykhailivsky Department. The modern period of studying the flora of the nature reserve began with the works of KOSTYLOV (1987), who first highlighted the high conservation value of the virgin steppe sections in this area and justified the need for their designation as a reserve. Later, studies of the vegetation and flora of the reserve, especially its rare components, continued (MOYSIYENKO ET AL., 2005; VORONOVA, 2005-2007; TKACHENKO, 2009; MARTSENYUK, 2011; ONYSHCHENKO & ANDRIENKO, 2012; KONAIKOVA, 2019; PRASOVA, 2020; MOYSIYENKO ET AL., 2021), as did studies of its alien plants (MELNYCHUK, 2020).

At the beginning of our study, the flora inventory of the nature reserve had comprised 615 vascular plant species. However, most research focused on the Yelanetsky Department, while the Mykhailivsky Department remained under explored. As a result of the new inventory, more than 100 additional species and subspecies of vascular plants, previously unrecorded in the reserve, were added to the flora (DRABYNIUK ET AL., 2022). During the five years preceding this study, two new rare species from the Red Data Book of Ukraine were discovered in the reserve's habitats: *Allium sphaeropodum* and *Colchicum triphyllum* (Fig. 3A). The latter was found here in an isolated habitat at the northern limit of its range (GNATIUK, 2024). A notable discovery in the Mykhailivsky Department was the first spontaneous occurrence of *Vitis × instabilis* in Ukraine (Fig. 3B), a hybrid widely used in viticulture as a phylloxera-resistant rootstock for grape cultivars (ARDENGI ET AL., 2014; RAAB-STRAUBE & RAUS, 2024).



A



B

Fig. 3. Recently discovered plants in the Yelanetsky Steppe Nature Reserve flora: A – *Colchicum triphyllum*, species at the northern border of its range (Yelanetsky Department); B – *Vitis x instabilis*, the first known spontaneous occurrence for the flora of Ukraine (Mykhailivsky Department)

## 5. Results

### Checklist of the Yelanetsky Steppe Nature Reserve flora

**Symbols and Abbreviations:** “!” – cultivated plant (Cult), “\*!” – plant forms self-seeding in cultivation sites. **Nat.** – Native plant, **Erg.** – ergasiophygyte, **Xen.** – xenophyte, **Cult.** – cultivated plant. **Territorial distribution:** **Yel.** – Yelanetsky Department, **Mykh.** – Mykhailivsky Department.

Only spontaneously occurring species and subspecies are numbered; cultivated plants are listed without numbering.

#### HORSETAILS

##### EQUISETACEAE

1. *Equisetum arvense* L.: Nat. - Yel.; Mykh.
2. *Equisetum ramosissimum* Desf.: Nat. - Yel.

#### FERNS

##### ASPLENIACEAE

3. *Asplenium septentrionale* (L.) Hoffm.: Nat. - Yel.

#### GYMNOSPERMS. CLASS PINOPSIDA

##### CUPRESSACEAE

- ! *Juniperus virginiana* L.: Cult. - !Yel.  
! *Platycladus orientalis* (L.) Franco: Cult. - !Yel.

##### PINACEAE

- ! *Pinus nigra* J.F. Arnold subsp. *nigra*: Cult. - !Yel.

#### GYMNOSPERMS. CLASS GNETOPSIDA

##### EPHEDRACEAE

4. *Ephedra distachya* L.: Nat. - Yel.; Mykh.

#### ANGIOSPERMS. CLADE MAGNOLIIDS

##### ARISTOLOCHIAACEAE

5. *Aristolochia clematitis* L.: Nat. - Yel.; Mykh.

#### ANGIOSPERMS. CLADE MONOCOTS

##### ALISMATACEAE

6. *Alisma plantago-aquatica* L.: Nat. - Yel.

##### AMARYLLIDACEAE

7. *Allium flavescens* Besser: Nat. - Yel.; Mykh.
8. *Allium flavum* L. subsp. *tauricum* (Besser ex Rchb.) K.Richt.: Nat. - Yel.; Mykh.

9. *Allium inaequale* Janka: Nat. - Yel.; Mykh.

10. *Allium paniculatum* L.: Nat. - Yel.

11. *Allium rotundum* L.: Nat. - Yel.

12. *Allium sativum* L.: Erg. - Yel.

13. *Allium sphaerocephalon* L.: Nat. - Yel.; Mykh.

14. *Allium sphaeropodum* Klokov (= *A. flavum* subsp. *tauricum* s.l.): Nat. - Yel.; Mykh. [Endemic]

#### ARACEAE

15. *Lemna minor* L.: Nat. - Yel.

16. *Lemna trisulca* L.: Nat. - Yel.

#### ASPARAGACEAE

17. *Anthericum ramosum* L.: Nat. - Yel.; Mykh.

18. *Asparagus officinalis* L.: Nat. - Yel.; Mykh.

19. *Asparagus verticillatus* L.: Nat. - Yel.; Mykh.

20. *Bellevalia speciosa* Woronow ex Grossh.: Nat. - Yel.; Mykh.

21. *Hyacinthella leucophaea* (K.Koch) Schur: Nat. - Yel.

22. *Muscari comosum* (L.) Mill.: Nat. - Yel.

23. *Muscari neglectum* Guss. ex Ten.: Nat. - Yel.; Mykh.

24. *Ornithogalum boucheanum* (Kunth) Asch.: Nat. - Yel.; Mykh.

25. *Ornithogalum fischerianum* Krasch.: Nat. - Yel.; Mykh.

26. *Ornithogalum orthophyllum* Ten. subsp. *kochii* (Parl.) Zahar.: Nat. - Yel.; Mykh.

27. *Polygonatum odoratum* (Mill.) Druce: Nat. - Yel.; Mykh.

28. *Scilla bifolia* L.: Nat. - Yel.; Mykh.

#### COLCHICACEAE

29. *Colchicum bulbocodium* Ker Gawl. subsp. *versicolor* (Ker Gawl.) K.Perss.: Nat. - Yel.

30. *Colchicum triphyllum* Kunze (= *C. ancyrense* B.L.Burt): Nat. - Yel.

#### CYPERACEAE

31. *Bolboschoenus glaucus* (Lam.) S.G.Sm.: Nat. - Yel.

32. *Bolboschoenus planiculmis* (F.Schmidt) T.V.Egorova: Nat. - Yel.; Mykh.

33. *Carex hirta* L.: Nat. - Yel.; Mykh.

34. *Carex melanostachya* M.Bieb. ex Willd.: Nat. - Yel.; Mykh.

35. *Carex michelii* Host: Nat. - Yel.

36. *Carex praecox* Schreb.: Nat. - Yel.; Mykh.

37. *Carex riparia* Curtis: Nat. - Yel.

38. *Carex spicata* Huds.: Nat. - Yel.

39. *Carex stenophylla* Wahlenb.: Nat. - Yel.  
40. *Carex supina* Willd. ex Wahlenb.: Nat. - Yel.; Mykh.  
41. *Eleocharis palustris* (L.) Roem. & Schult.: Nat. - Yel.  
42. *Schoenoplectus tabernaemontani* (C.C.Gmel.) Palla: Nat. - Yel.  
43. *Scirpoides holoschoenus* (L.) Soják: Nat. - Yel.
- IRIDACEAE  
44. *Crocus reticulatus* Steven ex Adam: Nat. - Yel.; Mykh.  
45. *Iris halophila* Pall.: Nat. - Yel.; Mykh.  
46. *Iris pontica* Zapał.: Nat. - Yel.; Mykh.  
47. *Iris pumila* L.: Nat. - Yel.; Mykh.
- JUNCACEAE  
48. *Juncus compressus* Jacq.: Nat. - Yel.  
49. *Juncus gerardi* Loisel.: Nat. - Yel.  
50. *Juncus inflexus* L.: Nat. - Yel.
- LILIACEAE  
51. *Gagea bohemica* (Zauschn.) Schult. & Schult.f.: Nat. - Yel.  
52. *Gagea bulbifera* (Pall.) Salisb.: Nat. - Yel.  
53. *Gagea pusilla* (F.W.Schmidt) Sweet: Nat. - Yel.  
54. *Gagea transversalis* Steven: Nat. - Yel.; Mykh.  
55. *Gagea villosa* (M.Bieb.) Sweet: Nat. - Yel.  
56. *Tulipa suaveolens* Roth: Nat. - Yel.  
57. *Tulipa hypanica* Klokov & Zoz (= *T. sylvestris* L. subsp. *australis* (Link) Pamp. s.l.): Nat. - Yel. [Endemic]
- POACEAE  
58. *Aegilops cylindrica* Host: Xen. - Yel.; Mykh.  
59. *Agropyron cristatum* (L.) Gaertn. var. *pectinatum* (M.Bieb.) B.Fedtsch.: Nat. - Yel.; Mykh.  
60. *Agrostis gigantea* Roth: Nat. - Yel.; Mykh.  
61. *Alopecurus pratensis* L.: Nat. - Yel.  
62. *Anthoxanthum repens* (Host) Veldkamp: Nat. - Yel.  
! *Avena sativa* L.: Cult. - !Yel.  
63. *Bothriochloa ischaemum* (L.) Keng: Nat. - Yel.; Mykh.  
64. *Bromus arvensis* L.: Xen. - Yel.; Mykh.  
65. *Bromus hordeaceus* L.: Nat. - Yel.; Mykh.  
66. *Bromus inermis* Leyss.: Nat. - Yel.; Mykh.  
67. *Bromus japonicus* Houtt.: Nat. - Yel.  
68. *Bromus riparius* Rehm.: Nat. - Yel.; Mykh.  
69. *Bromus squarrosus* L.: Nat. - Yel.; Mykh.  
70. *Bromus tectorum* L.: Xen. - Yel.; Mykh. [Invasive]  
71. *Calamagrostis epigejos* (L.) Roth: Nat. - Yel.; Mykh.  
72. *Cleistogenes serotina* (L.) Keng: Nat. - Yel.; Mykh.  
73. *Cynodon dactylon* (L.) Pers.: Xen. - Yel.; Mykh.  
74. *Dactylis glomerata* L.: Nat. - Yel.; Mykh.  
75. *Echinochloa crus-galli* (L.) P.Beauv.: Xen. - Yel.; Mykh.  
76. *Elymus repens* (L.) Gould: Nat. - Yel.; Mykh.  
77. *Eragrostis minor* Host: Xen. - Yel.; Mykh.  
78. *Eragrostis pilosa* (L.) P.Beauv.: Xen. - Yel.  
79. *Eremopyrum orientale* (L.) Jaub. & Spach: Xen. - Yel.; Mykh. (Paczoski, 1914)  
80. *Eremopyrum triticeum* (Gaertn.) Nevski: Nat. - Yel.  
81. *Festuca rupicola* Heuff.: Nat. - Yel.; Mykh.  
82. *Festuca valesiaca* Schleich. ex Gaudin: Nat. - Yel.; Mykh.  
83. *Glyceria fluitans* (L.) R.Br.: Nat. - Yel.  
84. *Hordeum murinum* L. subsp. *murinum*: Xen. - Yel.  
85. *Koeleria brevis* Steven: Nat. - Yel.; Mykh.  
86. *Koeleria macrantha* (Ledeb.) Schult.: Nat. - Yel.  
87. *Koeleria pyramidata* (Lam.) P.Beauv.: Nat. - Yel.  
88. *Lolium arundinaceum* (Schreb.) Darbysh subsp. *orientale* (Hack.) G.H.Loos: Nat. - Yel.; Mykh.  
89. *Lolium perenne* L.: Nat. - Yel.; Mykh.  
90. *Lolium pratense* (Huds.) Darbysh.: Nat. - Yel.  
91. *Melica × thuringiaca* Rauschert: Nat. - Yel.  
92. *Melica transsilvanica* Schur: Nat. - Yel.; Mykh.  
93. *Phleum phleoides* (L.) H.Karst.: Nat. - Yel.; Mykh.  
94. *Phragmites altissimus* (Benth.) Mabilie: Xen. - Yel.; Mykh.  
95. *Phragmites australis* (Cav.) Trin. ex Steud.: Nat. - Yel.; Mykh.  
96. *Poa angustifolia* L.: Nat. - Yel.; Mykh.  
97. *Poa annua* L.: Nat. - Yel.; Mykh.  
98. *Poa bulbosa* L.: Nat. - Yel.; Mykh.  
99. *Poa compressa* L.: Nat. - Yel.; Mykh.  
100. *Poa pratensis* L.: Nat. - Yel.; Mykh.
101. *Pseudoroegneria stipifolia* (Trautv.) Á.Löve (= *Elytrigia stipifolia* (Czern. ex Nevski) Nevski): Nat. - Yel.  
102. *Puccinellia distans* (Jacq.) Parl.: Nat. - Yel.  
103. *Sclerochloa dura* (L.) P.Beauv.: Xen. - Yel.; Mykh.  
104. *Setaria pumila* (Poir.) Roem. & Schult.: Xen. - Yel.; Mykh. [Invasive]  
105. *Setaria viridis* (L.) P.Beauv.: Xen. - Yel.; Mykh. [Invasive]  
106. *Stipa asperella* Klokov & Osychnyuk: Nat. - Yel.; Mykh. [Endemic]  
107. *Stipa capillata* L.: Nat. - Yel.; Mykh.  
108. *Stipa lessingiana* Trin. & Rupr.: Nat. - Yel.; Mykh.  
109. *Stipa pulcherrima* K.Koch: Nat. - Yel.; Mykh.  
110. *Stipa tirsia* Steven: Nat. - Yel.  
111. *Stipa ucrainica* P.A.Smirn.: Nat. - Yel.; Mykh.  
112. *Thinopyrum intermedium* (Host) Barkworth & D.R.Dewey subsp. *intermedium*: Nat. - Yel.; Mykh.  
113. *Thinopyrum intermedium* subsp. *barbulatum* (Schur) Barkworth & D.R.Dewey: Nat. - Yel.; Mykh.  
114. *Tragus racemosus* (L.) All.: Nat. - Yel.  
115. *Triticum aestivum* L.: Erg. - Yel.; Mykh.  
116. *Zea mays* L.: Erg. - Yel.
- POTAMOGETONACEAE  
117. *Potamogeton lucens* L.: Nat. - Yel.  
118. *Potamogeton natans* L.: Nat. - Yel.
- TYPHACEAE  
119. *Typha angustifolia* L.: Nat. - Yel.  
120. *Typha latifolia* L.: Nat. - Yel.
- ANGIOSPERMS. CLADE EUDICOTS (s. 1.)**  
AMARANTHACEAEs.  
121. *Amaranthus albus* L.: Xen. - Yel.; Mykh. [Invasive]  
122. *Amaranthus blitoides* S.Watson: Xen. - Yel.; Mykh. [Invasive]  
123. *Amaranthus retroflexus* L.: Xen. - Yel.; Mykh. [Invasive]  
124. *Atriplex micrantha* Ledeb.: Xen. - Yel.  
125. *Atriplex oblongifolia* Waldst. & Kit.: Nat. - Yel.; Mykh.  
126. *Atriplex patula* L.: Nat. - Yel.; Mykh.  
127. *Atriplex prostrata* Boucher ex DC.: Nat. - Yel.  
128. *Atriplex sagittata* Borkh.: Xen. - Yel.; Mykh.  
129. *Atriplex tatarica* L.: Xen. - Yel.; Mykh.  
130. *Bassia prostrata* (L.) Beck: Nat. - Yel.; Mykh.  
131. *Ceratocarpus arenarius* L.: Nat. - Yel.  
132. *Chenopodium album* L.: Xen. - Yel.; Mykh.  
133. *Chenopodium betaceum* Andrz.: Xen. - Yel.; Mykh.  
134. *Chenopodium opulifolium* Schrad. ex W.D.J.Koch & Ziz: Xen. - Yel.  
135. *Chenopodium vulvaria* L.: Xen. - Yel.  
136. *Oxybasis urtica* (L.) S.Fuentes, Uotila & Borsch: Xen. - Yel.  
137. *Polycnemum arvense* L.: Xen. - Yel.  
138. *Polycnemum majus* A.Braun ex Bogenh.: Nat. - Yel.  
139. *Salsola tragus* L.: Xen. - Yel.
- ANACARDIACEAE  
140. *Cotinus coggygria* Scop.: Erg. - Yel.; Mykh.
- APIACEAE  
141. *Anthriscus cerefolium* (L.) Hoffm.: Nat. - Yel.; Mykh. (Paczoski, 2008)  
142. *Anthriscus sylvestris* (L.) Hoffm.: Nat. - Yel.  
143. *Bupleurum rotundifolium* L.: Xen. - Yel.; Mykh.  
144. *Conium maculatum* L.: Xen. - Yel.; Mykh.  
145. *Daucus carota* L.: Nat. - Yel.; Mykh.  
146. *Eryngium campestre* L.: Nat. - Yel.; Mykh.  
147. *Eryngium planum* L.: Nat. - Yel.  
148. *Falcaria vulgaris* Bernh.: Nat. - Yel.; Mykh.  
149. *Ferulago galbanifera* (Mill.) W.D.J.Koch: Nat. - Yel.  
150. *Heraclium sibiricum* L.: Nat. - Yel.; Mykh.  
151. *Pastinaca clausii* (Ledeb.) Calest.: Nat. - Yel.; Mykh.  
152. *Peucedanum alsaticum* L.: Nat. - Yel.; Mykh.  
153. *Pimpinella saxifraga* L. subsp. *nigra* (Mill.) Gaudin: Nat. - Yel.; Mykh.  
154. *Pimpinella tragioides* Vill. subsp. *titanophila* (Woronow) Tutin: Nat. - Yel.; Mykh.  
155. *Seseli campestre* Besser: Nat. - Yel.; Mykh.  
156. *Seseli pallasii* Besser: Nat. - Yel.  
157. *Silaum silaus* (L.) Schinz & Thell.: Nat. - Yel.  
158. *Torilis arvensis* (Huds.) Link.: Xen. - Yel.  
159. *Torilis japonica* (Houtt.) DC.: Nat. - Yel.; Mykh.

160. *Trinia multicaulis* (Poir.) Schischk.: Nat. - Yel.  
 APOCYNACEAE  
 161. *Cynanchum acutum* L.: Nat. - Yel.  
 162. *Vinca herbacea* Waldst. & Kit.: Nat. - Yel.; Mykh.  
 163. *Vincetoxicum fuscum* (Hornem.) Endl. (= *V. intermedium* Taliev): Nat. - Yel.; Mykh.  
 164. *Vincetoxicum hirundinaria* Medik subsp. *hirundinaria*: Nat. - Yel.; Mykh.  
 165. *Vincetoxicum hirundinaria* subsp. *stepposum* (Pobed.) Markgr.: Nat. - Yel.  
 ASTERACEAE  
 166. *Achillea leptophylla* M.Bieb.: Nat. - Yel.  
 167. *Achillea nobilis* L.: Nat. - Yel.; Mykh.  
 168. *Achillea ochroleuca* Ehrh.: Nat. - Yel.  
 169. *Achillea pannonica* Scheele: Nat. - Yel.; Mykh.  
 170. *Achillea setacea* Waldst. & Kit.: Nat. - Yel.; Mykh.  
 171. *Achillea stepposa* Klokov & Krytzka: Nat. - Yel.; Mykh.  
 172. *Ambrosia artemisiifolia* L.: Erg. - Yel.; Mykh.[Invasive]  
 173. *Arctium lappa* L.: Nat. - Yel.  
 174. *Arctium minus* (Hill) Bernh.: Nat. - Yel.; Mykh.  
 175. *Arctium tomentosum* Mill.: Nat. - Yel.  
 176. *Artemisia absinthium* L.: Xen. - Yel.; Mykh.  
 177. *Artemisia austriaca* Jacq.: Nat. - Yel.; Mykh.  
 178. *Artemisia marschalliana* Spreng.: Nat. - Yel.; Mykh.  
 179. *Artemisia vulgaris* L.: Nat. - Yel.; Mykh.  
 180. *Aster amellus* L. subsp. *bessarabicus* (Bernh. ex Rchb.) Soó: Nat. - Yel.  
 181. *Bidens frondosa* L.: Xen. - Yel.; Mykh. [Invasive]  
 182. *Bidens tripartita* L.: Nat. - Yel.; Mykh.  
 183. *Carduus acanthoides* L.: Xen. - Yel.; Mykh.  
 184. *Carduus nutans* L. subsp. *leiophyllus* (Petrovič) Arènes: Nat. - Yel.; Mykh.  
 185. *Carduus uncinatus* M.Bieb.: Nat. - Yel.  
 186. *Centaurea diffusa* Lam.: Xen. - Yel.; Mykh. [Invasive]  
 187. *Centaurea jacea* L. subsp. *jacea*: Nat. - Yel.  
 188. *Centaurea jacea* subsp. *angustifolia* (DC.) Greml.: Nat. - Yel.; Mykh.  
 189. *Centaurea orientalis* L.: Nat. - Yel.; Mykh.  
 190. *Centaurea scabiosa* L. subsp. *adpressa* (Ledeb.) Gugler: Nat. - Yel.  
 191. *Centaurea scabiosa* subsp. *apiculata* (Ledeb.) Mikheev: Nat. - Yel.  
 192. *Centaurea stereophylla* Besser: Nat. - Yel.; Mykh.  
 193. *Chondrilla juncea* L.: Nat. - Yel.; Mykh.  
 194. *Chondrilla latifolia* M.Bieb.: Nat. - Yel.  
 195. *Cichorium intybus* L.: Xen. - Yel.; Mykh. [Invasive]  
 196. *Cirsium arvense* (L.) Scop. var. *arvense*: Nat. - Yel.; Mykh.  
 197. *Cirsium ukranicum* Besser ex DC.: Nat. - Yel.  
 198. *Cirsium vulgare* (Savi) Ten.: Nat. - Yel.; Mykh.  
 199. *Cota tinctoria* (L.) J.Gay: Nat. - Yel.; Mykh.  
 200. *Crepis foetida* L. subsp. *rhoeadifolia* (M.Bieb.) Čelak: Nat. - Yel.; Mykh.  
 201. *Crepis pulchra* L.: Xen. - Yel.; Mykh.  
 202. *Crepis ramosissima* d'Urv.: Nat. - Yel.  
 203. *Crepis sancta* (L.) Bornm.: Xen. - Yel.  
 204. *Crepis tectorum* L.: Nat. - Yel.; Mykh.  
 205. *Echinops ritro* L. subsp. *ruthenicus* (M.Bieb.) Nyman: Nat. - Yel.; Mykh.  
 206. *Echinops sphaerocephalus* L.: Nat. - Yel.; Mykh.  
 207. *Erigeron acris* L. subsp. *podolicus* (Besser) Nyman: Nat. - Yel.; Mykh.  
 208. *Erigeron annuus* (L.) Desf.: Xen. - Yel.; Mykh. [Invasive]  
 209. *Erigeron canadensis* L.: Xen. - Yel.; Mykh. [Invasive]  
 210. *Eupatorium cannabinum* L.: Nat. - Yel.  
 211. *Filago arvensis* L.: Nat. - Yel.  
 212. *Galatella biflora* (L.) Nees: Nat. - Yel.  
 213. *Galatella villosa* (L.) Rchb.fil.: Nat. - Yel.; Mykh.  
 214. *Grindelia squarrosa* (Pursh) Dunal: Xen. - Yel.; Mykh. [Invasive]  
 215. *Helianthus annuus* L.: Erg. - Yel.; Mykh.  
 216. *Helianthus tuberosus* L.: Erg. - Yel.; Mykh. [Invasive]  
 217. *Helichrysum arenarium* (L.) Moench: Nat. - Yel.; Mykh.  
 218. *Hieracium robustum* Fr.: Nat. - Yel.  
 219. *Hieracium umbellatum* L.: Nat. - Yel.  
 220. *Hieracium virosum* Pall.: Nat. - Yel.; Mykh.  
 221. *Jacobaea erucifolia* (L.) G.Gaertn., B.Mey. & Scherb.: Nat. - Yel.  
 222. *Jacobaea vulgaris* Gaertn.: Nat. - Yel.; Mykh.  
 223. *Jurinea arachnoidea* Bunge: Nat. - Yel.; Mykh.  
 224. *Jurinea longifolia* DC. (= *J. paczoskiana* Iljin): Nat. - Yel. [Endemic]  
 225. *Jurinea multiflora* (L.) B.Fedtsch.: Nat. - Yel.; Mykh.  
 226. *Jurinea stoechadifolia* (M.Bieb.) DC.: Nat. - Yel.; Mykh.  
 227. *Klasea erucifolia* (L.) Greuter & Wagenitz: Nat. - Yel.  
 228. *Klasea radiata* (Waldst. & Kit.) Á.Löve & D.Löve: Nat. - Yel.  
 229. *Lactuca saligna* L.: Nat. - Yel.; Mykh.  
 230. *Lactuca serriola* L.: Xen. - Yel.; Mykh.  
 231. *Lactuca tatarica* (L.) C.A.Mey.: Erg. - Yel.; Mykh.  
 232. *Leontodon hispidus* L.: Nat. - Yel.; Mykh.  
 233. *Matricaria chamomilla* L.: Erg. - Yel.; Mykh.  
 234. *Matricaria discoidea* DC.: Xen. - Yel.; Mykh.  
 235. *Onopordum acanthium* L.: Xen. - Yel.; Mykh.  
 236. *Pentanema asperum* (Poir.) G.V.Boiko & Korniy.: Nat. - Yel.; Mykh.  
 237. *Pentanema britannica* (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.: Nat. - Yel.; Mykh.  
 238. *Pentanema ensifolium* (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.: Nat. - Yel.; Mykh.  
 239. *Pentanema germanicum* (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.: Nat. - Yel.  
 240. *Pentanema hirtum* (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.: Nat. - Yel.  
 241. *Pentanema oculus-christi* (L.) D.Gut.Larr., Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.: Nat. - Yel.; Mykh.  
 242. *Picris hieracioides* L.: Nat. - Yel.; Mykh.  
 243. *Pilosella auriculoides* (Láng) Arv.-Touv.: Nat. - Yel.  
 244. *Pilosella cymosa* (L.) F.W.Schultz & Sch.Bip.: Nat. - Yel.; Mykh.  
 245. *Pilosella echioides* (Lumn.) F.W.Schultz & Sch.Bip.: Nat. - Yel.; Mykh.  
 246. *Pilosella fallax* (Willd.) Arv.-Touv.: Nat. - Yel.  
 247. *Pilosella floribunda* (Wimm. & Grab.) Fr.: Nat. - Yel.  
 248. *Pilosella officinarum* Vaill.: Nat. - Yel.; Mykh.  
 249. *Psephellus marschallianus* (Spreng.) K.Koch: Nat. - Yel.; Mykh.  
 250. *Psephellus sumensis* (Kalen.) Greuter: Nat. - Yel.; Mykh.  
 251. *Psephellus trinervius* (Stephan ex Willd.) Wagenitz: Nat. - Yel.  
 252. *Pseudopodospermum molle* (M.Bieb.) Kuth.: Nat. - Yel.; Mykh.  
 253. *Pseudopodospermum strictum* (Hornem.) Zaika, Sukhor & N.Kilian: Nat. - Yel.  
 254. *Pseudopodospermum tauricum* (M.Bieb.) Vasjukov & Saksonov: Nat. - Yel.  
 255. *Scorzonera laciniata* L.: Nat. - Yel.  
 256. *Scorzoneroides autumnalis* (L.) Moench: Nat. - Yel.; Mykh.  
 257. *Senecio doria* L.: Nat. - Yel.  
 258. *Senecio vernalis* Waldst. & Kit.: Nat. - Yel.; Mykh.  
 259. *Senecio vulgaris* L.: Xen. - Yel.; Mykh.  
 260. *Sonchus arvensis* L. subsp. *uliginosus* (M.Bieb.) Nyman: Nat. - Yel.; Mykh.  
 261. *Sonchus oleraceus* L.: Xen. - Yel.; Mykh.  
 262. *Sonchus palustris* L.: Nat. - Yel.  
 263. *Tanacetum corymbosum* (L.) Sch.Bip.: Nat. - Yel.  
 264. *Tanacetum millefolium* (L.) Tzvelev: Nat. - Yel.; Mykh.  
 265. *Tanacetum odessanum* (Klokov) Tzvelev: Nat. - Yel.; Mykh. [Endemic]  
 266. *Tanacetum vulgare* L.: Nat. - Yel.; Mykh.  
 267. *Taraxacum erythrospermum* Andr. ex Besser: Nat. - Yel.; Mykh.  
 268. *Taraxacum officinale* F.H.Wigg. s.l.: Nat. - Yel.; Mykh.  
 269. *Taraxacum serotinum* (Waldst. & Kit.) Poir.: Nat. - Yel.; Mykh.  
 270. *Tragopogon dubius* Scop. subsp. *desertorum* (Lindem.) Tzvelev (= *T. tesquicola* Klokov): Nat. - Yel. [Endemic]  
 271. *Tragopogon dubius* subsp. *major* (Jacq.) Vollm.: Nat. - Yel.; Mykh.  
 272. *Tripleurospermum inodorum* (L.) Sch.Bip.: Xen. - Yel.; Mykh.  
 273. *Tripolium pannonicum* (Jacq.) Dobroc.: Nat. - Yel.  
 274. *Xanthium orientale* L.: Xen. - Yel.; Mykh. [Invasive]  
 275. *Xanthium spinosum* L.: Xen. - Yel.  
 276. *Xanthium strumarium* L.: Xen. - Yel.  
 277. *Xeranthemum annuum* L.: Nat. - Yel.; Mykh.  
 BERBERIDACEAE  
 278. *Berberis vulgaris* L.: Nat. - Yel.  
 279. *Gymnospermium odessanum* (DC.) Takht.: Nat. - Yel. [Endemic]  
 BETULACEAE  
 ! *Betula pendula* Roth: Cult. - !Yel.  
 \**Corylus americana* Walter: Cult. - !\*Yel.  
 BORAGINACEAE  
 280. *Anchusa arvensis* (L.) M.Bieb. subsp. *orientalis* (L.) Nordh.: Xen. - Yel.  
 281. *Anchusa officinalis* L.: Xen. - Yel.; Mykh.

282. *Anchusa procera* Besser ex Link: Nat. - Yel.; Mykh.  
283. *Asperugo procumbens* L.: Nat. - Yel.  
284. *Buglossoides arvensis* (L.) I.M.Johnst.: Xen. - Yel.; Mykh.  
285. *Buglossoides rochelii* (Friv.) Stoyanov, Mátis & Sennikov (= *B. czernjajevii* (Klokov & Des.-Shost.) Czerep.): Nat. - Yel.  
286. *Cynoglossum officinale* L.: Xen. - Yel.; Mykh.  
287. *Echium italicum* L. subsp. *biebersteinii* (Lacaita) Greuter & Burdet: Nat. - Yel.  
288. *Echium vulgare* L.: Nat. - Yel.; Mykh.  
289. *Heliotropium stevenianum* Andr.: Nat. - Yel.  
291. *Lappula heteracantha* (Ledeb.) Gürke: Nat. - Yel.; Mykh.  
290. *Lappula patula* (Lehm.) Menyh.: Xen. - Yel.  
292. *Lappula squarrosa* (Retz.) Dumort.: Xen. - Yel.  
293. *Lithospermum officinale* L.: Nat. - Yel.; Mykh.  
294. *Myosotis ramosissima* Rochel ex Schult.: Nat. - Yel.  
295. *Myosotis stricta* Link ex Roem. & Schult.: Nat. - Yel.  
296. *Nonea pulla* (L.) DC.: Nat. - Yel.; Mykh.  
297. *Nonea rossica* Steven: Nat. - Yel.  
298. *Onosma visianii* Clementi: Nat. - Yel.; Mykh.  
299. *Pontechium maculatum* (L.) Böhle & Hilger: Nat. - Yel.; Mykh.  
300. *Symphytum officinale* L.: Nat. - Yel.
- BRASSICACEAE  
301. *Alyssum alyssoides* (L.) L.: Nat. - Yel.; Mykh.  
302. *Alyssum desertorum* Stapf: Nat. - Yel.; Mykh.  
303. *Alyssum hirsutum* M.Bieb.: Xen. - Yel.; Mykh.  
304. *Arabidopsis thaliana* (L.) Heynh.: Nat. - Yel.; Mykh.  
305. *Arabis auriculata* Lam.: Nat. - Yel.  
306. *Barbarea vulgaris* W.T.Aiton subsp. *arcuata* (Opiz ex J.Presl & C.Presl) Čelak.: Nat. - Yel.; Mykh.  
307. *Berteroa incana* (L.) DC.: Nat. - Yel.; Mykh.  
308. *Brassica elongata* Ehrh. subsp. *integrifolia* (Boiss.) Breistr.: Nat. - Yel.; Mykh.  
309. *Brassica juncea* (L.) Czern.: Erg. - Yel.  
310. *Bunias orientalis* L.: Xen. - Yel.; Mykh.  
311. *Camelina microcarpa* Andr. ex DC.: Xen. - Yel.; Mykh.  
312. *Capsella bursa-pastoris* (L.) Medik.: Xen. - Yel.; Mykh. [Invasive]  
313. *Chorispora tenella* (Pall.) DC.: Xen. - Yel.  
314. *Crambe tataria* Sebeók: Nat. - Yel.; Mykh.  
315. *Descurainia sophia* (L.) Webb ex Prantl.: Xen. - Yel.; Mykh.  
316. *Diplotaxis muralis* (L.) DC.: Xen. - Yel.  
317. *Draba nemorosa* L.: Nat. - Mykh.  
318. *Draba verna* L.: Nat. - Yel.; Mykh.  
319. *Erysimum canum* (Pill. & Mitterp.) Polatschek (= *Syrenia ucrainica* Klokov): Nat. - Yel.  
320. *Erysimum diffusum* Ehrh.: Nat. - Yel.; Mykh.  
321. *Erysimum repandum* L.: Xen. - Yel.; Mykh.  
322. *Euclidium syriacum* (L.) W.T.Aiton: Xen. - Yel.  
323. *Hesperis tristis* L.: Nat. - Yel.  
324. *Isatis tinctoria* L.: Nat. - Yel.; Mykh.  
325. *Lepidium draba* L.: Xen. - Yel.; Mykh.  
326. *Lepidium perfoliatum* L.: Xen. - Yel.; Mykh.  
327. *Lepidium ruderales* L.: Xen. - Yel.; Mykh.  
328. *Meniocus linifolius* (Stephan ex Willd.) DC.: Nat. - Yel.  
329. *Mutarda arvensis* (L.) D.A.German (= *Sinapis arvensis* L.): Xen. - Yel.; Mykh.  
330. *Noccaea perfoliata* (L.) Al-Shehbaz: Xen. - Yel.; Mykh.  
331. *Odontarrhena tortuosa* (Willd.) C.A.Mey.: Nat. - Yel.; Mykh.  
332. *Rapistrum perenne* (L.) All.: Nat. - Yel.; Mykh.  
333. *Rapistrum rugosum* (L.) All.: Xen. - Yel.  
334. *Rorippa amphibia* (L.) Besser: Nat. - Yel.  
335. *Rorippa austriaca* (Crantz) Besser: Nat. - Yel.  
336. *Sisymbrium altissimum* L.: Nat. - Yel.; Mykh.  
337. *Sisymbrium loeselii* L.: Xen. - Yel.; Mykh.  
338. *Sisymbrium officinale* (L.) Scop.: Xen. - Yel.; Mykh.  
339. *Sisymbrium polymorphum* (Murray) Roth: Nat. - Yel.; Mykh.  
340. *Thlaspi arvense* L.: Xen. - Yel.; Mykh.
- CAMPANULACEAE  
341. *Asyneuma canescens* (Waldst. & Kit.) Griseb. & Schenk: Nat. - Yel.; Mykh.  
342. *Campanula sibirica* L.: Nat. - Yel.; Mykh.
- CANNABACEAE  
343. *Cannabis sativa* L. var. *ruderalis* (Janisch.) S.Z.Liou: Xen. - Yel.; Mykh.  
344. *Humulus lupulus* L.: Nat. - Yel.; Mykh.
- CAPRIFOLIACEAE  
346. *Cephalaria transsylvanica* (L.) Schrad.: Xen. - Yel.; Mykh.  
347. *Cephalaria uralensis* (Murray) Schrad.: Nat. - Yel.; Mykh.  
348. *Dipsacus laciniatus* L.: Nat. - Yel.  
349. *Knautia arvensis* (L.) Coult.: Nat. - Yel.; Mykh.  
345. *Lonicera tatarica* L.: Erg. - Yel.; Mykh.  
350. *Scabiosa ochroleuca* L.: Nat. - Yel.; Mykh.  
351. *Valeriana dentata* (L.) All.: Xen. - Yel.  
352. *Valeriana pleurota* Christenh. & Byng: Nat. - Yel.  
353. *Valeriana rimosa* (Bastard) Christenh. & Byng: Xen. - Yel.  
354. *Valeriana stolonifera* Czern.: Nat. - Yel.  
355. *Valeriana tuberosa* L.: Nat. - Yel.
- CARYOPHYLLACEAE  
356. *Arenaria serpyllifolia* L.: Nat. - Yel.; Mykh.  
357. *Cerastium perfoliatum* L.: Nat. - Yel.  
358. *Dianthus carbonatus* Klokov: Nat. - Yel.; Mykh. [Endemic]  
359. *Dianthus elongatus* C.A.Mey.: Nat. - Yel.; Mykh. [Endemic]  
360. *Dianthus pseudoarmeria* M.Bieb.: Nat. - Yel.  
361. *Dichodon viscidum* (M.Bieb.) Holub: Nat. - Yel.  
362. *Eremogone biebersteinii* (D.F.K.Schldtl.) Holub: Nat. - Mykh.  
363. *Eremogone cephalotes* (M.Bieb.) Fenzl: Nat. - Yel.; Mykh. [Endemic]  
364. *Eremogone longifolia* (M.Bieb.) Fenzl: Nat. - Yel.  
365. *Eremogone rigida* (M.Bieb.) Fenzl: Nat. - Yel.  
366. *Gypsophila collina* Steven ex Ser.: Nat. - Yel.; Mykh. [Endemic]  
367. *Gypsophila pallasii* Ikonn.  
368. *Herniaria glabra* L.: Nat. - Yel.; Mykh.  
369. *Herniaria incana* Lam.: Nat. - Yel.; Mykh.  
370. *Holosteum umbellatum* L.: Nat. - Yel.; Mykh.  
371. *Minuartia setacea* (Thuill.) Hayek: Nat. - Yel.; Mykh.  
372. *Paronychia cephalotes* (M.Bieb.) Besser: Nat. - Yel.; Mykh.  
373. *Sabulina tenuifolia* Rchb. (= *Minuartia hypanica* Klokov): Nat. - Yel.  
374. *Saponaria officinalis* L.: Erg. - Yel.; Mykh.  
375. *Scleranthus annuus* L.: Xen. - Yel.; Mykh.  
376. *Silene bupleuroides* L.: Nat. - Yel.; Mykh.  
377. *Silene chersonensis* (Zapał.) Kleopow: Nat. - Yel.; Mykh.  
378. *Silene chlorantha* (Willd.) Ehrh.: Nat. - Yel.  
379. *Silene csereii* Baumg.: Nat. - Yel.; Mykh.  
380. *Silene latifolia* Poir. subsp. *alba* (Miller) Greuter & Burdet: Nat. - Yel.; Mykh.  
381. *Silene supina* M.Bieb.: Nat. - Yel.  
382. *Silene viscosa* (L.) Pers.: Nat. - Yel.; Mykh.  
383. *Silene vulgaris* (Moench) Garcke: Nat. - Yel.; Mykh.  
384. *Stellaria graminea* L.: Nat. - Yel.  
385. *Viscaria vulgaris* Bernh.: Nat. - Yel.; Mykh.
- CELASTRACEAE  
386. *Euonymus europaeus* L.: Nat. - Yel.; Mykh.  
387. *Euonymus verrucosus* Scop.: Nat. - Yel.
- CERATOPHYLLACEAE  
388. *Ceratophyllum demersum* L.: Nat. - Yel.
- CONVOLVULACEAE  
389. *Calystegia sepium* (L.) R.Br.: Nat. - Yel.; Mykh.  
390. *Convolvulus arvensis* L.: Nat. - Yel.; Mykh.  
391. *Convolvulus lineatus* L.: Nat. - Yel.; Mykh.  
392. *Cuscuta epithimum* (L.) L.: Nat. - Yel.
- CORNACEAE  
! *Cornus mas* L.: Cult. - !Yel.  
393. *Cornus sanguinea* L. subsp. *sanguinea*: Nat. - Mykh.  
394. *Cornus sanguinea* subsp. *australis* (C.A.Mey.) Jáv.: Nat. - Yel.; Mykh.  
395. *Cornus sanguinea* subsp. *x hungarica* (Kárpáti) Soó: Erg. - !Yel.; Mykh.
- CRASSULACEAE  
396. *Hylotelephium maximum* (L.) Holub subsp. *ruprechtii* (Jalas) Dostál: Nat. - Yel.; Mykh.  
397. *Sedum acre* L.: Nat. - Yel.
- CUCURBITACEAE  
398. *Bryonia alba* L.: Erg. - Mykh. (Paczoski, 2008)  
399. *Cucurbita pepo* L.: Erg. - Mykh.

## ELAEAGNACEAE

400. *Elaeagnus angustifolia* L.: Erg. - Yel.; Mykh. [Invasive]

## EUPHORBIACEAE

401. *Euphorbia agraria* M.Bieb.: Nat. - Yel.402. *Euphorbia esula* L.: Nat. - Yel.403. *Euphorbia* × *goldei* Prokh. (= *E. pseudoglareosa* Klokov): Nat. - Yel. [Endemic]404. *Euphorbia leptocaula* Boiss.: Nat. - Yel.405. *Euphorbia peplus* L.: Xen. - Yel.406. *Euphorbia saratoi* Ardoino: Nat. - Yel.; Mykh.407. *Euphorbia seguieriana* Neck.: Nat. - Yel.; Mykh.408. *Euphorbia semivillosa* (Prokh.) Krylov: Nat. - Yel.; Mykh.409. *Euphorbia stepposa* Zoz ex Prokh.: Nat. - Yel.; Mykh.

## FABACEAE

410. *Amorpha fruticosa* L.: Erg. - Yel.; Mykh. [Invasive]411. *Astragalus asper* Jacq.: Nat. - Yel.412. *Astragalus austriacus* Jacq.: Nat. - Yel.; Mykh.413. *Astragalus cicer* L.: Nat. - Yel.414. *Astragalus corniculatus* M.Bieb.: Nat. - Yel.415. *Astragalus dasyanthus* Pall.: Nat. - Yel.; Mykh.416. *Astragalus dolichophyllus* Pall.: Nat. - Yel.417. *Astragalus exscapus* L. subsp. *pubiflorus* (DC.) Soó: Nat. - Yel.; Mykh.418. *Astragalus henningii* (Steven) Boriss. (= *A. buchtormensis* Pall.s.l.): Nat. - Yel. [Endemic]419. *Astragalus odessanus* Besser. (= *A. cornutus* Pall. s.l.): Nat. - Yel. [Endemic]420. *Astragalus onobrychis* L.: Nat. - Yel.; Mykh.421. *Astragalus ponticus* Pall.: Nat. - Yel.; Mykh.422. *Astragalus pseudotataricus* Boriss.: Nat. - Yel.423. *Astragalus ucrainicus* Popov & Klokov: Nat. - Yel.; Mykh.424. *Astragalus varius* S.G.Gmel.: Nat. - Yel.425. *Astragalus vesicarius* L. subsp. *vesicarius*: Nat. - Yel.; Mykh.! *Caragana arborescens* Lam.: Cult. - !Yel.426. *Caragana frutex* (L.) K.Koch subsp. *frutex*: Nat. - Yel.427. *Caragana frutex* subsp. *mollis* (M.Bieb.) Kuzmanov: Nat. - Yel.428. *Caragana scythica* (Kom.) Pojark.: Nat. - Yel.; Mykh.429. *Chamaecytisus ruthenicus* (Fisch. ex Wol.) Klásk.: Nat. - Yel.430. *Chamaecytisus skrobiszewskii* (Pacz.) Klásk. (= *C. graniticus* auct. non Rehm): Nat. - Yel. [Endemic]431. *Coronilla varia* L.: Nat. - Yel.; Mykh.432. *Genista scythica* Pacz. (= *G. albida* Willd. s.l.): Nat. - Yel.; Mykh. [Endemic]433. *Gleditsia triacanthos* L.: Erg. - !Yel.; Mykh.434. *Hedysarum grandiflorum* Pall.: Nat. - Yel.; Mykh.435. *Lathyrus pratensis* L.: Nat. - Yel.436. *Lathyrus sylvestris* L.: Nat. - Yel.437. *Lathyrus tuberosus* L.: Erg. - Yel.; Mykh.438. *Lotus corniculatus* L.: Nat. - Yel.; Mykh.444. *Lotus stepposus* Kramina: Nat. - Yel.; Mykh.439. *Medicago* × *varia* Martyn: Erg. - Yel.440. *Medicago falcata* L.: Nat. - Yel.; Mykh.441. *Medicago lupulina* L.: Nat. - Yel.; Mykh.442. *Medicago minima* (L.) Bartal.: Nat. - Yel.; Mykh.443. *Medicago monspeliaca* (L.) Trautv.: Nat. - Yel.445. *Medicago sativa* L.: Erg. - Yel.; Mykh.446. *Melilotus albus* Medik.: Nat. - Yel.; Mykh.447. *Melilotus officinalis* (L.) Lam.: Nat. - Yel.; Mykh.448. *Onobrychis arenaria* (Kit.) DC.: Nat. - Yel.; Mykh.449. *Onobrychis gracilis* Besser: Nat. - Yel.450. *Oxytropis pilosa* (L.) DC.: Nat. - Yel.451. *Robinia pseudoacacia* L.: Erg. - !Yel.; Mykh. [Invasive]452. *Trifolium alpestre* L.: Nat. - Yel.453. *Trifolium arvense* L.: Nat. - Yel.; Mykh.454. *Trifolium aureum* Pollich: Nat. - Yel.455. *Trifolium fragiferum* L.: Nat. - Yel.456. *Trifolium pratense* L.: Nat. - Yel.; Mykh.457. *Trifolium repens* L.: Nat. - Yel.; Mykh.458. *Vicia cracca* L.: Nat. - Yel.; Mykh.459. *Vicia hirsuta* (L.) Gray: Xen. - Yel.460. *Vicia lathyroides* L.: Nat. - Yel.461. *Vicia sativa* L. subsp. *nigra* Ehrh.: Xen. - Yel.462. *Vicia tenuifolia* Roth: Nat. - Yel.; Mykh.463. *Vicia tetrasperma* (L.) Schreb.: Xen. - Yel.; Mykh.464. *Vicia villosa* Roth: Xen. - Yel.; Mykh. [Invasive]

## FAGACEAE

465. *Quercus robur* L.: Nat. - Yel.

## GERANIACEAE

466. *Erodium cicutarium* (L.) L'Her.: Nat. - Yel.; Mykh.467. *Geranium collinum* Stephan ex Willd.: Nat. - Yel.468. *Geranium divaricatum* Ehrh.: Nat. - Yel.

## GROSSULARIACEAE

! *Ribes aureum* Pursh: Cult. - !Yel.! *Ribes nigrum* L.: Cult. - !Yel.

## HYDRANGEACEAE

! *Philadelphus coronarius* L.: Cult. - !Yel.

## HYPERICACEAE

469. *Hypericum elegans* Stephan ex Willd.: Nat. - Yel.; Mykh.470. *Hypericum perforatum* L.: Nat. - Yel.; Mykh.

## JUGLANDACEAE

471. *Juglans regia* L.: Erg. - Yel.; Mykh.

## LAMIACEAE

472. *Ajuga chamaepitys* (L.) Schreb. subsp. *chia* (Schreb.) Arcang.: Nat. - Yel.; Mykh.473. *Ajuga genevensis* L.: Nat. - Yel.; Mykh.474. *Ballota nigra* L.: Xen. - Yel.; Mykh.475. *Betonica officinalis* L.: Nat. - Yel.; Mykh.476. *Chaiturus marrubiastrum* (L.) Ehrh. ex Rchb.: Nat. - Yel.; Mykh.477. *Clinopodium acinos* (L.) Kuntze: Nat. - Yel.; Mykh.478. *Glechoma hederacea* L.: Nat. - Yel.; Mykh.479. *Glechoma hirsuta* Waldst. & Kit.: Nat. - Yel.; Mykh. (Paczoski, 2008)480. *Lamium album* L.: Xen. - Yel.481. *Lamium amplexicaule* L.: Xen. - Yel.; Mykh.482. *Lamium purpureum* L.: Xen. - Yel.; Mykh.483. *Leonurus glaucescens* Bunge: Nat. - Yel.; Mykh.484. *Lycopus europaeus* L.: Nat. - Yel.; Mykh.485. *Lycopus exaltatus* L.f.: Nat. - Yel.486. *Marrubium peregrinum* L.: Nat. - Yel.; Mykh.487. *Nepeta nuda* L.: Nat. - Yel.; Mykh.488. *Nepeta ucranica* L. subsp. *parviflora* (M.Bieb.) M.Masclans: Nat. - Yel.489. *Origanum vulgare* L.: Nat. - Yel.; Mykh.490. *Phlomis herba-venti* L. subsp. *pungens* (Willd.) Maire ex DeFilipps: Nat. - Yel.; Mykh.491. *Phlomis tuberosa* (L.) Moench: Nat. - Yel.; Mykh.492. *Prunella grandiflora* (L.) Turra: Nat. - Yel.493. *Salvia aethiopsis* L.: Nat. - Yel.; Mykh.494. *Salvia dumetorum* Andrzej. ex Besser: Nat. - Yel.; Mykh.495. *Salvia nemorosa* L. subsp. *nemorosa*: Nat. - Yel.; Mykh.496. *Salvia nutans* L.: Nat. - Yel.; Mykh.497. *Salvia revelata* Mátis & A.Z.Szabó (= *S. austriaca* auct. non Jacq.): Nat. - Yel.; Mykh.498. *Scutellaria verna* Besser (= *S. supina* L.s.l.): Nat. - Yel. [Endemic]499. *Sideritis montana* L.: Nat. - Yel.; Mykh.500. *Stachys recta* L.: Nat. - Yel.; Mykh.501. *Teucrium chamaedrys* L.: Nat. - Yel.; Mykh.502. *Teucrium polium* L.: Nat. - Yel.; Mykh. (Paczoski, 2008)503. *Thymus* × *dimorphus* Klokov & Des.-Shost.: Nat. - Yel.; Mykh. [Endemic]

## LINACEAE

504. *Linum austriacum* L.: Nat. - Yel.; Mykh.505. *Linum flavum* L.: Nat. - Yel.; Mykh.506. *Linum hirsutum* L.: Nat. - Yel.; Mykh.507. *Linum nervosum* Waldst. & Kit.: Nat. - Yel.508. *Linum perenne* L.: Nat. - Yel.; Mykh.509. *Linum tauricum* Willd.: Nat. - Yel.; Mykh.510. *Linum tenuifolium* L.: Nat. - Yel.; Mykh.

## MALVACEAE

511. *Alcea biennis* Winterl.: Nat. - Yel.; Mykh.512. *Alcea rugosa* Alef.: Nat. - Yel.513. *Althaea officinalis* L.: Erg. - Yel.514. *Hibiscus trionum* L.: Xen. - Mykh.

515. *Malva neglecta* Wallr.: Xen. - Yel.; Mykh.  
516. *Malva pusilla* Sm.: Xen. - Yel.  
517. *Malva thuringiaca* (L.) Vis.: Nat. - Yel.; Mykh.  
! *Tilia cordata* Mill.: Cult. - !Yel.  
! \* *Tilia platyphyllos* Scop.: Cult. - !\*Yel.
- MORACEAE  
518. *Morus alba* L.: Erg. - Yel.; Mykh.
- OLEACEAE  
519. *Fraxinus excelsior* L.: Erg. - Yel.  
520. *Fraxinus pennsylvanica* Marshall: Erg. - Yel. [Invasive]  
521. *Ligustrum vulgare* L.: Nat. - Yel.; Mykh.  
! *Syringa × chinensis* Willd.: Cult. - !Yel.  
! *Syringa vulgaris* L.: Cult. - !Yel.; !Mykh.
- ONAGRACEAE  
522. *Epilobium hirsutum* L.: Nat. - Yel.; Mykh.
- OROBANCHACEAE  
523. *Odontites luteus* (L.) Clairv.: Nat. - Yel.; Mykh.  
524. *Odontites vulgaris* Moench: Nat. - Yel.  
525. *Orobanche alba* Stephan ex Willd. subsp. *major* (Čelak.) Zázvorka: Nat. - Yel.; Mykh.  
526. *Orobanche caryophyllacea* Sm.: Nat. - Yel.  
527. *Orobanche purpurea* Jacq.: Nat. - Yel.; Mykh.
- PAPAVERACEAE  
528. *Chelidonium majus* L.: Nat. - Yel.; Mykh.  
529. *Corydalis solida* (L.) Clairv.: Nat. - Mykh.  
530. *Fumaria parviflora* Lam.: Xen. - Yel.  
531. *Fumaria schleicheri* Soy.-Will.: Xen. - Yel.  
532. *Fumaria vaillantii* Loisel.: Xen. - Yel.; Mykh.  
533. *Glaucium corniculatum* (L.) Curtis: Nat. - Yel.; Mykh.  
534. *Papaver albiflorum* (Elkan) Pacz.: Nat. - Mykh. (Paczoski, 2008)  
535. *Papaver dubium* L. subsp. *dubium*: Xen. - Yel.; Mykh.  
536. *Papaver dubium* subsp. *stevenianum* (Mikheev) Kubát & Šipošová: Nat. - Mykh.  
537. *Papaver rhoeas* L.: Xen. - Yel.; Mykh.
- PLANTAGINACEAE  
538. *Linaria biebersteinii* Besser subsp. *biebersteinii*: Nat. - Yel.; Mykh. [Endemic]  
539. *Linaria genistifolia* (L.) Mill.: Nat. - Yel.; Mykh.  
540. *Linaria macroura* (M.Bieb.) M.Bieb.: Nat. - Yel.; Mykh.  
541. *Linaria vulgaris* Mill.: Nat. - Yel.; Mykh.  
542. *Plantago cornuti* Gouan: Nat. - Yel.  
543. *Plantago lanceolata* L.: Nat. - Yel.  
544. *Plantago major* L. subsp. *major*: Nat. - Yel.; Mykh.  
545. *Plantago major* subsp. *intermedia* (Gilib.) Lange: Nat. - Yel.  
546. *Plantago media* L.: Nat. - Yel.  
547. *Plantago tenuiflora* Waldst. & Kit.: Nat. - Yel.  
548. *Plantago urvillei* Opiz: Nat. - Yel.; Mykh.  
549. *Veronica anagallis-aquatica* L.: Nat. - Yel.  
550. *Veronica arvensis* L.: Xen. - Yel.  
551. *Veronica austriaca* L. subsp. *jacquinii* (Baumg.) Watzl: Nat. - Yel.; Mykh.  
552. *Veronica polita* Fr.: Xen. - Yel.; Mykh.  
553. *Veronica praecox* All.: Nat. - Yel.  
554. *Veronica prostrata* L.: Nat. - Yel.  
555. *Veronica gryniaca* Klokov: Nat. - Yel. [Endemic]  
556. *Veronica steppacea* Kotov: Nat. - Yel.; Mykh.  
557. *Veronica teucrium* L.: Nat. - Yel.; Mykh.  
558. *Veronica triphyllos* L.: Xen. - Yel.  
559. *Veronica verna* L.: Nat. - Yel.; Mykh.
- PLUMBAGINACEAE  
560. *Goniolimon besserianum* (Schult. ex Rchb.) Kusn.: Nat. - Yel.; Mykh. [Endemic]  
561. *Goniolimon tataricum* (L.) Boiss.: Nat. - Yel.  
562. *Limonium hypanicum* Klokov: Nat. - Mykh. [Endemic]  
563. *Limonium platyphyllum* Lincz.: Nat. - Yel.; Mykh.
- POLYGALACEAE  
564. *Polygala comosa* Schkuhr: Nat. - Yel.; Mykh.  
565. *Polygala major* Jacq.: Nat. - Mykh.
- POLYGONACEAE  
566. *Fallopia convolvulus* (L.) Á.Löve: Xen. - Yel.; Mykh.  
567. *Persicaria amphibia* (L.) Delarbre: Nat. - Yel.  
568. *Persicaria maculosa* Gray: Nat. - Yel.  
569. *Persicaria tomentosa* (Schrank) E.P.Bicknell: Nat. - Yel.  
570. *Polygonum aviculare* L. subsp. *aviculare*: Nat. - Yel.; Mykh.  
571. *Polygonum aviculare* subsp. *neglectum* (Besser) Arcang.: Nat. - Yel.; Mykh.  
572. *Polygonum novoascanicum* Klokov: Nat. - Yel.  
573. *Rumex acetosella* L. subsp. *acetoselloides* (Balansa) Den Nijs: Nat. - Yel.  
574. *Rumex confertus* Willd.: Nat. - Yel.; Mykh.  
575. *Rumex hydrolapathum* Huds.: Nat. - Yel.  
576. *Rumex patientia* L. subsp. *patientia*: Erg. - Mykh.  
577. *Rumex patientia* subsp. *orientalis* (Bernh. ex Schult. & Schult.f.) Danser: Erg. - Yel.  
578. *Rumex stenophyllus* Ledeb.: Nat. - Yel.  
579. *Rumex thyrsiflorus* Fingerh.: Nat. - Yel.
- PORTULACACEAE  
580. *Portulaca oleracea* L.: Xen. - Yel.; Mykh. [Invasive]
- PRIMULACEAE  
581. *Androsace elongata* L.: Nat. - Yel.; Mykh.  
582. *Androsace maxima* L.: Nat. - Yel.  
583. *Lysimachia foemina* (Mill.) U.Manns & Anderb.: Xen. - Yel.  
584. *Lysimachia nummularia* L.: Nat. - Yel.  
585. *Lysimachia vulgaris* L.: Nat. - Yel.
- RANUNCULACEAE  
586. *Adonis aestivalis* L.: Xen. - Yel.; Mykh.  
587. *Adonis vernalis* L.: Nat. - Yel.; Mykh.  
588. *Adonis volgensis* Steven ex DC.: Nat. - Yel.  
589. *Anemonoides sylvestris* (L.) Galasso, Banfi & Soldano: Nat. - Yel.; Mykh.  
590. *Clematis integrifolia* L.: Nat. - Yel.; Mykh.  
591. *Delphinium ajacis* L. (= *Consolida orientalis* (Gay) Schröd.): Erg. - Yel.  
592. *Delphinium consolida* L. subsp. *paniculatum* (Host) N.Busch: Nat. - Yel.; Mykh.  
593. *Nigella arvensis* L.: Xen. - Yel.; Mykh.  
594. *Pulsatilla pratensis* (L.) Mill. subsp. *pratensis* (= *P. nigricans* Störck.): Nat. - Yel.; Mykh.  
595. *Pulsatilla pratensis* subsp. *ucrainica* (Ugr.) Grey-Wilson: Nat. - Yel.; Mykh. [Endemic]  
596. *Ranunculus illyricus* L.: Nat. - Yel.; Mykh.  
597. *Ranunculus pedatus* Waldst. & Kit.: Nat. - Yel.  
598. *Ranunculus polyanthemus* L.: Nat. - Yel.; Mykh.  
599. *Ranunculus sceleratus* L.: Nat. - Yel.  
600. *Ranunculus testiculatus* Crantz: Nat. - Yel.; Mykh.  
601. *Thalictrum minus* L. subsp. *minus*: Nat. - Yel.; Mykh.  
602. *Thalictrum minus* subsp. *flexuosum* (Bernh. ex Rchb.) Syme: Nat. - Mykh.
- RESEDACEAE  
603. *Reseda lutea* L.: Xen. - Yel.; Mykh.
- RHAMNACEAE  
604. *Rhamnus cathartica* L.: Nat. - Yel.; Mykh.
- ROSACEAE  
605. *Agrimonia eupatoria* L. subsp. *eupatoria*: Nat. - Yel.; Mykh.  
606. *Agrimonia eupatoria* subsp. *grandis* (Asch. & Graebn.) Bornm.: Nat. - Yel.; Mykh.  
607. *Agrimonia procera* Wallr.: Nat. - Yel.  
608. *Argentina anserina* (L.) Rydb.: Nat. - Yel.; Mykh.  
609. *Crataegus × kyrtostyla* Fingerh.: Nat. - Yel.; Mykh.  
610. *Crataegus monogyna* Jacq.: Nat. - Yel.; Mykh.  
611. *Filipendula vulgaris* Moench: Nat. - Yel.  
612. *Fragaria viridis* Weston subsp. *campestris* (Steven) Pawl.: Nat. - Yel.  
613. *Geum urbanum* L.: Nat. - Yel.; Mykh.  
614. *Malus domestica* (Suckow) Borkh.: Erg. - Yel.; Mykh.  
615. *Potentilla argentea* L.: Nat. - Yel.; Mykh.  
616. *Potentilla astracana* Jacq.: Nat. - Yel.; Mykh.  
617. *Potentilla humifusa* Willd. ex D.F.K.Schltldl.: Nat. - Yel.  
618. *Potentilla incana* P.Gaertn., B.Mey. & Scherb.: Nat. - Yel.; Mykh.  
619. *Potentilla inclinata* Vill. (= *P. canescens* Besser): Nat. - Yel.  
620. *Potentilla neglecta* Baumg.: Nat. - Yel.; Mykh.  
621. *Potentilla patula* Waldst. & Kit.: Nat. - Yel.  
622. *Potentilla recta* L. subsp. *recta*: Nat. - Yel.  
623. *Potentilla recta* subsp. *obscura* (Willd.) Arcang.: Nat. - Yel.; Mykh.  
624. *Potentilla recta* subsp. *pilosa* (Poir.) Jáv.: Nat. - Yel.; Mykh.

625. *Potentilla reptans* L.: Nat. - Yel.; Mykh.  
 626. *Potentilla supina* L. subsp. *supina*: Nat. - Yel.  
 627. *Prunus armeniaca* L.: Erg. - Yel.; Mykh.  
 ! *Prunus avium* (L.) L.: Cult. - !Yel.  
 628. *Prunus cerasifera* Ehrh.: Erg. - Yel.; Mykh.  
 629. *Prunus cerasus* L.: Erg. - Yel.  
 ! *Prunus domestica* L.: Cult. - !Yel.  
 ! *Prunus insititia* L.: Cult. - !Yel.  
 630. *Prunus mahaleb* L.: Erg. - Yel.; Mykh.  
 631. *Prunus spinosa* L. subsp. *dasyphylla* (Schur) Domin: Nat. - Yel.; Mykh.  
 632. *Prunus tenella* Batsch.: Nat. - Yel.; Mykh.  
 !\* *Prunus virginiana* L.: Cult. - !\*Yel.  
 633. *Pyrus communis* L. subsp. *communis*: Erg. - Yel.; Mykh.  
 634. *Pyrus communis* subsp. *pyraster* (L.) Ehrh.: Nat. - Yel.; Mykh.  
 635. *Rosa canina* L.: Nat. - Yel.; Mykh.  
 636. *Rosa corymbifera* Borkh.: Nat. - Yel.; Mykh.  
 637. *Rosa dumalis* Bechst. (= *R. biserrata* auct. non Mérat): Nat. - Yel.  
 638. *Rosa gallica* L.: Nat. - Yel.; Mykh.  
 639. *Rosa marginata* Wallr.: Nat. - Yel.; Mykh.  
 640. *Rosa rubiginosa* L.: Nat. - Yel.; Mykh.  
 641. *Rosa spinosissima* L.: Nat. - Yel.  
 642. *Rosa tomentosa* Sm. (= *R. dimorpha* Besser): Nat. - Yel.  
 643. *Rubus caesius* L.: Nat. - Yel.; Mykh.  
 644. *Sanguisorba minor* Scop. subsp. *balearica* (Bourg. ex Nyman) Muñoz Garm. & C.Navarro: Nat. - Yel.; Mykh.  
 ! *Spiraea alba* Du Roi var. *latifolia* (Aiton) Dippel: Cult. - !Yel.  
 645. *Spiraea hypericifolia* L.: Nat. - Yel.  
 RUBIACEAE  
 646. *Cynanchica pyrenaica* (L.) P.Caputo & Del Guacchio subsp. *cynanchica* (L.) P.Caputo & Del Guacchio: Nat. - Yel.; Mykh.  
 647. *Cynanchica rumelica* (Boiss.) P.Caputo & Del Guacchio: Nat. - Yel.; Mykh.  
 648. *Galium album* Mill.: Nat. - Yel.  
 649. *Galium aparine* L.: Nat. - Yel.; Mykh.  
 650. *Galium borysthenticum* Klokov: Nat. - Yel. [Endemic]  
 651. *Galium humifusum* M.Bieb.: Nat. - Yel.; Mykh.  
 652. *Galium octonarum* (Klokov) Pobed.: Nat. - Yel.; Mykh.  
 653. *Galium rubioides* L. (= *G. physocarpum* Ledeb.): Nat. - Yel.  
 654. *Galium spurium* L.: Xen. - Mykh. (Paczoski, 2008)  
 655. *Galium verum* L.: Nat. - Yel.; Mykh.  
 656. *Galium volhynicum* Pobed.: Nat. - Yel.  
 RUTACEAE  
 657. *Haplophyllum suaveolens* (DC.) G.Don f.: Nat. - Yel.; Mykh. (Paczoski, 2008)  
 SALICACEAE  
 ! *Populus nigra* L. f. *italica* (Münchh.) A.Andersen: Cult. - !Yel.  
 658. *Salix alba* L.: Nat. - Yel.  
 659. *Salix cinerea* L.: Nat. - Yel.  
 ! *Salix × fragilis* L. (= *S. × rubens* Schrank): Cult. - !Yel. [Invasive]

## 6. Analysis of the flora

The spontaneous flora of the Yelanetsky Steppe Nature Reserve combines two local floras – Yelanetsky Department and Mykhailivsky Department (Table 1). In the Yelanetsky Department 660 taxa were recorded, accounting for 96.9% of the total diversity of the reserve's native flora; in the Mykhailivsky Department, 61.13% of the reserve's native plants diversity was recorded.

The level of adventization of the studied flora was 21.7%, a relatively high indicator for a protected area. For example, according to BURDA ET AL. (2015), this indicator ranged from 9.8% to 28.5% in model

! *Salix × pendulina* Wender f. *tristis* (Gaudin) I.V.Belyaeva: Cult. - !Yel.  
 660. *Salix triandra* L.: Nat. - Yel.  
 SANTALACEAE  
 661. *Thesium linophyllum* L.: Nat. - Yel.  
 662. *Thesium ramosum* Hayne: Nat. - Yel.; Mykh.  
 SAPINDACEAE  
 663. *Acer campestre* L.: Nat. - Yel.; Mykh.  
 664. *Acer negundo* L.: Erg. - Yel.; Mykh. [Invasive]  
 665. *Acer platanoides* L.: Nat. - Yel.  
 666. *Acer tataricum* L.: Nat. - Yel.; Mykh.  
 SCROPHULARIACEAE  
 667. *Verbascum blattaria* L.: Nat. - Yel.  
 668. *Verbascum chaixii* Vill. subsp. *orientale* Hayek (= *V. marschallianum* Ivanina & Tzvelev): Nat. - Yel.  
 669. *Verbascum densiflorum* Bertol.: Nat. - Yel.; Mykh.  
 670. *Verbascum lychnitis* L.: Nat. - Yel.; Mykh.  
 671. *Verbascum nigrum* L.: Nat. - Yel.; Mykh.  
 672. *Verbascum phlomoides* L.: Nat. - Yel.; Mykh.  
 673. *Verbascum phoeniceum* L.: Nat. - Yel.  
 SOLANACEAE  
 674. *Datura stramonium* L.: Xen. - Yel.  
 675. *Hyoscyamus niger* L.: Xen. - Yel.; Mykh.  
 676. *Lycium barbarum* L.: Erg. - Yel.  
 677. *Solanum dulcamara* L.: Nat. - Yel.  
 678. *Solanum nigrum* L.: Xen. - Yel.; Mykh.  
 THYMELAEACEAE  
 679. *Thymelaea passerina* (L.) Coss. & Germ.: Xen. - Yel.  
 ULMACEAE  
 680. *Ulmus laevis* Pall.: Nat. - Yel.  
 681. *Ulmus minor* Mill.: Nat. - Yel.; Mykh.  
 682. *Ulmus pumila* L.: Erg. - Yel.; Mykh. [Invasive]  
 URTICACEAE  
 683. *Urtica dioica* L. subsp. *dioica*: Nat. - Yel.; Mykh.  
 VIBURNACEAE  
 684. *Sambucus nigra* L.: Nat. - Yel.; Mykh.  
 685. *Sambucus racemosa* L.: Erg. - Yel.  
 VIOLACEAE  
 686. *Viola ambigua* Waldst. & Kit.: Nat. - Yel.; Mykh.  
 687. *Viola arvensis* Murray: Xen. - Yel.; Mykh.  
 688. *Viola odorata* L.: Nat. - Yel.; Mykh.  
 689. *Viola suavis* M.Bieb.: Nat. - Yel.; Mykh.  
 690. *Viola tricolor* L. subsp. *matutina* (Klokov) Valentine: Nat. - Yel.; Mykh.  
 VITACEAE  
 ! *Parthenocissus inserta* (A.Kern.) Fritsch: Cult. - !Yel. [Invasive]  
 691. *Vitis × instabilis* Ardenghi, Galasso, Banfi & Lastrucci: Erg. - Mykh.  
 ! *Vitis vinifera* L.: Cult. - !Yel.  
 ZYGOPHYLLACEAE  
 692. *Tribulus terrestris* L.: Xen. - Mykh.

floras of large conservation areas in the Forest-Steppe zone of Ukraine. Due to adventization, the flora now includes 63 new genera and 10 new families (*Anacardiaceae*, *Cucurbitaceae*, *Elaeagnaceae*, *Juglandaceae*, *Moraceae*, *Portulacaceae*, *Resedaceae*, *Thymelaeaceae*, *Vitaceae*, and *Zygophyllaceae*). Among alien plants, xenophytes significantly outnumbered escapees from cultivation, which suggested the reserve's relative remoteness from areas with intensive plant introduction – a factor generally considered favourable for preserving steppe flora.

Based on our data, the Yelanetsky Steppe Nature Reserve was among the largest centres for the preservation of steppe ecosystems in Ukraine. Its

flora was highly representative compared with published data on other multifunctional high-ranking protected areas in Ukraine that preserve steppe

ecosystems and for which relevant information is available (Table 2).

Table 1. Systematic and immigration structure of the Yelanetsky Steppe Nature Reserve flora

Higher taxa	Native plants	Alien plants		Total
		Xenophytes	Ergasiophygophytes	
The Yelanetsky Department				
<i>HORSETAILS</i>	2	-	-	2
<i>FERNS</i>	1	-	-	1
<i>GYMNOSPERMS</i>	1	-	-	1
<i>ANGIOSPERMS</i>	521	104	31	656
Total (by department)	525	104	31	660
The Mykhailivsky Department				
<i>HORSETAILS</i>	1	-	-	1
<i>GYMNOSPERMS</i>	1	-	-	1
<i>ANGIOSPERMS</i>	329	77	29	435
Total (by department)	332	77	29	438
The Nature Reserve as a whole				
Total	542	110	40	692

Table 2. Comparison of the species richness of the Yelanetsky Steppe Nature Reserve flora with the other steppe-protected areas of Ukraine

Protected Area	Area (ha)	Total Species Count
Mykhailivska Tsilyna Nature Reserve (Sumy Oblast)	882.9	609 (Kolomyichuk et al., 2021)
Askania-Nova Biosphere Reserve (Kherson Oblast)	33,307	527 (Vedenkov & Drohobych, 2003; Shapoval et al., 2023)
Buzky Gard National Nature Park (Mykolaiv Oblast)	6,138	1,080 (Shyriaieva et al., 2022)
Yelanetsky Steppe Nature Reserve (Mykolaiv Oblast)	3010,65	692
Striltsivsky Steppe Department, Luhansk Nature Reserve (Luhansk Oblast)	1,036.51	735 (Onyshchenko & Andrienko, 2012)
Provallia Steppe Department, Luhansk Nature Reserve (Luhansk Oblast)	587.5	783 (Onyshchenko & Andrienko, 2012)
Ukrainian Steppe Nature Reserve, Kalmiushy Department (Donetsk Oblast)	579.6	226 (Onyshchenko & Andrienko, 2012)
Ukrainian Steppe Nature Reserve, Stone Graves Department (Donetsk Oblast)	389.2	470 (Onyshchenko & Andrienko, 2012)
Ukrainian Steppe Nature Reserve, Chalk Flora Department (Donetsk Oblast)	1,134	490 (Onyshchenko & Andrienko, 2012)
Ukrainian Steppe Nature Reserve, Khomutovsky Steppe Department (Donetsk Oblast)	1,030.4	604 (Onyshchenko & Andrienko, 2012)
Opuk Nature Reserve (Crimea)	1,592.3	452 (Onyshchenko & Andrienko, 2012)

The geographical structure of the reserve's flora distinctly reflected its steppe character (Table 3). The most represented native plants are those associated with growth in steppe and xerothermic habitats – with the Eurasian Steppe and Mediterranean types of ranges (and the corresponding geographical elements). Plants belonging to these geoelements–Eurasian Forest–Steppe, Steppe and Desert–Steppe, as well as Mediterranean and

European–Mediterranean–together accounted for 59.1% and were provisionally treated as the “southern” geographical group (Fig. 4). By contrast, plants of the European and European–Siberian geoelements, provisionally combined as the “northern” geographical group, comprised only 8.2% in total.

Among alien species, the most common are of Mediterranean (in the broad sense) and Asian origin which together made up 76.0% (Table 4). This

trend is characteristic of Ukraine's synanthropic flora as a whole (PROPOPOVA, 1991) and has intensified recently due to global warming, which has facilitated the northward expansion of annuals (PROPOPOVA, 2006; BOYCHENKO ET AL., 2016; KELLER ET AL., 2011).

Table 3. Geographical structure of native plants of the Yelanetsky Steppe Nature Reserve flora

Geographical elements	Number of species	%
Eurasian Steppe	143	26.3
Mediterranean	102	18.8
Eurasian	97	17.9
European-Mediterranean	55	10.1
Palaearctic	48	8.9
European	42	7.8
Holarctic	22	4.1
Eurasian Forest-Steppe	17	3.1
Pluriregional	9	1.7
Eurasian Desert-Steppe	5	0.9
Euro-Siberian	2	0.4
Total	542	100

Table 4. Geographical structure of the alien plants in the Yelanetsky Steppe Nature Reserve flora

Region of origin	Number of species	%
Mediterranean	81	54.0
Asia	33	22.0
America	20	13.3
Europe	7	4.7
Anthropogenic origin	5	3.3
Eurasia	4	2.7
Total	150	100

Table 5. Ecological-biomorphological structure of the flora of the Yelanetsky Steppe Nature Reserve (Raunkiaer, 1934)

Life forms	Native plants		Alien plants	
	Number of species	%	Number of species	%
Phanerophytes	30	5.5	20	13.3
Chamaephytes	33	6.1	1	0.7
Hemicryptophytes	310	57.2	48	32.0
Cryptophytes	103	19.0	5	3.3
Therophytes	61	11.3	76	50.7
Hydrophytes	5	0.9	-	-
Total	542	100	150	100

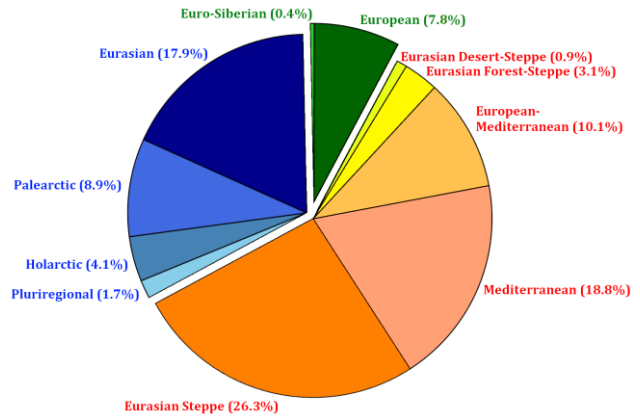


Fig. 4. Scheme of the geographical distribution of native plants in the Yelanetsky Steppe Nature Reserve flora: *blue*– widespread geoelements, *red*–geoelements of the "southern" geographical group, *green*–geoelements of the "northern" geographical group

The natural biomorphological structure of the reserve's flora (Table 5) was formed under the steppe landscapes influenced by a moderately continental climate. The predominant biomorphs were hemicryptophytes, which generally dominate life-form spectra in temperate Holarctic floras (RAUNKIAER, 1934). The overall proportion of therophytes was also high. In natural floras, this proportion tends to increase toward arid regions. The relatively high proportion of cryptophytes reflected the influence of pronounced continental conditions in the reserve. The total proportion of woody biomorphs was 11.6%, with low shrubs and subshrubs prevailing. For comparison, according to MOYSIYENKO (2011), the flora of the Northern Black Sea region showed similar proportions: 7.7% phanerophytes, 32.9% hemicryptophytes, and 23.0% cryptophytes. Among alien plants, therophytes were the predominant biomorphological group, a pattern consistent with the alien fraction of Ukraine's flora in general (PROPOPOVA, 1991).

Table 6. Ecological-coenotic structure of the Yelanetsky Steppe Nature Reserve flora

Cenomorpha	Reserve as a whole		Yelanetsky Dep.		Mykhailivsky Dep.	
	Number of species	%	Number of species	%	Number of species	%
Aquatics	5	0.9	5	1.0	-	-
Sylvants	32	5.9	29	5.5	21	6.3
Marginants	82	15.1	79	15.0	55	16.6
Paludants	22	4.1	21	4.0	5	1.5
Pratants	61	11.3	60	11.4	35	10.5
Stepants	213	39.3	208	39.6	149	44.9
Psammophytes	43	7.9	43	8.2	22	6.6
Petrophytes	27	5.0	25	4.8	14	4.2
Halophytes	14	2.6	14	2.7	1	0.3
Ruderal plants	43	7.9	41	7.8	30	9.0
Total	542	100	525	100	332	100

The ecological-coenotic characteristics of the reserve's natural flora fully reflected the steppe nature of its landscapes and resulted in stepants constituting the largest share of species (Table 6), with marginants and pratants moderately represented. Other cenomorpha were represented by significantly fewer species. The ecological-coenotic spectrum of the native plants in the Yelanetsky Department was largely similar to that of the reserve as a whole. This section hosted a variety of biotopes, including aquatic and wetland (a pond and a seasonal stream), petrophytic (limestone outcrops), and forest (artificial plantations). By contrast, the Mykhailivsky Department lacked open water bodies, however, the proportion of stepants is somewhat higher.

## 7. Discussion

Our results show that the vascular flora of the Yelanetsky Steppe Nature Reserve is strongly steppe-biased, with geo-elements tied to the steppe and Mediterranean regions forming the majority of native plants. From a phytogeographical perspective, endemic plants are considered the most valuable taxa, as they impart distinctiveness and uniqueness to the flora under study (YENA, 2004). In the Yelanetsky Steppe Nature Reserve, 24 such taxa were recorded, including several that are not recognized as distinct species in current nomenclatural sources but are listed in the Red Data Book of Ukraine and require further population-genetic research, such as *Astragalus odessanus*, *Scutellaria verna*, *Tulipa hypanicum*. All of them belonged to the Eurasian Steppe geographical element and are predominantly endemics of the Black Sea (Pontic) region (less commonly, as joint endemics of the Podolian Upland

and the Black Sea region). Thus, the Yelanetsky Steppe safeguarded a substantial share of the endemic core of Ukraine's flora, underscoring the uniqueness of its native flora. This structure is consistent with the reserve's position in the Northern Steppe subzone and with the dominance of hemicryptophytes in temperate Holarctic floras (Table 5).

The nature reserve also contained taxa whose taxonomic status had previously been interpreted more narrowly, which had allowed them to be considered endemic. However, these taxa are now treated as synonyms of more broadly distributed species, for example: *Allium podolicum* (syn. of *A. paniculatum*), *Minuartia leiosperma* (syn. of *M. setacea*), *Rosa crenatula* (syn. of *R. gallica*), *Silene ucranica* (syn. of *S. bupleuroides*), among others. Furthermore, updated chorological data for some species necessitated their exclusion from the list of endemics; for instance, *Galium volhynicum* was found to occur not only in the Black Sea region but also in the Balkans (ASSYOV ET AL., 2012).

### 7.1. The role of the nature reserve in biodiversity conservation of the steppe zone

The significant diversity of natural habitats, the relatively low intensity of land use in the past, and the specificity of the gully systems are the key factors contributing to the high phytodiversity of the nature reserve and, consequently, its rare component. The flora of the nature reserve included 30 rare plant species listed in the Red Data Book of Ukraine (ORDER..., 2021), accounting for 34% of those occurring in the Mykolaiv Oblast (POST-WAR DEVELOPMENT..., 2023). Seven species were listed in the IUCN Red List; twelve in the

European Red List; and two in the Revised Appendix I to the Bern Convention (*Crambe tataria*, *Echium russicum*). Nineteen species were protected at the regional level. In total, the reserve hosted 38 plant species with national and/or international conservation status, indicating a relatively high conservation value. For comparison, the steppe Askania-Nova Biosphere Reserve listed 27 specially protected plant species (VEDENKOV & DROHOBYCH, 2003); departments of the Ukrainian Steppe Nature Reserve listed 20 (in Kalmiusky), 40 (in Stone Graves), 38 (in Chalk Flora), and 41 (Khomutovsky Steppe) (ONYSHCHENKO & ANDRIENKO, 2012). The Luhansk Nature Reserve lists 37 rare plants in Provallia Steppe Department and 31 in Striltsivsky Steppe Department, while the Opuk Nature Reserve in Crimea listed 25 rare plants (ONYSHCHENKO & ANDRIENKO, 2012). Thus, in terms of floristic and conservation (phytosozological) value, the Yelanetsky Steppe Nature Reserve ranked above average among Ukraine's high-ranking steppe protected areas and served as a regional and national biodiversity hub.

The Yelanetsky Steppe Nature Reserve is a keystone refuge for floristic diversity in Ukraine's steppe zone, safeguarding Bern Convention Resolution 4 habitats – E1.13 Continental dry rocky steppic grasslands and dwarf scrub on chalk outcrops, E1.2 Perennial calcareous grassland and basic steppes, and E1.3 Mediterranean xeric grassland. In addition to populations of 24 Pontic and Podolian–Pontic endemics, the reserve supports numerous taxa of the “southern” geographical group at the edges of their range (e.g., *Colchicum triphyllum*, *Stipa asperella*, *S. tirsia*, *Tulipa suaveolens*, *Vincetoxicum furcatum*). Maintaining these populations helps sustain the richness and stability of steppe ecosystems. Amid widespread ploughing of steppe landscapes, the reserve functions as a refugium for petrophytic–steppe flora. Moreover, terrain irregularities, such as rock outcrops and ravine slopes, form micro-refugia that buffer climatic extremes for stenotopic steppe plants, increasing their resilience and the overall stability of the steppe vegetation cover.

Given the ongoing Russian invasion of Ukraine, Yelanetsky Steppe is one of the few steppe reserves currently under Ukrainian control (together with Mykhailivska Tsilyna and Chalk Flora). In contrast, several other steppe reserves are under occupation, with reported breaches of protection regimes (PARKHOMENKO & VASYLIUK, 2022; BONDAR ET AL., 2024). This places disproportionate responsibility

on Yelanetsky Steppe as a functioning refuge and reference site for steppe biodiversity and management practice.

## 7.2. Invasive plants and other threats

The reserve's flora included twenty-six invasive species (PROTOPOPOVA & SHEVERA, 2019), sixteen annual or short-lived herbs (e.g., *Ambrosia artemisiifolia*, *Bromus tectorum*, *Grindelia squarrosa*), two perennials (*Cichorium intybus*, *Helianthus tuberosus*), and eight woody plants. While natural steppe vegetation is generally resistant to many short-lived (and some perennial) invaders (BURDA ET AL., 2015; BURDA & KONIAKIN, 2019), the greatest risk was posed by woody alien plants escaping from cultivation (ergasiophytes): *Acer negundo*, *Amorpha fruticosa*, *Elaeagnus angustifolia*, *Fraxinus pennsylvanica*, *Robinia pseudoacacia*, and *Ulmus pumila*, and the acclimatized ergasiophyte *Parthenocissus inserta*. The latter is cultivated in the Yelanetsky Department and does not form part of the spontaneous flora, exhibiting localized clonal expansion in the immediate vicinity of the planting sites. Also, a highly invasive species of willow – *Salix × fragilis*, grows in the reserve only as a cultivated plant. Beyond biotic threats, recurrent wildfires, whether accidental or human-induced, constitute an acute driver of steppe degradation. Severe-season burns can deplete litter and soil seed banks, damage biological soil crusts, and open recruitment windows for nitrophilous and ruderal aliens. In parallel, agrochemical drift from adjacent cropland (fertilizers, herbicides, pesticide aerosols) can depress forb richness, shift competitive hierarchies, and facilitate the expansion of disturbance-tolerant species.

In the Yelanetsky Department, the chief threat was the expansion of *Ulmus pumila*, which has self-seeded extensively from artificial plantations; *Elaeagnus angustifolia* and *Fraxinus pennsylvanica* were less active. Other ergasiophytes – *Cotinus coggygria*, *Malus domestica*, *Morus alba* – increased gradually. Along the talweg of the Roza gully, self-seeding of rarely used ergasiophytes in the steppe zone was observed, including *Corylus americana*, *Prunus virginiana*, and *Tilia platyphyllos*. In the Mykhailivsky Department, expansion of alien woody plants was more intensive due to numerous shelterbelts and terrain that has favoured shrub and tree regeneration; all highly active woody aliens

showed moderate population increases, though without dominance by *U. pumila*. Because of these impacts, controlling woody invaders and mitigating their spread is a critical management priority.

Overall, the reserve's steppe ecosystems exhibited relatively high resilience to plant invasions. It is well established that the frequency and degree of naturalization, and hence invasive potential, of alien plants in Ukraine decrease from north to south (PROTOPOPOVA & SHEVERA, 2009). A substantial fraction of aliens in the reserve occurred as casuals and do not currently exhibit invasive potential. Over the next 20–50 years, with an extensive-use buffer zone and sustained eradication of *Elaeagnus angustifolia*, *Robinia pseudoacacia*, *Ulmus pumila* and other woody aliens, the rate of alien penetration is expected to remain low, a trend also observed in other steppe reserves of southern Ukraine (PODPRYATOV & KOLOMIYCHUK, 2018).

Beyond biotic threats, other factors can substantially affect steppe ecosystems, notably pyrogenic disturbance. Burning of dry steppe vegetation, most often anthropogenic, has mixed effects. Low- to moderate-intensity burns can reduce litter and, in the short term, benefit many native steppe plants (e.g., by stimulating germination), but they adversely affect steppe fauna, especially small, isolated populations of rare insects. Agrochemical contamination by pesticides and fertilizers drifting from adjacent croplands exerts additional pressure on the reserve's natural ecosystems, degrading the native structure of the vegetation cover and potentially facilitating the establishment of alien plants.

### 7.3. Management implications

Invasive woody plants constituted the principal ecological risk, while clonal, high-seed-producing perennials (e.g., *Asclepias syriaca* L.) may also threaten steppe systems. We recommend: (1) phased removal of high-impact woody aliens (*Acer negundo*, *Elaeagnus angustifolia*, *Ulmus pumila*) starting from foci along ravines and plantation edges; (2) follow-up control for 3–5 consecutive growing seasons; (3) restoration of competitive steppe grasses/forbs on disturbed sites (hay-transfer/seed addition from local donor plots); (4) avoiding new plantings, or replacing them with non-invasive, preferably native, trees within the reserve and its buffer; (5) instituting early-detection, rapid-response protocols.

Under continued warming that is likely to favour alien therophytes, management should (6) maintain habitat heterogeneity and microrefugia (rock outcrops, north-facing slopes), (7) avoid nutrient enrichment and soil disturbance that create invasion opportunities, and (8) apply targeted grazing or late-season mowing to limit litter build-up without suppressing spring ephemerals and endemic forbs. Monitoring should include (9) annual censuses of trigger endemic populations and (10) a simple invasion-pressure metric (counts of woody-alien seedlings per fixed-length transect). To reduce non-biotic pressures, we recommend no-spray/no-fertilizer buffer strips along reserve boundaries, an integrated fire-management plan, and periodic screening of surface waters for nutrient and pesticide contamination downstream of agricultural catchments.

## 8. Conclusions

This study documented 692 vascular plant species and subspecies in the Yelanetsky Steppe Nature Reserve, of which 542 were native and 150 alien. The alien fraction is 21.7% of the total, which is relatively high for a protected area. The flora had a distinctly steppe profile: native taxa linked to the Steppe zone and the Mediterranean together comprised 59.12%. Twenty-four endemic taxa, predominantly Pontic, less commonly Podolian–Pontic, conferred marked phytogeographical distinctiveness. The life-form and ecological-coenotic structures likewise underscored its steppe character. The spontaneous flora included 38 species of national and/or international conservation concern, confirming the reserve as an important refuge of floristic diversity. Conversely, 26 highly invasive alien species were recorded; six woody species posed the greatest threat, and their control should remain a management priority.

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