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CONTRIBUTION TO THE KNOWLEDGE ON THE VASCULAR FLORA OF THE POTENTIALLY PROTECTED AREA DUGA NJIVA (REPUBLIKA SRPSKA, BOSNIA AND HERZEGOVINA)

PRILOG POZNAVANJU VASKULARNE FLORE POTENCIJALNOG ZAŠTIĆENOG PODRUČJA DUGA NJIVA (REPUBLIKA SRPSKA, BOSNA I HERCEGOVINA)

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Abstract

Field research in Duga Njiva was conducted during the growing season of 2023. A total of 372 species and subspecies of vascular plants were found. Compositae, Fabaceae, Lamiaceae, and Poaceae are among the most present families. The percentage supremacy of hemicryptophytes was determined in the biological spectrum of the flora of Duga Njiva. Phytogeographical analysis confirmed the dominance of European-Caucasian, Central European, and Eurasian floristic elements. The presence of six strictly protected and protected species was confirmed in the research area, as follows: *Cephalanthera damasonium, Cephalanthera longifolia, Ilex aquifolium, Platanthera bifolia, Ruscus aculeatus*, and *Ruscus hypoglossum*.

Key words: Biodiversity, Bosnia and Herzegovina, strictly protected and protected species, Trebava

1. INTRODUCTION / UVOD

The potentially protected area of Duga Njiva is located in the northern part of Republika Srpska and Bosnia and Herzegovina, in the territory of the municipality of Modriča. It is located in the southern part of the municipality, covering the northern part of Trebava Mountain and the settlements of Riječani Gornji, Krčevljani, Tolisa, Vranjak and, to a lesser extent, Koprivna.

Duga Njiva has biological, ecological, cultural-historical, and landscape values. It included Duga Njiva in the list of potentially protected nature areas by the Land Institute of the SR BiH and the Institute for the Protection of Cultural-Historical and Natural Heritage of the Republika Srpska. The site is also on the list of potentially protected areas of the Republika Srpska in the Spatial Plan of the Republika Srpska until 2015 (Spatial Plan of the Republika Srpska until 2015, 2008) and in the Amendments to the Spatial Plan of the Re-

publika Srpska until 2025 (Amendments to the Spatial Plan of the Republika Srpska until 2025, 2013). The area of Duga Njiva proposed for protection is 3605 ha.

So far, the research on the wider area of Duga Njiva and Trebava is very modest. Data on the forest communities of this area were published by Fabijanić et al. (1967), which analyzed the forests of northern Bosnia on Eocene flysch. It is a large study that, in addition to Trebava Mountain, included the research of Majevica and Vučjak.

Since the basic condition for declaring a protected area is a good knowledge of biodiversity, one of the tasks was to collect data on the flora of this area. This paper aims to complete the data on the distribution of the plant species found at the national level, which is especially important for protected and strictly protected species that inhabit this area.

2. MATERIAL AND METHODS / MATERIJAL I METOD RADA

The area of Duga Njiva includes the northern slopes of Trebava Mountain, which is classified as low mountains and is located at the junction of two large geographical units: the Dinaric Mountains and the Pannonian Plain. It belongs to the "island" mountains of northern BiH, next to Kozara, Prosara, Motajica, Vučjak, and Majevica (Figure 1). Its highest peak is Vis (692 m). The lower peak, Duga Njiva, is 622 meters above sea leveland is located at the border of the area proposed for protection (Marković, 1983).

The relief of the Duga Njiva area is typical of mountainous terrain with the incised valleys of several smaller watercourses: Mitrovača (Babešnica), Riječanski Potok (Dusa), Desna Rijeka and Tolisa. They originate from the highest ridge of this area, i.e. Duga Njiva and Zelinjsko Brdo, and flow towards the north. The relief is dominated by ridges and mountain slopes with several prominent peaks with an average height of about 450 m. The altitude ranges from 190 m to 622 m above sea level.

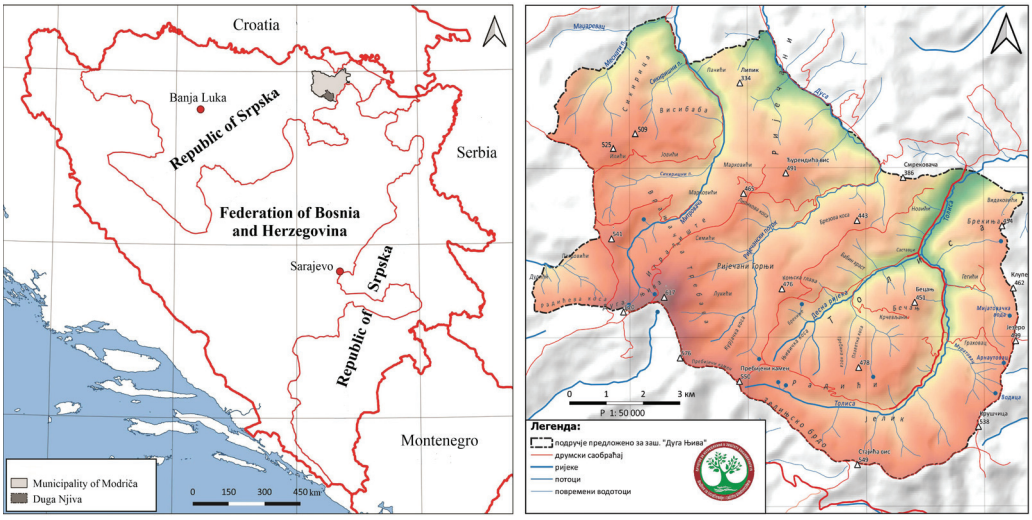

Figure 1. Map and location of the research area in Bosnia and Herzegovina / **Slika 1**. Karta i položaj istraživanog područja u BiH

The geological base of this area consists of Paleogene sedimentary rocks. These are sediments, covered by carbonate-free loess.I In this flysch formation, the most common rocks are sandstones and marls with silicified chert-limestone admixtures (Laušević et al., 1962-1976). Going from north to south, that is, from the lower to the higher parts of Duga Njiva, first there are layers of flysch, then bank sandstones, claystone, siltstones, marls and, more rarely, conglomerates. In the central part of the area proposed for protection, there are deposits: bedrock lithotamnian limestones, sheet calcarenites, marly siltstones, and sandstones. Finally, in the southern part, there are deposits of flysch, fine-grained and medium-grained sandstones alternating with siltstones and, more rarely, marls.

According to the pedological map of the area, the most common soil types in this area are: fluvisol, dystric cambisol, and luvisol.

Duga Njiva is located in the area where a moderate-continental climate prevails. Given that it is an area located on the edge of the Pannonian Plain, the influence of the continental climate from the north is pronounced.

In the context of real forest vegetation, Illyrian forests of sessile oak and common hornbeam belonging to the *Erythronio-Carpinion* alliance dominate, with submontane beech forests with holly of the *Aremonio-Fagion* alliance and acidophilous beech forests of the *Luzulo-Fagion* alliance alternating. Montane forests of sessile oak and forests of sessile oak, and Turkey oak belonging to the *Quercion petraeo-cerridis* alliance are present on terrains with more pronounced relief. The lowland areas of the research area, river and stream valleys, are habitats of forests of pedunculate oak and common hornbeam (*Carpinion betuli*) and floodplain forests of pedunculate oak with Dyer's greenweed (*Alnion incanae*). These forests are degraded and only fragments can be seen. Forests of black alder (*Alnion glutinosae*) grow on the swampiest and wettest terrains, the willow and poplar forest (*Salicion albae*) on the banks, that is, the field ash forest of the *Alnion incanae* alliance, all of which are also interspersed and in small surface fragments along the watercourse (Stefanović et al., 1983). Almost all of these permanent stages of vegetation have been degraded into various types of coppice forests, in some places thickets (hazel, hawthorn, thorn, juniper, elderberry, etc.). There are also forest cultures of black and white pine, hornbeam, and fast-growing conifers (Douglas, pine, larch).

Meadows and pastures of secondary origin are overgrown with communities from the *Cynosurion cristati* and *Arrhenatherion elatioris* alliances. They are most present in the following localities: Krčevljani, Radići, Riječani, Vis, Koprivnska Trebava, and Vranjačka Trebava - Ilići.

Ruderal vegetation belonging to *Plantaginetea majoris* and *Agropyretea repentis* and vegetation of arable land of the class *Chenopodiete* have developed on the surfaces where anthropogenic influence is pronounced.

The research included a large part of the potentially protected area Duga Njiva. The plants were collected during the growing season of 2023 and were deposited in the herbarium of the Society for Biodiversity Research and Protection. The determination of the collected plant material was made based on keys in basic and standard floras and iconographies (Domac, 1967; Jávorka & Csapody, 1975). Taxonomic status and nomenclature are presented according to Euro+Med PlantBase (2006+). Recorded taxa are presented phylogenetically, with families within classes arranged alphabetically. Species belong to a certain life form according to Raunkier's classification (Raunkiaer, 1934), developed according to Stevanović (Stevanović, 1992a). Species belonging to floristic elements were determined according to Pignatti et al. (2005). They were then, for reasons of simplification, analyzed by grouping into higher levels phytochorions (Steva-

nović, 1992b). The protection statuses are taken from the Regulation on Strictly Protected and Protected Wild Species of the Republika Srpska (Official Gazette of the RS, No. 65/20). Alien species were classified into three groups: cultivated (CUL), spontaneously regenerating (CAS), and invasive (INV), according to Pyšek et al. 2004. Invasiveness status of the herbal species is determined according to Đug et al. (2019) and Maslo (2016).

3. RESULTS AND DISCUSSION / REZULTATI I DISKUSIJA

372 species and subspecies of vascular plants were recorded during field research in Duga Njiva (Appendix 1).

Among the most represented families, Compositae (48), Fabaceae (31), Lamiaceae (26), Poaceae (27), Rosaceae (21), and Ranunculaceae (10) stand out. In terms of the number of species and genera, these are the richest in the flora of Bosnia and Herzegovina (Beck-Mannagetta, 1903a, 1903b, 1904, 1906a, 1906b, 1906c, 1907, 1914, 1916a, 1916b, 1918, 1920, 1922, 1923, 1927; Beck & Malý 1967, 1974, 1983). The largest number of species (9) belongs to the genus *Galium*, followed by the genera: *Hieracium* and *Pilosella* together, *Lathyrus* and *Trifolium* with six species each, *Carex, Geranium*, and *Viola* with five species each, and *Cardamine* and *Potentilla* with four species each.

The analysis of the representation of individual life forms of the flora of Duga Njiva revealed the percentage dominance of hemicryptophytes with 182 representatives or 49% of the total number of taxa (Figure 2). Other life forms are present in the following descending order: phanerophytes (16.7% or 62 taxa), geophytes (13.7% or 51 taxa), therophytes (12.9% or 48 taxa), hamephytes (4.6% or 17 taxa) and scandetophytes (3.2% or 12 taxa). The high participation of the hemicryptophyte life form is compatible with the general temperate-continental conditions of the research area. The large presence of phanerophytes can be explained by the fact that the composition of the flora of Duga Njiva also includes 12 woody species that belong to naturalized alien species or are grown in culture.

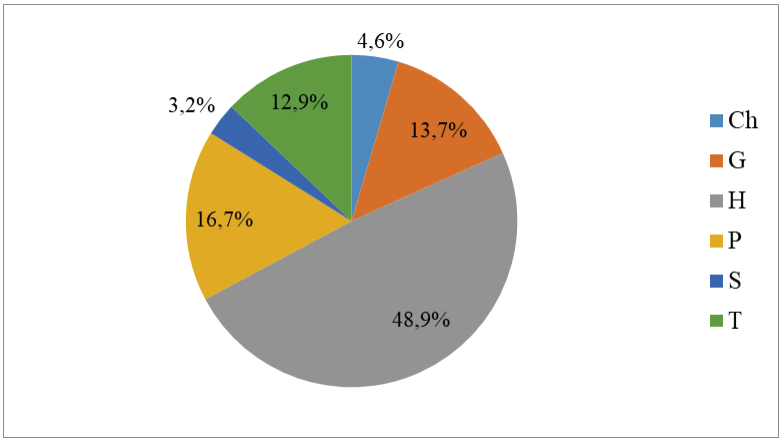

Figure 2. Individual life forms in the vascular flora of Duga Njiva (Ch - champhytes, G - Geophytes, H - Hemicryptophytes, P - Phanerophytes, S - Scandetophytes, T - Therophytes) / **Slika 2**. Zastupljenost pojedinih životnih formi u vaskularnoj flori Duge Njive (Ch - hamfite, G - geofite, H - hemikriptofite, P - fanerofite, S - skandetofite, T - terofite)

The distribution of flora by basic chorological groups (Stevanović 1992b) is shown in Figure 3. Typical floristic elements of wide distribution such as European-Caucasian, Central European, and Eurasian take part in more than 52% of the flora. An extremely high percentage of Mediterranean-sub-Mediterranean floristic elements (11.7%), as well as Holarctic ones (9%), indicates that the wider area of Trebava is under the influence of the warm climate coming from the south, but also the continental influence from the north. 6.5% of species belonging to the group of alien or allochthonous plants are present in the flora of Duga Njiva.

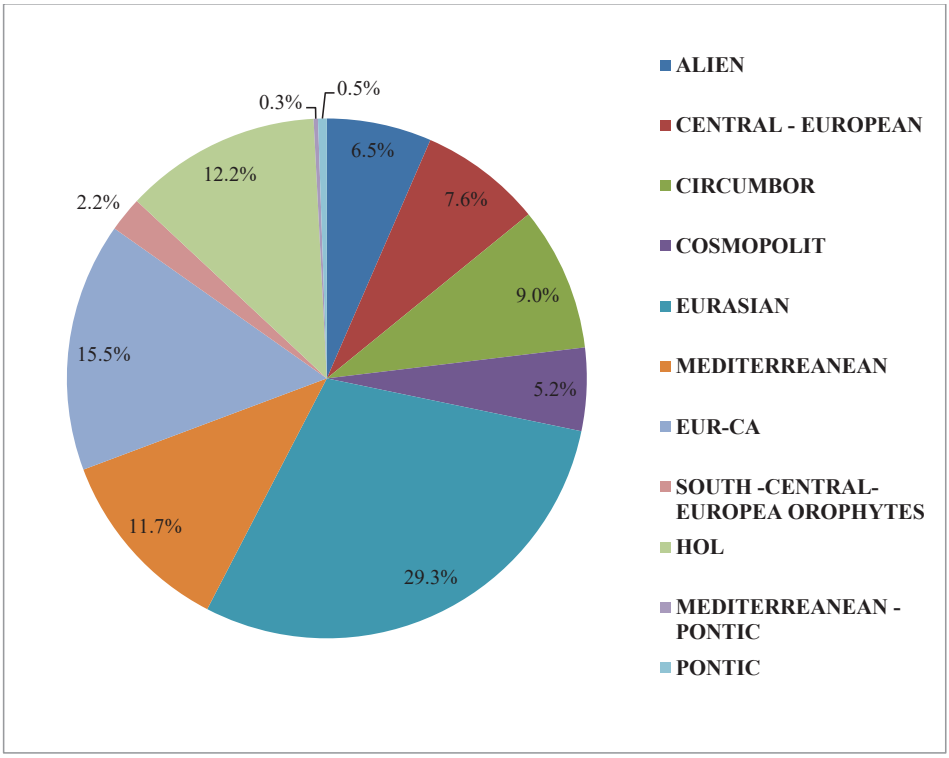

Figure 3. Basic chorological groups in the vascular flora of Duga Njiva (Chorological groups: ALIEN - Allochthonous group; CENTRAL - EUROPEAN - Central European; CIRCUMBOR - Circumboreal; COSMPOLIT - Cosmopolitan; EURASIAN - Euro-Asian; MEDITERRANEAN - Mediterranean; EUR-CA - European-Caucasus; SOUTH -CENTRAL-EUROPEA OROPHYTES Central-South European mountain; HOL Holarctic; MEDITERRANEAN – PONTIC - Mediterranean – Pontic; PONTIC - Pontic) / **Slika 3**. Zastupljenost osnovnih horoloških grupa u vaskularnoj flori Duge Njive (Horološke grupe: ALIEN – alohtona grupa; CENTRAL - EUROPEAN - centralnoevropska; CIRCUMBOR - cirkumborealna; COSMPOLIT - kosmopolitska; EURASIAN - evro-azijska; MEDITERRANEAN - mediteranska; EUR-CA - evropsko-kavkaska; SOUTH – CENTRAL - EUROPEA OROPHYTES - srednje-južno evropsko planinska; HOL - holarktička; MEDITERRANEAN - PONTIC - mediteransko-pontska; PONTIC - pontska)

Among the strictly protected and protected species (according to the Decree, Official Gazette of the RS No. 65/2020), six species were identified during this research: *Cephalanthera damasonium* (Mill.) Druce, *Cephalanthera longifolia* (L.) Fritsch, *Ilex aquifolium* L., *Platanthera bifolia* (L.) Rich., *Ruscus aculeatus* L. and *Ruscus hypoglossum* L.

21 alien species (ALIEN)were recorded in the area of Duga Njiva, 13 of them being invasive and spreading very quickly. *Ambrosia artemisiifolia, Phytolacca americana*, and *Solidago gigantea* are common in the research area.

Taxonomic, ecological, and phytogeographic analysis is similar to the analysis of the vascular flora of the National Park "Kozara" (Bucalo et al., 2006), and the flora of the Nature Park "Papuk" (Pandža, 2010). Based on the taxonomic analysis, it can be seen that the most present families are Compositae, Fabaceae, and Poaceae in the area of the "Kozara" National Park and the "Papuk" Nature Park. Comparing the ecological analysis of the flora of Duga Njiva and the flora of Papuk, it was recorded that the hemicryptophyte life form is the most present. Therophytes are somewhat less present compared to the ecological analysis of Papuk. Comparisons were also made with the flora of other localities in the northern part of Bosnia and Herzegovina, such as the surroundings of the Moštanica monastery (Škondrić et al., 2012), the northern slopes of Motajica mountain (Škondrić et al., 2012), and settlements Hrvaćani (Škondrić et al., 2013), Dugo Polje near Modriča (Škondrić et al., 2013), and Mali Prnjavor near Doboj. By comparing the floristic wealth with the mentioned localities, a slightly lower number of species was recorded compared to the flora of Duga Njiva. By comparing the taxonomic analysis, it was shown that the Compositae family has the largest percentage in all localities. An exception is the flora of Dugo Polje, where the Fabaceae family is the most present. The hemicryptophyte life form has the largest share in all floras. By comparing the phytogeographical analysis, it was concluded that the largest contribution is made by widely distributed floristic elements.

4. CONCLUSION / ZAKLJUČAK

The recorded floristic wealth of the potentially protected area of Duga Njiva is the result of the variety of orographic, edaphic, and phytoclimatic conditions, the plant-geographical position, and the historical development of the living world of this area, as well as a very pronounced human action in some localities.

Considering the short time of the research, this paper does not register the entire vascular flora of the potentially protected area of Duga Njiva. However, the study is expected to continue and record new species that, according to their ecology, are very likely to be present in this area.

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Sažetak

Potencijalno zaštićeno područje Duga Njiva smješteno je u sjevernom dijelu Republike Srpske i Bosne i Hercegovine, na teritoriji opštine Modriča i zahvata sjeverne obronke planine Trebave. Duga Njiva posjeduje određene biološke, ekološke, kulturno-istorijske i pejzažne vrijednosti, zbog čega se našla na spisku potencijalno zaštićenih područja Republike Srpske.

Cilj ovog rada je proučavanje vaskularne flore ovog područja i sakupljanje podataka o rasprostranjenosti biljnih vrsta, posebno biljaka koje su strogo zaštićene i zaštićene. Terenskim istraživanjima Duge Njive, u vegetacionom periodu 2023. godine, zabilježeno je prisustvo 372 vrste i podvrste vaskularnih biljaka. Među najzastupljenijim familijama posebno se ističu Compositae (48), Fabaceae (31), Lamiaceae (26), Poaceae (27), Rosaceae (21) i Ranunculaceae (10). Analizom zastupljenosti pojedinih životnih formi flore Duge Njive, utvrđena je procentualna dominacija hemikriptofita sa 182 predstavnika. Ostale životne forme zastupljene su u sljedećem opadajućem nizu: fanerofite (62 taksona), geofite (51 taksona), terofite (48 taksona), hamefite (17 taksona) i skandetofite (12 taksona). U flori Duge Njive dominiraju florni elementi širokog rasprostranjenja, kao što su evropsko-kavkaski, centralnoevropski i evroazijski, čije je učešće u više od 52%. Od strogo zaštićenih i zaštićenih vrsta (prema Uredbi, ''Službeni glasnik RS'', broj

65/2020) u toku ovog istraživanja konstatovane su četiri strogo zaštićene vrste: *Cephalanthera damasonium* (Mill.) Druce, *Cephalanthera longifolia* (L.) Fritsch, *Platanthera bifolia* (L.) Rich., i *Ruscus hypoglossum* L. kao i dvije zaštićene: *Ilex aquifolium* L. i *Ruscus aculeatus* L. Nažalost, na području Duge Njive zabilježen je značajan broj stranih vrsta, od kojih su neke invazivne i česte na istraživanom području, kao što su: *Ambrosia artemisiifolia, Phytolacca americana* i *Solidago gigantea*. U nastavku istraživanja očekuje se da će biti zabilježene nove vrste koje su, sudeći na osnovu njihove ekologije, vrlo vjerovatno prisutne na ovom prostoru.

Ključne reči: biodiverzitet, Bosna i Hercegovina, strogo zaštićene i zaštićene vrste, Trebava

Appendix 1 / Prilog 1

Overview of the flora of the study area / Pregled flore istraživanog područja

PTERIDOPHYTA

SPHENOPSIDA

Equisetaceae: *Equisetum telmateia* Ehrh., *Equisteum arvense* L.

FILICOPSIDA

Aspleniaceae: *Asplenium adiantum-nigrum* L., *Asplenium scolopendrium* L.
Athyriaceae: *Athyrium filix-femina* (L.) Roth
Dryopteridaceae: *Dryopteris carthusiana* (Vill.) H. P. Fuchs, *Dryopteris filix-mas* (L.) Schott, *Polystichum setiferum* (Forssk.) Woyn.
Hypolepidaceae: *Pteridium aquilinum* (L.) Kuhn

SPERMATOPHYTA

GYMNOSPERMAE

CONIFEROPSIDA

Cupressaceae: *Thuja occidentalis* L. (CUL)
Pinaceae: *Abies alba* Mill., *Larix decidua* Mill. (CUL), *Picea abies* (L.) H. Karst., *Pinus nigra* Arnold (CUL), *Pinus strobus* L. (CUL), *Pseudotsuga menziesii* (Mirb.) Franco (CUL)

ANGIOSPERMAE (Magnoliophytina)

DICOTYLEDONES (Magnoliopsida)

Amaranthaceae: *Chenopodium album* L.
Apiaceae: *Aegopodium podagraria* L., *Angelica sylvestris* L., *Conium maculatum* L., *Daucus carota* L., *Heracleum sphondylium* L., *Pastinaca sativa* L., *Peucedanum cervaria* (L.) Lapeyr., *Pimpinella saxifraga* L., *Sanicula europaea* L.
Aquifoliaceae: *Ilex aquifolium* L.
Araliaceae: *Hedera helix* L.
Aristolochiaceae: *Asarum europaeum* L.
Asclepiadaceae: *Vincetoxicum hirudinaria* Medik.
Balsaminaceae: *Impatiens balfouri* Hook.f. (INV)
Berberidaceae: *Epimedium alpinum* L.
Betulaceae: *Alnus glutinosa* (L.) Gaertn., *Betula pendula* Roth, *Carpinus betulus* L., *Corylus avellana* L., *Ostrya carpinifolia* Scop.
Boraginaceae: *Aegonychon purpurocaeruleum* (L.) Holub, *Echium vulgare* L., *Lithospermum officinale* L., *Pulmonaria officinalis* L., *Symphytum tuberosum* L.
Brassicaceae: *Alliaria petiolata* (M. Bieb.) Cavara et Grande, *Cardamine bulbifera* (L.) Crantz, *Cardamine enneaphyllos* (L.) Crantz, *Cardamine hirsuta* L., *Cardamine waldsteinii* Dyer, *Rorippa sylvestris* (L.) Besser, *Capsella bursa-pastoris* (L.) Medik.
Campanulaceae: *Campanula bononiensis* L., *Campanula patula* L., *Campanula persicifolia* L., *Campanula rapunculus* L., *Campanula trachelium* L.

Cannabaceae: *Humulus lupulus* L.
Caprifoliaceae: *Sambucus ebulus* L., *Sambucus nigra* L.
Caryophyllaceae: *Dianthus armeria* L., *Moenchia mantica* (L.) Bartl., *Myosoton aquaticum* (L.) Moench, *Petrorhagia saxifraga* (L.) Link, *Saponaria officinalis* L., *Silene nemoralis* Waldst. & Kit., *Silene vulgaris* (Moench) Garcke, *Stellaria media* (L.) Cirilo, *Stellaria graminea* L.
Celastraceae: *Euonymus europaeus* L., *Euonymus verrucosus* Scop.
Clusiaceae: *Hypericum androsaemum* L., *Hypericum perforatum* L., *Hypericum tetrapterum* Fr.
Compositae: *Achillea millefolium* L. aggr., *Ambrosia artemisiifolia* L. (INV), *Aposeris foetida* (L.) Less.. *Arctium lappa* L., *Arctium minus* (Hill) Bernh., *Artemisia vulgaris* L., *Bellis perennis* L., *Bidens frondosa* L. (INV), *Bidens tripartitus* L., *Carduus acanthoides* L., *Carlina vulgaris* L., *Centaurea jacea* L., *Centaurea scabiosa* L., *Centaurea phrygia* L. subsp. *stenolepis* (A.Kern.) Gugler, *Cichorium intybus* L., *Cirsium vulgare* (Savi) Ten., *Cirsium arvense* (L.) Scop., *Crepis biennis* L., *Crepis foetida* L., *Erigeron annuus* (L.) Desf. (INV), *Erigeron canadensis* L. (INV), *Eupatorium cannabinum* L., *Hieracium murorum* L., *Hieracium racemosum* Willd., *Hieracium sabaudum* L., *Hypochaeris radicata* L., *Inula conyzae* (Griess.) DC., *Inula salicina* L., *Jacobaea erratica* (Bertol.) Fourr., *Lactuca muralis* (L.) Gaertn., *Lapsana communis* L., *Leucanthemum vulgare* Lam. aggr., *Leontodon hispidus* L., *Petasites hybridus* (L.) P. Gaertn., B. Mey. et Schreb., *Picris hieracioides* L., *Pilosella caespitosa* (Dumort.) P. D. Sell & C. West aggr., *Pilosella lactucella* (Wallr.) P. D. Sell & C. West, *Pilosella officinarum* Vaill., *Pulicaria dysenterica* (L.) Bernh., *Scorzoneroides autumnalis* (L.) Moench, *Senecio ovatus* (G.Gaertn. & al.) Hoppe, *Serratula tinctoria* L., *Solidago gigantea* Aiton (INV), *Sonchus arvensis* L., *Sonchus asper* (L.) Hill, *Taraxacum officinale* Web, *Tussilago farfara* L.. *Xanthium orientale* L. subsp. *italicum* (Moretti) Greuter (INV)
Convolvulaceae: *Calystegia sepium* (L.) R. Br., *Calystegia silvatica* (Kit.) Griseb., *Convolvulus arvensis* L.
Cornaceae: *Cornus mas* L., *Cornus sanguinea* L.
Crassulaceae: *Sedum hispanicum* L.
Dipsacaceae: *Dipsacus fullonum* L., *Dipsacus pilosus* L., *Knautia drymeia* Heuff.
Ericaceae: *Calluna vulgaris* (L.) Hull
Euphorbiaceae: *Euphorbia amygdaloides* L., *Euphorbia cyparissias* L., *Euphorbia epithymoides* L. *Mercurialis perennis* L.
Fabaceae: *Amorpha fruticosa* L. (INV), *Anthyllis vulneraria* L., *Cytisus hirsutus* L., *Dorycnium pentaphyllum* subsp. *herbaceum* (Vill.) Bonnier & Layens, *Dorycnium pentaphyllum* subsp. *germanicum* (Gremli) Gams, *Galega officinalis* L., *Genista tinctoria* L., *Genista pilosa* L., *Lathyrus pratensis* L., *Lathyrus venetus* (Mill.) Wohlf., *Lathyrus vernus* (L.) Bernh., *Lathyrus latifolius* L., *Lathyrus niger* (L.) Bernh., *Lathyrus sylvestris* L., *Lembotropis nigricans* (L.) Griseb., *Lotus corniculatus* L., *Medicago lupulina* L., *Medicago sativa* L., *Melilotus albus* Medik., *Ononis spinosa* subsp. *hircina* (Jacq.) Gams, *Ononis spinosa* L., *Robinia pseudoacacia* L. (INV), *Trifolium dubium* Sibth., *Trifolium medium* L., *Trifolum patens* Schreb., *Trifolium pratense* L., *Trifolium repens* L., *Trifolium hybridum* L., *Vicia cracca* L. aggr., *Vicia sepium* L., *Wisteria sinensis* (Sims) DC. (CUL)
Fagaceae: *Quercus cerris* L., *Quercus petraea* (Matt.) Liebl., *Quercus rubra* L. (CAS)
Gentianaceae: *Centaurium erythraea* Rafn.,
Geraniaceae: *Geranium columbinum* L., *Geranium dissectum* L., *Geranium robertianum* L., *Geranium sanguineum* L., *Geranium molle* L.
Juglandaceae: *Juglans regia* L.
Lamiaceae: *Ajuga genevensis* L., *Ajuga reptans* L., *Clinopodium grandiflorum* (L.) Kuntze, *Clinopodium menthifolium* (Host) Stace, *Clinopodium vulgare* L., *Galeopsis speciosa* Mill., *Galeopsis tetrahit* L., *Glechoma hederacea* L., *Glechoma hirsuta* Waldst. et Kit., *Lamium galeobdolon* (L.) Crantz, *Lamium purpureum* L., *Lycopus europaeus* L., *Melittis melissophyllum* L., *Mentha aquatica* L., *Mentha arvensis* L., *Mentha longifolia* (L.) L., *Mentha pulegium* L., *Prunella laciniata* (L.) L., *Prunella vulgaris* L., *Salvia glutinosa* L., *Salvia verticillata* L., *Stachys germanica* L., *Stachys sylvatica* L., *Stachys officinalis* (L.) Trevis., *Thymus pulegioides* L., *Teucrium chamaedrys* L.
Linaceae: *Linum catharticum* L.
Lythraceae: *Lythrum salicaria* L.
Malvaceae: *Lavatera thuringiaca* (L.) Vis., *Malva alcea* L., *Malva moschata* L.
Moraceae: *Morus alba* L. (CAS)
Oleaceae: *Fraxinus angustifolia* Vahl, *Fraxinus ornus* L., *Ligustrum vulgare* L., *Syringa vulgaris* L.
Onagraceae: *Circaea lutetiana* L., *Epilobium montanum* L., *Epilobium parviflorum* Schreb.
Orobanchaceae: *Lathraea squamaria* L., *Melampyrum pratense* L., *Rhinanthus minor* L.
Oxalidaceae: *Oxalis acetosella* L., *Oxalis stricta* L. (INV).
Papaveraceae: *Chelidonium majus* L., *Corydalis cava* (L.) Schweigg. & Korte

Phytolaccaceae: *Phytolacca americana* L. (INV)
Plantaginaceae: *Digitalis grandiflora* Mill., *Linaria vulgaris* Mill., *Plantago lanceolata* L., *Plantago major* L., *Plantago media* L., *Veronica chamaedrys* L., *Veronica montana* L., *Veronica persica* Poir. (INV)
Polygalaceae: *Polygala vulgaris* L.
Polygonaceae: *Persicaria hydropiper* (L.) Delarbre, *Persicaria lapathifolia* (L.) Delarbre, *Rumex acetosa* L., *Rumex conglomeratus* Murray, *Rumex crispus* L., *Rumex obtusifolius* L.
Primulaceae: *Anagallis arvensis* L., *Lysimachia nummularia* L., *Lysimachia punctata* L., *Lysimachia vulgaris* L., *Primula vulgaris* L.
Ranunculaceae: *Actaea spicata* L., *Anemone nemorosa* L., *Anemone ranunculoides* (L.) Holub, *Clematis vitalba* L., *Ficaria verna* Huds, *Helleborus odorus* Willd., *Isopyrum thalictroides* L., *Ranunculus acris* L., *Ranunculus repens* L., *Ranunculus sardous* Crantz
Rosaceae: *Agrimonia eupatoria* L.. *Crataegus monogyna* Jacq., *Filipendula vulgaris* Moench, *Fragaria vesca* L., *Geum urbanum* L., *Malus sylvestris* Mill., *Potentilla argentea* L., *Potentilla erecta* (L.) Raeusch., *Potentilla micrantha* DC., *Potentilla reptans* L., *Prunus avium* (L.) L., *Prunus cerasifera* Ehrh. (CAS), *Prunus spinosa* L., *Pyrus communis* L. (CAS), *Pyrus pyraster* (L.) Burgsd., *Rosa arvensis* Huds., *Rosa canina* L., *Rubus caesius* L., *Rubus plicatus* Weihe & Nees, *Rubus hirtus* L., *Sorbus torminalis* (L.) Crantz
Rubiaceae: *Cruciata glabra* (L.) Ehrend., *Cruciata laevipes* Opiz, *Galium aparine* L., *Galium divaricatum* Lam., *Galium intermedium* Schult., *Galium lucidum* All., *Galium mollugo* L., *Galium odoratum* (L.) Scop., *Galium rotundifolium* L., *Galium sylvaticum* L., *Galium verum* L., *Sherardia arvensis* L.
Salicaceae: *Populus alba* L., *Populus tremula* L., *Salix alba* L., *Salix caprea* L., *Salix cinerea* L., *Salix fragilis* L.
Sapindaceae: *Acer campestre* L., *Acer platanoides* L., *Acer pseudoplatanus* L., *Acer tataricum* L.
Saxifragaceae: *Chrysosplenium alternifolium* L.
Scrophulariaceae: *Scrophularia nodosa* L., *Verbascum densiflorum* Bertol., *Verbascum nigrum* L., *Verbascum phlomoides* L.
Solanaceae: *Atropa bella-donna* L., *Solanum dulcamara* L.
Tiliaceae: *Tilia cordata* Mill., *Tilia platyphyllos* Scop., *Tilia tomentosa* Moench
Ulmaceae: *Ulmus glabra* Huds.
Urticaceae: *Urtica dioica* L.
Verbenaceae: *Verbena officinalis* L.
Viburnaceae: *Viburnum lantana* L.
Violaceae: *Viola arvensis* Murray, *Viola hirta* L., *Viola reichenbachiana* Jord. ex Boreau, *Viola riviniana* Rchb., *Viola tricolor* L.
Vitaceae: *Vitis vinifera* L. (CUL)

MONOCOTYLEDONES

Amaryllidaceae: *Allium carinatum* L., *Allium ursinum* L.
Araceae: *Arum maculatum* L.
Asparagaceae: *Leopoldia comosa* (L.) Parl., *Ornithogalum pyrenaicum* L., *Polygonatum multiflorum* (L.) All., *Scilla bifolia* L., *Ruscus aculeatus* L., *Ruscus hypoglossum* L.
Cyperaceae: *Carex flacca* Schreb., *Carex montana* L., *Carex pendula* Huds., *Carex pilosa* Scop., *Carex sylvatica* Huds
Colchicaceae: *Colchicum autumnale* L.
Discoreaceae: *Dioscorea communis* (L.) Caddick & Wilkin
Juncaceae: *Juncus conglomeratus* L., *Juncus effusus* L., *Juncus tenuis* Willd. (INV), *Luzula campestris* (L.) DC., *Luzula pilosa* (L.) Willd., *Luzula sylvatica* (Huds.) Gaudin
Liliaceae: *Erythronium dens-canis* L., *Lilium martagon* L., *Gagea lutea* L.
Orchidaceae: *Anacamptis morio* (L.) R.M.Bateman, Pridgeon & M.W.Chase, *Cephalanthera damasonium* (Mill.) Druce, *Cephalanthera longifolia* (L.) Fritsch, *Neottia nidus-avis* (L.) Rich., *Platanthera bifolia* (L.) Rich.
Poaceae: *Agrostis stolonifera* L., *Alopecurus pratensis* L., *Apera spica-venti* (L.) P.Beauv., *Arrhenatherum elatius* (L.) J. Presl et C. Presl, *Brachypodium sylvaticum* (Huds.) P. Beauv., *Bromopsis ramosa* (Huds.) Holub, *Bromus hordeaceus* L., *Bromus sterilis* L., *Calamagrostis epigejos* (L.) Roth, *Calamagrostis varia* (Schrad.) Host, *Cynosurus cristatus* L., *Cynosurus echinatus* L., *Dactylis glomerata* L., *Elytrigia repens* (L.) Nevski, *Eragrostis pilosa* (L.) P. Beauv., *Festuca rubra* L.. *Drymochloa drymeja* (Mert. & W.D.J.Koch) Holub, *Holcus lanatus* L., *Hordeum murinum* L., *Lolium perenne* L., *Melica uniflora* Retz., *Molinia caerulea* (L.) Moench, *Paspalum paspaloides* (Michx.) Scribn., *Poa nemoralis* L., *Poa pratensis* L., *Setaria pumila* (Poir.) Roem. et Schult., *Sorghum halepense* (L.) Pers.