

A CONTRIBUTION TO THE VASCULAR FLORA OF THE SLATINA REGION

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Floristic research in the area of Slatina and its surroundings was conducted during the period March–October, 2009–2010. The last complete species list dates back to 1957 and refers specifically to the town of Slatina. It provides 398 taxa of which 5 have been given a particular Red List category, but only 1 has been confirmed with the latest research.

The new research has revised the old data and expanded the area of investigation to surrounding villages, approximately 60 km² in total. Many of the previously recorded taxa have not been found, but with the new ones added to the list, the final number was 550 taxa: 524 species and 26 subspecies classified into 334 genera and 94 families. Of the total number of taxa, 12 belong to Pteridophyta and 538 to the Spermatophyta division, with the *Asteraceae* family the largest.

According to the Red Book of Vascular Flora of Croatia and Flora Croatica Database, 25 species have been given a certain IUCN Red List status and numerous taxa are protected by the law (105 protected, 29 strictly protected). Taxa with an IUCN status have been analyzed in detail regarding their sites of occurrence, causes of threat and population density. Some of the notable findings include: *Carex riparia* Curtis, *Cyperus glomeratus* L., *Hibiscus trionum* L., *Hottonia palustris* L., *Pseudolysimachion longifolium* (L.) Opiz and several species within the *Orchidaceae* family.

Key words: flora mapping, Slatina and surroundings, threatened taxa, Red List

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Istraživanje flore na području grada Slatine i okolice provedeno je u periodu od ožujka do listopada tijekom 2009. i 2010. godine. Posljednja cjelokupna florna lista izrađena je 1957. i odnosi se isključivo na grad Slatinu. Dotična lista broji 398 svojiti od čega 5 pripada određenoj kategoriji ugroženosti, no samo je 1 potvrđena u najnovijem istraživanju.

Novim istraživanjem obavljena je korekcija florne liste te je istovremeno prošireno područje istraživanja na okolna sela, ukupne površine od oko 60 km². Mnoge ranije zabilježene svojite ovim istraživanjem nisu potvrđene, no dodatkom novih, lista je ažurirana i broji 550 svojiti: 524 vrste i 26 podvrsta raspoređeno u 334 roda i 94 porodica. Od ukupnog broja, 12 svojiti ulazi u odjeljak Pteridophyta, a preostalih 538 u Spermatophyta, s porodicom *Asteraceae* kao najbrojnijom.

Prema Crvenoj knjizi vaskularne flore Hrvatske i online bazi Flora Croatica Database, 25 svojiti posjeduje određeni status prema Crvenoj listi IUCN-a dok je znatan broj zakonom zaštićen (105 zaštićenih, 29 strogo zaštićenih). Svojite s IUCN statusom detaljno su obrađene u smislu njihova nalazišta, uzroka ugroženosti i gustoće populacije. Valja spomenuti nekolicinu vrijednih nalaza: *Carex riparia* Curtis, *Cyperus glomeratus* L., *Hibiscus trionum* L., *Hottonia palustris* L., *Pseudolysimachion longifolium* (L.) Opiz te nekoliko vrsti iz porodice *Orchidaceae*.

Cljučne riječi: kartiranje flore, Slatina i okolica, ugrožene svojite, Crvena lista

INTRODUCTION

The region of Slatina spreads across the central part of Virovitica-Podravina County (Fig. 1.) with total area of 156 km² at coordinates 45° 42" N and 17° 42" E with an average relief elevation of 127 m. The region contains 15 settlements: Bakić, Bistrica, Donji Meljani, Golenić, Gornji Miholjac, Ivanbrijeg, Kozice, Lukavac, Markovo, Medinci, Novi Senkovac, Radosavci, Sladojevački Lug, Sladojevci and the town of Slatina.

Detailed mapping of the flora in the stated area has not been performed recently. Therefore, new investigations on-site are necessary to confirm previously found taxa and supplement the list with the latest data. The existent species list (NOVKOVIĆ, 1957) dealt specifically with the town of Slatina. It was created in a period when anthropogenic influence was present on a smaller scale, which is perhaps the main reason that the certain threatened taxa have not been confirmed by the latest research. Later field observations in the region supplemented the flora to a certain extent.

Because of the urban expansion and construction, much of the meadow and forest land has been put to arable use and consequently many taxa have not been confirmed, including those threatened to a certain degree. In line with such environmental impacts, new field investigations were conducted during the period of 2009–2010 on a frequent basis, regarding the areas of Bistrica, Donji Meljani, Radosavci, Sladojevački Lug, Sladojevci and the town of Slatina. This research resulted in many newly found taxa and also in detailed site descriptions, photo-documentation and a critical view of the threatened taxa. The data gathered in this investigation will provide a basis for future comparison and will enable population monitoring of Red List species.

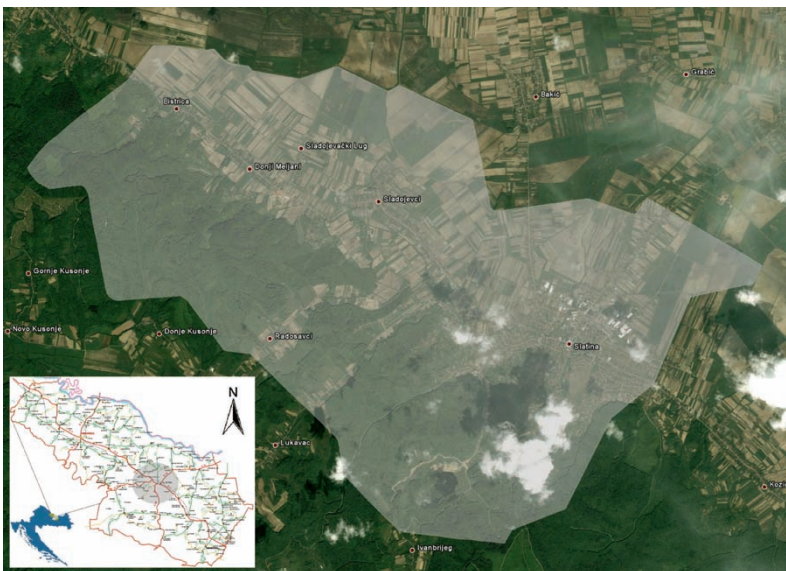


Fig. 1. The investigated area of the Slatina region within Virovitica-Podravina County. (STIPANIĆ *et al.*, 2006; Google Earth)

STUDY AREA

The region of Slatina is bordered by the Drava River to the north and slopes of Mt Papuk to the south. The northern part of the region is characterized by arable lowlands where the contour lines run from 100 to 120 m. Further to the south, the land gradually develops into higher terrain, eventually mountainous, with relief elevations up to 1000 m. The mountainous region, which is prolific with stream valleys, extends in the northwest to southeast direction. No strict natural borders are distinguished in the eastern and western parts of Slatina (STIPANIĆ *et al.*, 2006).

The climate is moderate continental with an average annual temperature of 11.3 °C and 726.4 mm of average annual precipitation. Summers are usually warm with an average temperature of 20.8 °C, whereas the winter temperature average is 1.3 °C. Most precipitation occurs in September with 90.9 mm on average, while January and February, with average values of 39.5 mm and 34.1 mm respectively, present the least precipitation. The measurements were taken during the period 2000–2008 (Meteorological and hydrological service, 2009).

Out of the total area (156 km²), which is 7.72 % of Virovitica-Podravina County, approximately 60 km² has been investigated (Fig. 1). According to STIPANIĆ *et al.*, area structure is characterised by: 4128 ha of arable land, 310 ha of pastures, 200 ha of forest, 115 ha of orchards, 68 ha of vineyards and 38 ha of gardens.

METHODS

This research, in the main part, deals with the wild flora of the Slatina region, but also considers some cultivated species which have notably spread out of their cultivation area (i.e. spruce plantations).

The data on taxa distribution were gathered by implementing two methods: literature and field observations. The primary aim of consulting literature regarding the floristic inventory of the Slatina region was to gain an insight into existent floristic lists and taxa localities. The only complete floristic list for this area was recorded by NOVKOVIĆ (1957) who focused on the investigation of Slatina, excluding its surroundings. Floristic inventory and general sites of occurrence were provided for all taxa found at the time. Later works related to the Slatina region (MARKOVIĆ-GOSPODARIĆ, 1965; ILIJANIĆ & ŠEGULJA, 1983), mostly based on phytocenological research, provide a certain addition to the flora of Slatina and its surroundings.

Field observations consisted of taxa identification, location mapping and photo-documentation. The general aim has been to gain precise coordinates, therefore methods of direct mapping (NIKOLIĆ, 2006) were used and performed on site: a topographic map of scale 1 : 25 000 (STATE GEODETIC ADMINISTRATION) or a handheld GPS (Global Positioning System) device modified for Zone 5 (Central meridian at 15° E) of Gauss-Krüger coordinate system. Additionally, coordinates of direct mapping can be subjected to generalization and can thus be converted into a model of reduced precision (i.e. UTM or MTB grid).

In this paper a single representative coordinate is given for each taxon. For taxa with an IUCN status, all known coordinates are noted. Taxa in the floristic list have been described using the abbreviations **TM25** or **GPS** for coordinates obtained using either a topographic map or a GPS device, respectively. The number in brackets

represents GPS accuracy for the given coordinate. When toponym nomenclature was used, the topographic maps were also useful in presenting the sites of threatened taxa and creating textual descriptions regarding these sites.

During the course of field observations, the determination of plant taxa was carried out using the following keys and iconographies: DOMAC (2002), JAVORKA & CSAPODY (1991), PIGNATTI (1982), ROTHMALER (2009) and TUTIN *et al.* (1980, 1993). In the frame of the higher systematic groups, the families are listed following the classification by DOMAC (2002). Further within families are allocated genera and within genera there are species. Taxonomy has been adjusted according to the Flora Croatica Database (NIKOLIĆ, 2010). Life form abbreviations are given according to PIGNATTI (1982): **T** Therophyta, **G** Geophyta, **H** Hemicryptophyta, **Ch** Chamaephyta, **Pn** Nanophanerophyta, **P** Phanerophyta, **Hy** Hydrophyta.

Following the names of species and subspecies within the floristic list, common sites of occurrence have been given for every taxon, followed by a single representative coordinate for the same. It should also be noted that certain taxa fall into a protective category by the law (ANONYMOUS, 2009) and such are abbreviated as **P** for *Protected* and **SP** for *Strictly Protected*. The taxa under an IUCN category have been analyzed later in the text. The analysis of these species is consistent with IUCN Red List categories (NIKOLIĆ & TOPIĆ, 2005), which are noted as follows: **DD** (*Data deficient*), **EN** (*Endangered*), **NT** (*Near Threatened*) and **VU** (*Vulnerable*). These are followed by coordinates of all known localities, which are further geographically described in reference with topographic maps. Finally, possible threats and population density (where possible in numbers, otherwise an approximation) are given according to the author's perception of anthropogenic and other influences in the area of the threatened species.

RESULTS

In the course of this investigation, 550 taxa have been noted in the area of Slatina and surrounding villages: 524 species and 26 subspecies classified into 334 genera and 94 families of vascular flora (Tab. 1). Pteridophyta division counts 12 taxa and Spermatophyta 538 taxa. The three most numerous families are: *Asteraceae* with 50 taxa (9.1 %), followed by *Poaceae* with 47 taxa (8.6 %) and *Fabaceae*, counting 33 taxa (6.0 %) in total. Families with 20 taxa or less are aggregated in the category *Other* and count 300 taxa in total (Fig. 2).

Tab. 1. Flora analysis according to the systematic categories.

Scientific classification	Families	Genera	sp & ssp
Pteridophyta	6 (6.4 %)	7 (2.1 %)	12 (2.2 %)
Spermatophyta			
Gymnospermae	2 (2.1 %)	4 (1.2 %)	5 (0.9 %)
Angiospermae			
Dicotyledoneae	73 (77.7 %)	256 (76.6 %)	425 (77.3 %)
Monocotyledoneae	13 (13.8 %)	67 (20.1 %)	108 (19.6 %)
T O T A L	94	334	550

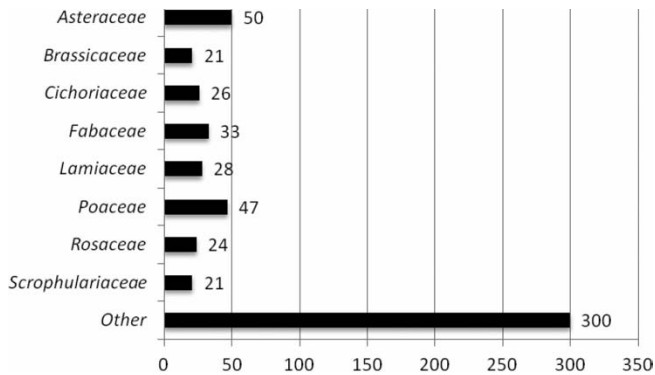


Fig. 2. Numerical distribution of taxa within families.

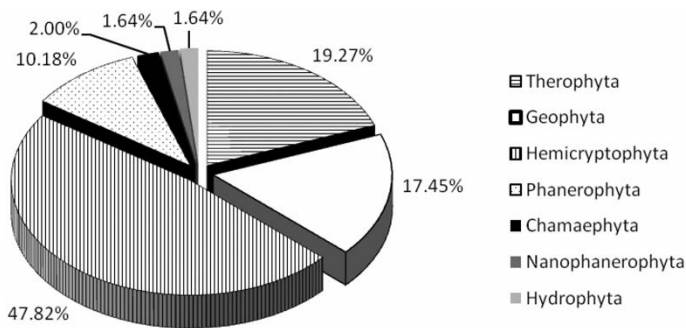


Fig. 3. Life form proportions in the investigated area.

According to the analysis of life forms (Fig. 3), Hemicryptophytes with 47.82 % present a significant domination within the life form quota. They are followed by Therophytes and Geophytes, with 19.27 % and 17.45 % respectively. Phanerophytes present a lesser share along with other life forms which are remotely present.

During field investigations, 25 species have been found which fall under a certain IUCN Red List category, of which 22 (4.0 % of total taxa) are threatened to a certain degree. *Orchidaceae*, with 5 taxa, is the most threatened of the listed families. Furthermore, 105 taxa are protected by the law and 29 taxa are declared strictly protected.

P T E R I D O P H Y T A

E Q U I S E T A T A E

Equisetaceae

- G *Equisetum arvense* L. Field borders, vineyards. GPS: (5) E5704270 N5068450
- G *Equisetum hyemale* L. **SP VU**
- G *Equisetum ramosissimum* Desf. Railroad vicinity. GPS: (6) E5705770 N5068130
- G *Equisetum sylvaticum* L. Forest roadsides. GPS: (15) E5703330 N5068310
- G *Equisetum telmateia* Ehrh. Forest roadsides. GPS: (7) E5702630 N5068290

F I L I C A T A E

Aspleniaceae

- H *Asplenium scolopendrium* L. Inside vineyard wells. GPS: (5) E5704650 N5068010
 H *Asplenium trichomanes* L. Shaded inclined roadsides. GPS: (7) E5704130 N5068450

Dryopteridaceae

- H *Dryopteris filix-mas* (L.) Schott P Forest roadsides. GPS: (5) E5704270 N5068450
 H *Polystichum setiferum* (Forssk.) Woyнар Damp forest. TM25: E5701800 N5067340

Hypolepidaceae

- G *Pteridium aquilinum* (L.) Kuhn Forest edge and roadsides. TM25: E5708730 N5064730

Polypodiaceae

- H *Polypodium vulgare* L. P Shaded forest and forest trails. GPS: (7) E5704130 N5068450

Woodsiaceae

- H *Athyrium filix-femina* (L.) Roth Forest roadsides. GPS: (8) E5702610 N5068170

S P E R M A T O P H Y T A

G Y M N O S P E R M A E

Cupressaceae

- P *Juniperus communis* L. Forest edge. GPS: (6) E5704410 N5065620

Pinaceae

- P *Larix decidua* Mill. Forestry plantations. TM25: E5708610 N5064670
 P *Picea abies* (L.) Karsten Forestry plantations. GPS: (7) E5703450 N5066760
 P *Pinus strobus* L. Forestry plantations. TM25: E5708460 N5064690
 P *Pinus sylvestris* L. Forestry plantations. GPS: (7) E5703450 N5066760

A N G I O S P E R M A E

D i c o t y l e d o n e a e

Betulaceae

- P *Alnus glutinosa* (L.) Gaertner Damp and flooded areas. TM25: E5702870 N5066980
 P *Betula pendula* Roth Forest and meadow borders. TM25: E5704370 N5068810

Corylaceae

- P *Carpinus betulus* L. Common forest component. GPS: (2) E5702045 N5068654
 P *Corylus avellana* L. Common forest component, scrub. GPS: (10) E5702681 N5068138

Fagaceae

- P *Fagus sylvatica* L. Common forest component. GPS: (5) E5701595 N5068616
 P *Quercus cerris* L. Forest edge. GPS: (7) E5704210 N5065870
 P *Quercus petraea* (Mattuschka) Liebl.
 Common forest component. GPS: (5) E5704303 N5068532
 P *Quercus robur* L. Common forest component. GPS: (4) E5701674 N5068627

Juglandaceae

- P *Juglans regia* L. Roadsides and borders (forest and vineyard). GPS: (7) E5703193 N5067474

Salicaceae

- P *Populus alba* L. Roadsides. GPS: (7) E5710180 N5067340

- P *Populus nigra* L. Meadow borders. GPS: (4) E5702494 N5068905
 P *Populus tremula* L. P Forest roadsides. GPS: (13) E5703199 N5067407
 P *Populus* × *canescens* (Aiton) Sm. Forest edge. GPS: (6) E5703977 N5068132
 P *Salix alba* L. Damp habitats (canals, ditches, roadsides). GPS: (5) E5704164 N5068299
 P *Salix caprea* L. Forest roadsides. GPS: (11) E5702689 N5068251
 P *Salix fragilis* L. Scrub. GPS: (4) E5705560 N5068205

Moraceae

- P *Morus alba* L. Roadsides, scrub. GPS: (6) E5704260 N5068420

Cannabaceae

- P *Humulus lupulus* L. Fences and walls, scrub. TM25: E5704310 N5068810

Ulmaceae

- P *Ulmus glabra* Huds. Forest (Oak and Beech). GPS: (5) E5709610 N5063280
 P *Ulmus minor* Miller Roadsides. GPS: (11) E5704816 N5065817

Urticaceae

- H *Urtica dioica* L. Cultivated, disturbed and waste ground. GPS: (7) E5704290 N5068480

Loranthaceae

- P *Loranthus europaeus* Jacq.
 On forest oaks and urban trees. TM25: E5704360 N5068790

Polygonaceae

- T *Polygonum aviculare* L. Roadsides, waste places. GPS: (5) E5702950 N5069460
 T *Polygonum lapathifolium* L. Cultivated land. GPS: (4) E 5704350 N5069370
 T *Polygonum mite* Schrank Damp roadsides. GPS: (7) E5709150 N5062480
 H *Polygonum salicifolium* Brouss. ex Willd. **SP DD**
 Forest ditches. GPS: (6) E5702890 N5066730
 G *Reynoutria japonica* Houtt. Canals, ditches, roadsides. TM25: E5705940 N5067760
 H *Rumex acetosa* L. Field borders, meadows, orchards. GPS: (4) E5704720 N5068420
 H *Rumex conglomeratus* Murray Forest roadsides. GPS: (7) E5703889 N5068114
 H *Rumex crispus* L. Canals, disturbed ground, meadows. GPS: (4) E5705510 N5068240
 H *Rumex obtusifolius* L. Canals, meadows, vineyards. GPS: (6) E5704515 N5069244
 H *Rumex sanguineus* L. Forest roadsides. GPS: (6) E5702726 N5068172

Euphorbiaceae

- Ch *Euphorbia amygdaloides* L. P Forest roadsides. GPS: (6) E5703120 N5067560
 H *Euphorbia cyparissias* L. P Meadows, roadsides. GPS: (7) E5704060 N5068480
 G *Euphorbia dulcis* L. P Forest roadsides. GPS: (6) E5702960 N5067590
 G *Euphorbia epithymoides* Kern. P Forest roadsides. GPS: (14) E5707070 N5063850
 H *Euphorbia esula* L. P Meadows, roadsides. GPS: (5) E5704650 N5068000
 T *Euphorbia helioscopia* L. P Vineyards. GPS: (7) E5703800 N5068680
 G *Euphorbia palustris* L. P Meadows, meadow canals. GPS: (4) E5704160 N5069490
 G *Mercurialis perennis* L. Damp forest, forest roadsides. TM25: E5702850 N5067404

Chenopodiaceae

- T *Chenopodium album* L. Arable land, roadsides. TM25: E5704640 N5068970
 T *Chenopodium hybridum* L. Field roadsides. TM25: E5704643 N5068973
 T *Chenopodium polyspermum* L. Forest roadsides. GPS: (7) E5709150 N5062480

Amaranthaceae

- T *Amaranthus albus* L. Railroads. TM25: E5711200 N5065870
 T *Amaranthus deflexus* L. By fences and house walls. TM25: E5710030 N5065730

- T *Amaranthus lividus* L. Cultivated land. GPS: (6) E5704332 N5068935
 T *Amaranthus retroflexus* L. Cultivated land, waste ground. GPS: (9) E5702480 N5069980

Phytolaccaceae

- G *Phytolacca americana* L. Disturbed ground, roadsides. GPS: (7) E5709790 N5064180

Portulacaceae

- T *Portulaca oleracea* L. Disturbed ground, roadsides. GPS: (4) E5704380 N5068829

Caryophyllaceae

- T *Cerastium dubium* (Bast.) Guépin Meadows. GPS: (5) E5704260 N5069420
 H *Cerastium fontanum* Baumg. ssp. *vulgare* (Hartman) Greuter et Burdet
 Meadow borders. GPS: (6) E5703012 N5069372
 T *Cerastium glomeratum* Thuill. Abandoned fields. GPS: (5) E5704760 N5068810
 H *Cerastium sylvaticum* Waldst. et Kit. Forest roadsides. GPS: (6) E5701601 N5068645
 H *Cucubalus baccifer* L. Vineyard borders. TM25: E5704600 N5068120
 H *Dianthus barbatus* L. **SP** Forest edge and roadsides. GPS: (9) E5702810 N5068330
 H *Dianthus armeria* L. ssp. *armeriastrum* (Wolfner) Velen
 Forest roadsides. GPS: (7) E5704130 N5065800
 H *Lychnis flos-cuculi* L. Forest roadsides, meadows. GPS: (4) E5705510 N5068240
 T *Moenchia mantica* (L.) Bartl. Meadows, vineyards. GPS: (4) E5704710 N5068010
 H *Myosoton aquaticum* (L.) Moench Roadsides. GPS: (9) E5705550 N5068210
 H *Saponaria officinalis* L. **P** Meadow borders, roadsides. GPS: (7) E5705780 N5068140
 H *Silene italica* (L.) Pers. ssp. *italica* Roadsides. GPS: (11) E5704330 N5065770
 H *Silene latifolia* Poir. Disturbed ground, forest roadsides. TM25: E5704460 N5068790
 H *Silene nutans* L. Forest trails. GPS: (9) E5703573 N5068425
 H *Silene vulgaris* (Moench) Garcke Street lawns. TM25: E5711030 N5065910
 Ch *Spergularia rubra* (L.) J. Presl et C. Presl **P** Dry bare ground. TM25: E5704310 N5068900
 H *Stellaria graminea* L. Meadows, roadsides. TM25: E5708710 N5064690
 Ch *Stellaria holostea* L. Forest, roadsides. TM25: E5704520 N5068140
 H *Stellaria palustris* Retz. **SP DD**
 T *Stellaria media* (L.) Vill. Cultivated land, roadsides. GPS: (4) E5703799 N5068169

Aristolochiaceae

- G *Aristolochia clematitis* L. Roadsides. GPS: (7) E5710000 N5064580
 H *Asarum europaeum* L. **P** Forest banks, scrub. GPS: (13) E5702280 N5067500

Ranunculaceae

- H *Aconitum lycoctonum* L. ssp. *vulparia* (Reichenb.) Nyman
 Forest stream banks. GPS: (16m) E5708250 N5064610
 G *Anemone nemorosa* L. **P** Damp forest, scrub. GPS: (7) E5709330 N5063320
 G *Anemone ranunculoides* L. **P** Damp forest, scrub. TM25: E5702870 N5066980
 H *Caltha palustris* L. **P** Ditches, damp forest, stream banks. GPS: (6) E5702450 N5068880
 P *Clematis vitalba* L. Forest roadsides, scrub. GPS: (4) E5704030 N5068490
 G *Helleborus atrorubens* Waldst. et Kit. **SP** Damp forest. GPS: (5) E5703570 N5066670
 G *Helleborus dumetorum* Waldst. et Kit. **P** Damp forest. GPS: (13) E5702360 N5068710
 G *Hepatica nobilis* Schreber **P** Forest ground. GPS: (7) E5709680 N5063830
 G *Isopyrum thalictroides* L. Damp forest. GPS: (12) E5709380 N5063250
 H *Ranunculus acris* L. **P** Meadows. GPS: (4) E5704720 N5068420
 T *Ranunculus arvensis* L. **P** Arable land. GPS: (5) E5704430 N5069290
 H *Ranunculus bulbosus* L. **P** Meadows. GPS: (4) E5704260 N5069420
 G *Ranunculus ficaria* L. **P** Ditches, damp forest, stream banks. GPS: (5) E5704710 N5069060
 H *Ranunculus lanuginosus* L. **P** Forest roadsides. GPS: (6) E5703120 N5067560

- H *Ranunculus repens* L. **P** Canals, ditches, meadows. GPS: (7) E5705660 N5068160
 T *Ranunculus sardous* Crantz **P** Arable land. GPS: (6) E5705580 N5068190

Ceratophyllaceae

- Hy *Ceratophyllum demersum* L. Ponds. GPS: (5) E5704309 N5068855

Papaveraceae

- H *Chelidonium majus* L. Disturbed land, roadsides, scrub. TM25: E5704590 N5068950
 T *Papaver rhoeas* L. **P** Fields, roadsides, railroads. TM25: E5703950 N5069430

Fumariaceae

- G *Corydalis bulbosa* (L.) DC. **P** Damp forest. GPS: (6) E5702710 N5069120

Brassicaceae

- H *Alliaria petiolata* (M. Bieb.) Cavara et Grande **P**
 Canal banks, forest roadsides, scrub. GPS: (6) E5704720 N5068000
 T *Arabidopsis thaliana* (L.) Heynh.
 Abandoned fields, disturbed ground. GPS: (5) E5704760 N5068810
 G *Armoracia rusticana* P. Gaertn., B. Mey. et Scherb.
 Ditches, roadsides, waste ground. TM25: E5706590 N5067860
 H *Barbarea vulgaris* R. Br. Wet meadows. GPS: (4) E5705510 N5068240
 T *Brassica napus* L. Fields, roadsides. GPS: (5) E5704390 N5068820
 H *Capsella bursa-pastoris* (L.) Medik.
 Cultivated land, meadows, roadsides. GPS: (5) E5704589 N5068934
 H *Cardamine amara* L. Damp forest, roadsides. GPS: (5) E5702460 N5068880
 G *Cardamine bulbifera* (L.) Crantz Forest roadsides. GPS: (8) E5702360 N5068760
 G *Cardamine enneaphylos* (L.) Crantz Forest edge. GPS: (9) E5709360 N5063290
 T *Cardamine hirsuta* L. Cultivated land, meadows. GPS: (5) E5704700 N5068010
 T *Cardamine impatiens* L. Forest roadsides. GPS: (5) E5703000 N5067350
 H *Cardamine pratensis* L. Meadows. GPS: (5) E5702995 N5067347
 G *Cardamine waldsteinii* Dyer **SP** Forest trails. GPS: (8) E5709777 N5063751
 G *Cardaria draba* (L.) Desv. Field borders, meadows. GPS: (5) E5705780 N5068131
 T *Erophila verna* (L.) Chevall. ssp. *verna* Meadow roadsides. TM25: E5704225 N5069446
 H *Hesperis matronalis* L. Canals. GPS: (6) E5706177 N5066183
 T *Lepidium ruderales* L. Disturbed ground, roadsides. GPS: (5) E5705723 N5068158
 T *Lepidium virginicum* L. Disturbed ground, roadsides. TM25: E5705645 N5068159
 H *Rorippa sylvestris* (L.) Besser Wet meadows. GPS: (5) E5705560 N5068198
 T *Sinapis arvensis* L. Disturbed ground, fields, roadsides. GPS: (5) E5704203 N5069682
 T *Sisymbrium officinale* (L.) Scop. Disturbed ground. GPS: (5) E5704457 N5068797

Resedaceae

- H *Reseda lutea* L. **P** Field borders, railroads. GPS: (5) E5703982 N5069432

Cistaceae

- Ch *Helianthemum nummularium* (L.) Mill. ssp. *nummularium*
 Forest roadsides (on gravel). GPS: (5) E5704342 N5065928

Violaceae

- H *Viola alba* Besser ssp. *scotophylla* (Jord.) Nyman Vineyards. TM25: E5704623 N5068009
 T *Viola arvensis* Murray **P**
 Arable and abandoned fields, roadsides. GPS: (5) E5704764 N5068813
 H *Viola odorata* L. **P** Lawns, scrub. TM25: E5710370 N5065797
 H *Viola reichenbachiana* Jord. ex Boreau
 Forest roadsides, vineyards. GPS: (5) E5704652 N5068014

Cucurbitaceae

- T *Echinocystis lobata* (Michx.) Torr. et Gray
Roadsides, railroads, scrub, waste ground. GPS: (4) E5704288 N5068462

Clusiaceae

- H *Hypericum hirsutum* L. Forest roadsides. GPS: (9) E5703125 N5067947
H *Hypericum perforatum* L. P Field roadsides, meadows. GPS: (5) E5702397 N5069897

Malvaceae

- T *Abutilon theophrasti* Medik. Field roadsides. GPS: (4) E5712531 N5066517
H *Althaea officinalis* L. P Roadsides. GPS: (5) E5704940 N5069348
T *Hibiscus trionum* L. SP EN
H *Malva alcea* L. Forest roadsides, orchards. GPS: (10) E5709249 N5062468
T *Malva neglecta* Wallr. P By concrete walls. GPS: (7) E5709018 N5065970
H *Malva sylvestris* L. Disturbed ground, roadsides. GPS: (5) E5704401 N5068818

Tiliaceae

- P *Tilia cordata* Mill. Scrub, roadsides. GPS: (7) E5703910 N5069030
P *Tilia platyphyllos* Scop. ssp. *platyphyllos* Forest component. GPS: (5) E5707916 N5064521
P *Tilia tomentosa* Moench Forest component. GPS: (5) E5702799 N5068070

Oxalidaceae

- G *Oxalis acetosella* L. P Forest. TM25: E5708545 N5064727
H *Oxalis corniculata* L. Bare ground around houses. TM25: E5710343 N5065833
H *Oxalis fontana* Bunge Field borders and roadsides. GPS: (5) E5804233 N5072161

Geraniaceae

- T *Geranium columbinum* L. Forest roadsides. GPS: (8) E5704761 N5065472
T *Geranium dissectum* L. Roadsides, waste ground. GPS: (4) E5704261 N5068453
T *Geranium molle* L. Dry roadsides. GPS: (6) E5709911 N5064430
H *Geranium phaeum* L. Forest roadsides, vineyards. GPS: (4) E5704548 N5068120
T *Geranium robertianum* L. P Forest roadsides, vineyards. GPS: (5) E5702995 N5067347

Balsaminaceae

- T *Impatiens balfourii* Hooker f. Forest edge. GPS: (7) E5709415 N5063057

Simaroubaceae

- P *Ailanthus altissima* (Mill.) Swingle Roadsides. GPS: (7) E5703910 N5069030

Polygalaceae

- H *Polygala comosa* Schkuhr Forest roadsides. GPS: (5) E5704339 N5065936

Anacardiaceae

- P *Rhus typhina* L. Disturbed ground, roadsides. GPS: (7) E5709145 N5064578

Aceraceae

- P *Acer campestre* L. Scrub, forest, roadsides. GPS: (3) E5704335 N5068831
P *Acer negundo* L. Roadsides. GPS: (7) E5707494 N5066228
P *Acer platanoides* L. Forest roadsides. TM25: E5701498 N5068331
P *Acer pseudoplatanus* L. Forest, forest roadsides. GPS: (9) E5703656 N5066740
P *Acer tataricum* L. Forest edge, scrub. GPS: (8) E5703928 N5066319

Celastraceae

- P *Euonymus europaeus* L. P Roadsides, scrub. GPS: (4) E5704043 N5068484

Staphyleaceae

P *Staphylea pinnata* L. Forest edge and roadsides. GPS: (5) E5709708 N5063655

Rhamnaceae

P *Frangula alnus* Mill. Forest roadsides, scrub. GPS: (7) E5704252 N5065884

Vitaceae

P *Parthenocissus quinquefolia* (L.) Planchon
Fences, waste ground. TM25: E5710421 N5065760

P *Vitis vinifera* L. ssp. *silvestris* (C.C.Gmel.) Hegi
Scrub, roadsides. TM25: E5704239 N5068407

Saxifragaceae

H *Chrysosplenium alternifolium* L.
Damp forest, forest trails, stream banks. GPS: (7) E5709333 N5063318

H *Saxifraga bulbifera* L. Meadows. GPS: (4) E5704406 N5069299

T *Saxifraga tridactylites* L. Railroads. GPS: (5) E5705791 N5068122

Rosaceae

H *Agrimonia eupatoria* L. P Field borders, meadows. GPS: (7) E5704323 N5069389

H *Aruncus dioicus* (Walter) Fernald P Forest edge. GPS: (8) E5702609 N5068171

P *Crataegus monogyna* Jacq. P Scrub. GPS: (7) E5704271 N5068453

H *Filipendula vulgaris* Moench Meadows. GPS: (4) E5706351 N5069327

H *Fragaria moschata* Duchesne Vineyards. GPS: (7) E5704713 N5068007

H *Fragaria vesca* L. Forest roadsides, scrub. GPS: (7) E5703949 N5068528

H *Geum urbanum* L. P Shaded roadsides. GPS: (4) E5702481 N5070005

H *Potentilla argentea* L. Forest roadsides. GPS: (7) E5704521 N5065396

H *Potentilla micrantha* Ramond ex DC. Forest edge. GPS: (7) E5709531 N5063223

H *Potentilla recta* L. Dry meadows. GPS: (5) E5704046 N5068496

H *Potentilla reptans* L. Bare places, lawns, forest clearings. GPS: (11) E5703088 N5068229

T *Potentilla supina* L. Disturbed ground. GPS: (5) E5704677 N5068562

P *Prunus avium* L. P Forest, scrub. GPS: (7) E5703167 N5067093

P *Prunus domestica* L. Scrub. TM25: E5705954 N5069398

P *Prunus spinosa* L. Scrub. GPS: (4) E5704046 N5068491

P *Pyrus pyraeaster* Burgsd. P Forest, scrub. TM25: E5704252 N5065884

Pn *Rosa canina* L. P Scrub, roadsides. GPS: (6) E5704040 N5068493

Pn *Rosa jundzillii* Besser Scrub. GPS: (7) E5704242 N5065883

Pn *Rosa nitidula* Besser Scrub, meadow borders. GPS: (5) E5706020 N5069354

Pn *Rubus caesius* L. Scrub, roadsides. GPS: (5) E5703993 N5069439

Pn *Rubus discolor* Weihe et Ness Scrub, roadsides. GPS: (4) E5702482 N5070002

Pn *Rubus hirtus* Waldst. et Kit. Scrub. GPS: (8) E5702299 N5069636

H *Sanguisorba minor* Scop. P Forest roadsides. GPS: (9) E5704306 N5065926

P *Sorbus torminalis* (L.) Crantz Forest. TM25: E5703502 N5066715

Fabaceae

P *Amorpha fruticosa* L. Forest edge. GPS: (8) E5701624 N5068636

H *Astragalus glycyphyllos* L. Forest roadsides. GPS: (7) E5702774 N5067832

H *Coronilla varia* L. Forest roadsides. GPS: (8) E5702802 N5067842

Ch *Chamaecytisus supinus* (L.) Link Forest edge. GPS: (6) E5703580 N5066689

H *Dorycnium herbaceum* Vill. Forest roadsides. GPS: (6) E5703580 N5066690

H *Galega officinalis* L. P Field borders, forest roadsides. GPS: (5) E5705613 N5070115

Ch *Genista tinctoria* L. P Forest roadsides. GPS: (13) E5702861 N5068404

T *Glycine max* (L.) Merr. Abandoned fields. GPS: (5) E5705986 N5069418

- T *Lathyrus hirsutus* L. Meadows. GPS: (5) E5706369 N5069178
 G *Lathyrus niger* (L.) Bernhardt Forest edge. GPS: (9) E5709274 N5063092
 H *Lathyrus pratensis* L. Meadows. GPS: (4) E5704288 N5069420
 H *Lathyrus tuberosus* L. Arable land, meadows. GPS: (5) E5703984 N5069424
 G *Lathyrus vernus* (L.) Bernhardt Forest roadsides. GPS: (6) E5703170 N5067858
 H *Lotus corniculatus* L. Meadows, roadsides. GPS: (5) E5705519 N5068220
 H *Medicago falcata* L. Dry meadows. GPS: (5) E5704042 N5068490
 T *Medicago lupulina* L. Meadows, roadsides. TM25: E5705524 N5068193
 H *Medicago sativa* L. Arable land, meadow borders, roadsides. GPS: (6) E5706066 N5069307
 T *Melilotus albus* Medik. Meadows, roadsides. GPS: (5) E5710225 N5065164
 H *Melilotus officinalis* (L.) Lam. Disturbed ground, roadsides. GPS: (6) E5709088 N5064799
 Ch *Ononis arvensis* L. Meadows. GPS: (5) E5706473 N5069125
 P *Robinia pseudoacacia* L. Forest component, scrub. GPS: (8) E5702669 N5068293
 T *Trifolium arvense* L. Dry places. GPS: (5) E5708835 N5063348
 T *Trifolium dubium* Sibth. Dry meadows. GPS: (4) E5704043 N5068484
 H *Trifolium hybridum* L. Meadows. GPS: (4) E5709960 N5067185
 G *Trifolium medium* L. Forest roadsides. GPS: (7) E5704470 N5065487
 H *Trifolium pratense* L. Cultivated land, meadows, roadsides. GPS: (6) E5704177 N5069513
 H *Trifolium repens* L. Lawns, meadows, roadsides. GPS: (5) E5706320 N5069216
 T *Vicia angustifolia* L. ssp. *segetalis* (Thuill.) Corb. Meadows. GPS: (6) E5703012 N5069372
 H *Vicia cracca* L. ssp. *cracca* Meadows. GPS: (5) E5704497 N5068822
 H *Vicia grandiflora* Scop. Fields, meadows, vineyards. GPS: (4) E5704723 N5068421
 T *Vicia hirsuta* (L.) Gray Meadows. GPS: (5) E5704219 N5069482
 G *Vicia oroboides* Wulfen Forest roadsides. GPS: (5) E5702581 N5068192
 T *Vicia villosa* Roth ssp. *varia* (Host) Corb.
 Meadows, roadsides. GPS: (5) E5706348 N5069192

Thymelaeaceae

- Pn *Daphne mezereum* L. **P NT**

Lythraceae

- T *Lythrum hyssopifolia* L. **SP** Disturbed ground. GPS: (5) E5703035 N5069343
 H *Lythrum salicaria* L. **P** Arable land, forest roadsides. GPS: (4) E5712424 N5066513

Onagraceae

- H *Circaea lutetiana* L. Forest roadsides. GPS: (9) E5702593 N5067784
 H *Epilobium hirsutum* L. Roadsides. GPS: (7) E5705600 N5068191
 H *Epilobium parviflorum* Schreber Forest edge, vineyards. TM25: E5709791 N5063859
 H *Oenothera biennis* L. Roadsides, waste ground. GPS: (5) E5704448 N5068783

Haloragaceae

- Hy *Myriophyllum spicatum* L. Lakes, ponds. GPS: (5) E5706845 N5066121

Callitrichaceae

- Hy *Callitriche palustris* L. **SP** Stagnant water. GPS: (7) E5708437 N5064680

Cornaceae

- P *Cornus sanguinea* L. Forest, scrub. TM25: E5703543 N5068294

Araliaceae

- P *Hedera helix* L. Forest, scrub, fences. GPS: (9) E5702562 N5068166

Apiaceae

- G *Aegopodium podagraria* L. Canals, ditches. TM25: E5704406 N5068833

- T *Aethusa cynapium* L. ssp. *cynapium* Field borders. GPS: (7) E5703910 N5069030
 H *Angelica sylvestris* L. Forest roadsides. GPS: (9) E5702824 N5067588
 H *Anthriscus sylvestris* (L.) Hoffm. Forest roadsides, meadows. GPS: (7) E5702592 N5068985
 T *Chaerophyllum temulum* L. Roadsides. GPS: (4) E5709885 N5064410
 H *Conium maculatum* L. P Disturbed ground, roadsides. GPS: (7) E5704285 N5068431
 H *Daucus carota* L. Meadows, roadsides. GPS: (4) E5706036 N5069363
 H *Eryngium campestre* L. P Dry meadows. GPS: (5) E5704022 N5068507
 H *Heracleum sphondylium* L. ssp. *ternatum* (Velen.) Brummitt
 Disturbed land, roadsides, waste places. GPS: (7) E5704271 N5068453
 H *Oenanthe silaifolia* M. Bieb. Wet meadows. GPS: (5) E5705997 N5069380
 H *Pastinaca sativa* L. Arable land, meadows. GPS: (4) E5706462 N5069127
 H *Peucedanum carvifolia* Vill. Meadows. TM25: E5704450 E5069466
 H *Peucedanum oreoselinum* (L.) Moench Dry meadows. GPS: (7) E5704053 N5068488
 H *Pimpinella saxifraga* L. P Dry meadows. GPS: (5) E5704427 N5068765
 H *Sanicula europaea* L. P Forest. GPS: (8) E5709688 N5063682
 H *Selinum carvifolia* (L.) L. Meadows. TM25: E5704237 N5069133
 T *Torilis arvensis* (Huds.) Link Arable land. GPS: (5) E5706149 N5069270

Pyrolaceae

- G *Monotropa hypopitys* L. Forest (Beech). GPS: (10) E5701815 N5068860

Primulaceae

- T *Anagallis arvensis* L. Lawns, meadows, vineyards. GPS: (6) E5704072 N5068335
 G *Cyclamen purpurascens* Mill. P NT
 Hy *Hottonia palustris* L. SP EN
 H *Lysimachia nummularia* L. Damp forest roadsides. GPS: (9) E5702593 N5067784
 H *Lysimachia punctata* L. Forest roadsides, pastures. TM25: E5702282 N5069860
 H *Primula vulgaris* Huds. Forest, forest roadsides, scrub. GPS: (7) E5702899 N5068423

Cuscutaceae

- T *Cuscuta campestris* Yuncker Arable land, roadsides. GPS: (5) E5707240 N5067294

Convolvulaceae

- H *Calystegia sepium* (L.) R. Br. Arable land, roadsides. GPS: (5) E5711661 N5066392
 H *Calystegia silvatica* (Kit.) Griseb. Roadsides. GPS: (4) E5702481 N5070005
 G *Convolvulus arvensis* L. Cultivated land, scrub, roadsides. GPS: (4) E5705556 N5068240

Boraginaceae

- T *Cerinthe minor* L. Meadow roadsides. GPS: (5) E5707977 N5063260
 H *Echium vulgare* L. Roadsides. GPS: (5) E5709008 N5063450
 Ch *Lithospermum purpureocaeruleum* L. Forest edge. GPS: (6) E5703117 N5067563
 T *Myosotis arvensis* (L.) Hill Meadows. GPS: (5) E5704257 N5068417
 T *Myosotis ramosissima* Rochel SP Meadows. GPS: (5) E5704191 N5069506
 H *Myosotis scorpioides* L. Streams. GPS: (9) E5708214 N5064548
 H *Pulmonaria officinalis* L. Forest, scrub. GPS: (5) E5704339 N5068584
 H *Symphytum officinale* L. Ditches, meadows. GPS: (4) E5704159 N5069487
 G *Symphytum tuberosum* L. P Forest, meadows. GPS: (6) E5703117 N5067563

Solanaceae

- H *Atropa bella-donna* L. P Forest clearings. GPS: (10) E5709249 N5062468
 T *Datura stramonium* L. Arable land. GPS: (5) E5707653 N5066984
 H *Physalis alkekengi* L. P Forest trails, scrub. TM25: E5704393 N5068632
 Pn *Solanum dulcamara* L. P Forest roadsides, scrub. GPS: (7) E5709531 N5063223
 T *Solanum nigrum* L. P Disturbed ground, roadsides. GPS: (7) E5709844 N5063837

Scrophulariaceae

- H *Cymbalaria muralis* P.Gaertn., Mey. et Scherb. ssp. *muralis*
House walls and concrete pathways. GPS: (13) E5710957 N5065974
- H *Digitalis ferruginea* L. **SP VU**
- T *Euphrasia stricta* Wolff ex J.F.Lehm. Meadows. GPS: (6) E5708731 N5064692
- H *Gratiola officinalis* L. **P** Canals, ditches, meadows. GPS: (4) E5706410 N5069153
- G *Lathraea squamaria* L. Forest. GPS: (9) E5709356 N5063286
- H *Linaria vulgaris* Mill. **P** Cultivated land, meadows, roadsides. TM25: E5704450 N5069466
- T *Melampyrum nemorosum* L. Forest edge. GPS: (6) E5703003 N5069379
- T *Odontites vulgaris* Moench Dry meadows. GPS: (6) E5704048 N5068494
- H *Pseudolysimachion longifolium* (L.) Opiz **SP EN**
- H *Pseudolysimachion orchideum* (Crantz) Wraber
Dry meadows. GPS: (4) E5704050 N5068494
- H *Scrophularia nodosa* L. **P** Abandoned fields, forest edge. GPS: (5) E5704764 N5068813
- H *Verbascum blattaria* L. **P** Bare places, roadsides. GPS: (6) E5702312 N5069631
- H *Verbascum nigrum* L. **P** Forest roadsides. GPS: (6) E5702797 N5067846
- H *Verbascum pulverulentum* Vill. **P** Meadows. GPS: (6) E5705807 N5068130
- H *Veronica anagallis-aquatica* L.
Canals, streams. GPS: (5) E5705574 N5068328
- H *Veronica chamaedrys* L. Forest roadsides, vineyards. TM25: E5703851 N5068629
- T *Veronica hederifolia* L. Cultivated land. GPS: (4) E5704648 N5068894
- H *Veronica montana* L. Damp forest trails. GPS: (8) E5707129 N5063879
- H *Veronica officinalis* L. **P** Forest. GPS: (7) E5702994 N5068296
- T *Veronica persica* Poir. Cultivated land, ditches, meadows. GPS: (6) E5703839 N5068628
- H *Veronica serpyllifolia* L. Meadows. GPS: (4) E5704406 N5069299

Verbenaceae

- H *Verbena officinalis* L. Roadsides, grassy places. GPS: (6) E5702312 N5069631

Lamiaceae

- T *Acinos arvensis* (Lam.) Dandy Forest roadsides. GPS: (6) E5709025 N5062576
- H *Ajuga reptans* L. Forest, meadows. GPS: (5) E5704260 N5069424
- H *Ballota nigra* L. **P** Disturbed ground, roadsides. TM25: E5709892 N5064386
- H *Betonica officinalis* L. **P** Meadows. GPS: (6) E5704362 N5069345
- H *Calamintha sylvatica* Bromf. Forest roadsides. GPS: (9) E5701496 N5068327
- H *Clinopodium vulgare* L. Dry meadows, forest roadsides. GPS: (5) E5704069 N5068479
- T *Galeopsis speciosa* Mill. Forest edge, roadsides. GPS: (7) E5709044 N5063702
- H *Glechoma hederacea* L. Forest roadsides, lawns, vineyards. GPS: (4) E5704688 N5068572
- H *Glechoma hirsuta* Waldst. et Kit. Forest. GPS: (4) E5702174 N5068666
- H *Lamium album* L. Roadsides. GPS: (6) E5708299 N5064671
- H *Lamium galeobdolon* (L.) L. Forest roadsides. GPS: (7) E5702149 N5068645
- H *Lamium maculatum* L. Forest edge and roadsides. GPS: (5) E5703594 N5068278
- T *Lamium purpureum* L. Cultivated land, meadows, roadsides. TM25: E5704664 N5068423
- H *Lycopus europaeus* L. **P** Forest roadsides, meadows. GPS: (15) E5703326 N5068313
- H *Melittis melissophyllum* L. **P** Forest edge and trails. GPS: (8) E5709688 N5063682
- H *Mentha aquatica* L. **P** Lake banks. GPS: (5) E5708429 N5063410
- H *Mentha longifolia* (L.) Huds. **P** Disturbed ground, meadows. GPS: (10) E5702467 N5069913
- H *Mentha pulegium* L. **P** Arable land, canals. GPS: (4) E5706473 N5069133
- H *Origanum vulgare* L. Forest roadsides. GPS: (8) E5703518 N5066711
- H *Prunella laciniata* (L.) L. Roadsides. GPS: (4) E5704043 N5068484
- H *Prunella vulgaris* L. Meadows, roadsides. GPS: (6) E5702487 N5069864

- H *Salvia glutinosa* L. Forest roadsides. GPS: (12) E5703362 N5067150
 G *Scutellaria hastifolia* L. Meadows. GPS: (5) E5704341 N5069376
 T *Stachys annua* (L.) L. Meadow roadsides. GPS: (5) E5707977 N5063260
 H *Stachys palustris* L. Field canals, vineyard borders. GPS: (5) E5705623 N5070093
 H *Stachys sylvatica* L. Forest roadsides. GPS: (5) E5703649 N5068257
 Ch *Teucrium chamaedrys* L. P Dry places. GPS: (5) E5704075 N5068475
 Ch *Thymus pulegioides* L. Meadow borders. GPS: (5) E5708516 N5064831

Plantaginaceae

- H *Plantago lanceolata* L. Lawns, meadows, roadsides. GPS: (9) E5702557 N5068962
 H *Plantago major* L. Grassy and waste habitats. GPS: (5) E5704161 N5069525

Gentianaceae

- H *Centaurium erythraea* Rafn ssp. *erythraea* Meadows. GPS: (4) E5704325 N5069394
 H *Gentiana asclepiadea* L. P NT

Apocynaceae

- Ch *Vinca minor* L. P Forest, scrub. GPS: (7) E5703163 N5067082

Asclepiadaceae

- G *Asclepias syriaca* L.
 Arable land, meadow borders, waste places. GPS: (5) E5704293 N5069419
 H *Vincetoxicum hirsutinaria* Medik. P
 Disturbed ground, forest roadsides. GPS: (8) E5702841 N5067838

Oleaceae

- P *Fraxinus angustifolia* Vahl Forest edge, meadow borders. GPS: (6) E5703575 N5066691
 P *Fraxinus ornus* L. Forest edge and roadsides. GPS: (8) E5709910 N5062356
 Pn *Ligustrum vulgare* L. Forest, scrub. GPS: (8) E5709591 N5063311

Rubiaceae

- H *Asperula cynanchica* L. Dry meadows. GPS: (6) E5704046 N5068492
 G *Asperula taurina* L. Forest. GPS: (8) E5702358 N5068764
 H *Cruciata laevipes* Opiz Roadsides. GPS: (5) E5704554 N5068123
 T *Galium aparine* L. Roadsides. TM25: E5705510 N5068229
 H *Galium mollugo* L. Meadows, roadsides. GPS: (3) E5705595 N5068186
 G *Galium odoratum* (L.) Scop. P Forest (Hornbeam). GPS: (7) E5702158 N5068669
 H *Galium palustre* L. Canals. GPS: (5) E5704315 N5068877
 H *Galium sylvaticum* L. Forest roadsides. GPS: (7) E5703012 N5067349
 H *Galium verum* L. P Meadows. GPS: (5) E5705517 N5068211

Caprifoliaceae

- G *Sambucus ebulus* L. Forest roadsides. GPS: (7) E5702774 N5067832
 P *Sambucus nigra* L. Forest roadsides, scrub. GPS: (7) E5701956 N5068654
 P *Viburnum opulus* L. Forest edge. GPS: (9) E5704481 N5065488

Valerianaceae

- H *Valeriana officinalis* L. P Scrub. GPS: (8) E5703844 N5068115
 T *Valerianella locusta* (L.) Laterrade P
 Cultivated land, meadows. GPS: (5) E5704260 N5069424

Dipsacaceae

- H *Dipsacus fullonum* L. Disturbed ground, roadsides. TM25: E5709053 N5064846
 H *Dipsacus laciniatus* L. Disturbed ground, meadows. GPS: (4) E5706462 N5069127

- H *Dipsacus pilosus* L. Forest roadsides. GPS: (13) E5703378 N5067052
 H *Knautia arvensis* (L.) Coult. Meadows. GPS: (5) E5704355 N5069345
 H *Knautia drymeia* Heuff. Forest. GPS: (9) E5701601 N5068640
 H *Scabiosa ochroleuca* L. Dry meadows. GPS: (6) E5704085 N5068472

Campanulaceae

- H *Campanula cervicaria* L. Forest roadsides. GPS: (8) E5704467 N5065519
 H *Campanula patula* L. Canal banks, grassy places, meadows. GPS: (5) E5706623 N5069036
 H *Campanula persicifolia* L. Forest roadsides. TM25: E5702931 N5068301
 H *Campanula trachelium* L. Forest. GPS: (13) E5702489 N5067385

Asteraceae

- H *Achillea millefolium* L. Meadows, pastures, roadsides. GPS: (5) E5704154 N5069534
 T *Ambrosia artemisiifolia* L. Arable land, disturbed ground. TM25: E5704319 N5068399
 H *Arctium lappa* L. Forest, scrub, roadsides. GPS: (6) E5703841 N5068125
 H *Artemisia vulgaris* L. Roadsides. TM25: E5704718 N5069053
 H *Bellis perennis* L. Grassy habitats. GPS: (4) E5704646 N5068488
 T *Bidens tripartita* L. Arable land, damp forest roadsides. GPS: (7) E5702731 N5068286
 H *Buphthalmum salicifolium* L. Forest roadsides. GPS: (7) E5704332 N5065760
 H *Carduus acanthoides* L. Roadsides. GPS: (6) E5704246 N5068365
 H *Carlina vulgaris* L. Dry meadows. GPS: (6) E5704046 N5068492
 H *Carpesium abrotanoides* L. Forest trails. GPS: (7) E5701549 N5068492
 T *Centaurea cyanus* L. P Disturbed ground. GPS: (8) E5704203 N5068330
 H *Centaurea jacea* L. Meadows, roadsides. GPS: (4) E5705312 N5068365
 H *Centaurea nigrescens* Willd. Forest and shaded roadsides. GPS: (6) E5704252 N5068406
 H *Centaurea rhenana* Boreau Dry meadows. GPS: (6) E5704067 N5068480
 H *Centaurea scabiosa* L. Dry meadows. GPS: (6) E5704085 N5068472
 H *Centaurea stenolepis* A. Kern. SP Roadsides. GPS: (6) E5704241 N5068351
 T *Chamomilla recutita* (L.) Rauschert
 Arable land, disturbed ground, roadsides. GPS: (4) E5704460 N5068762
 G *Cirsium arvense* (L.) Scop.
 Disturbed land, meadows, roadsides. GPS: (5) E5702927 N5069886
 G *Cirsium canum* (L.) All. Wet meadows. GPS: (4) E5704289 N5068942
 H *Cirsium oleraceum* (L.) Scop. Forest edge. GPS: (9) E5702645 N5067726
 H *Cirsium vulgare* (Savi) Ten.
 Arable land, disturbed ground, forest roadsides. GPS: (6) E5702781 N5068091
 T *Conyza canadensis* (L.) Cronquist
 Cultivated and waste land, roadsides. GPS: (4) E5705779 N5068118
 T *Erechtites hieraciifolia* (L.) Raf. ex DC. Forest roadsides. GPS: (9) E5709096 N5062499
 T *Erigeron annuus* (L.) Pers. Meadows, roadsides. GPS: (6) E5709892 N5064418
 H *Eupatorium cannabinum* L. Ditches, roadsides. GPS: (10) E5704380 N5068821
 T *Galinsoga ciliata* (Raf.) S.F.Blake Arable land, lawns. GPS: (6) E5704332 N5068935
 T *Galinsoga parviflora* Cav. Disturbed ground, field borders. GPS: (6) E5704340 N5068933
 T *Helianthus annuus* L. Arable land, roadsides. GPS: (2) E5706356 N5069174
 G *Helianthus tuberosus* L. Field roadsides. GPS: (5) E5704840 N5069232
 H *Inula britannica* L. Damp forest roadsides. GPS: (8) E5702614 N5068179
 H *Inula helenium* L. P Forest roadsides, meadows. GPS: (6) E5704142 N5065860
 H *Inula salicina* L. P Meadows. GPS: (5) E5704382 N5069328
 H *Leucanthemum vulgare* Lam. Meadows, roadsides. GPS: (4) E5704380 N5069301
 T *Matricaria perforata* Mérat Arable land. GPS: (5) E5705985 N5069340

- H *Onopordum acanthium* L. P Disturbed ground. GPS: (5) E5703207 N5069607
 G *Petasites hybridus* (L.) P.Gaertn., B.Mey. et Schreb.
 Canal banks, damp meadows, forest roadsides. GPS: (5) E5704709 N5069062
 T *Pseudognaphalium luteoalbum* (L.) Hilliard et B.L.Burttt **SP DD**
 By concrete walls. GPS: (8) E5711088 N5065908
 H *Pulicaria dysenterica* (L.) Bernh. P Roadsides. GPS: (5) E5704561 N5068903
 G *Rudbeckia laciniata* L. Forest roadsides. GPS: (7) E5708327 N5064686
 H *Senecio erraticus* Bertol. ssp. *barbareifolius* (Wimm. et Graebn.) Beger
 Forest roadsides. GPS: (7) E5709686 N5063634
 H *Senecio erucifolius* L. Dry meadows. GPS: (5) E5704051 N5068494
 H *Senecio germanicus* Wallr. Forest, forest roadsides. GPS: (13) E5702670 N5067708
 T *Senecio vulgaris* L. Disturbed land, roadsides, vineyards. GPS: (2) E5703956 N5068602
 H *Serratula tinctoria* L. Meadows. GPS: (5) E5704184 N5069505
 H *Solidago gigantea* Aiton Meadows, roadsides. GPS: (10) E5702440 N5069927
 H *Solidago virgaurea* L. Forest trails. GPS: (7) E5701509 N5068398
 H *Tanacetum vulgare* L. P Disturbed land, meadows, roadsides. GPS: (6) E5707231 N5067252
 H *Tephrosieris crispa* (Jacq.) Rchb. Forest canals. GPS: (6) E5704020 N5066123
 G *Tussilago farfara* L. Forest roadsides. TM25: E5702292 N5069604
 T *Xanthium strumarium* L. ssp. *italicum* (Moretti) D.Löve
 Abandoned fields, disturbed ground, roadsides. GPS: (5) E5707644 N5062398

Cichoriaceae

- H *Chondrilla juncea* L. Dry meadows. GPS: (5) E5704037 N5068489
 H *Cichorium intybus* L. Disturbed ground, meadows, roadsides. GPS: (7) E5705782 N5068140
 H *Crepis biennis* L. Arable land, roadsides, vineyards. GPS: (4) E5711804 N5066375
 T *Crepis capillaris* (L.) Wallr. Forest roadsides, meadows. GPS: (7) E5703900 N5068720
 T *Crepis setosa* Haller f. Roadsides. TM25: E5705862 N5069194
 T *Crepis vesicaria* L. ssp. *taraxacifolia* (Thuill.) Thell.
 Roadsides. GPS: (7) E5704692 N5068011
 H *Hieracium murorum* L. Forest edge. GPS: (14) E5703008 N5068252
 H *Hieracium piloselloides* Vill. ssp. *piloselloides* Dry meadows. GPS: (4) E5704049 N5068491
 H *Hieracium racemosum* Waldst. et Kit. ex Willd. Forest. GPS: (9) E5703431 N5068390
 H *Hieracium sabaudum* L. Forest. GPS: (6) E5701498 N5068331
 H *Hieracium umbellatum* L. Forest roadsides. GPS: (5) E5704554 N5065365
 H *Hypochoeris radicata* L. Meadows, roadsides. TM25: E5702436 N5069766
 H *Lactuca serriola* L. Disturbed and waste ground, roadsides. GPS: (4) E5705592 N5068218
 T *Lapsana communis* L. Arable land, roadsides. GPS: (7) E5702819 N5067513
 H *Leontodon autumnalis* L. Lawns, meadows. GPS: (7) E5704260 N5069440
 H *Leontodon hispidus* L. ssp. *danubialis* (Jacq.) Simonk.
 Lawns, meadows. GPS: (7) E5703900 N5068720
 H *Leontodon hispidus* L. ssp. *hispidus* Lawns, roadsides. GPS: (4) E5704002 N5068511
 H *Leontodon incanus* (L.) Schrank Dry meadows. GPS: (7) E5704260 N5069440
 H *Mycelis muralis* (L.) Dumort. Forest. GPS: (8) E5703784 N5067078
 H *Picris hieracioides* L. Disturbed ground, roadsides. GPS: (6) E5704246 N5068365
 H *Sonchus arvensis* L. Cultivated and waste land. TM25: E5704333 N5068921
 T *Sonchus asper* (L.) Hill Cultivated and waste land, roadsides. GPS: (5) E5705514 N5068214
 H *Sonchus oleraceus* L. Concrete pathways, disturbed ground. TM25: E5710034 N5065734
 T *Taraxacum officinale* Weber Roadsides, grassy habitats. GPS: (8) E5704193 N5068428
 H *Tragopogon dubius* Scop. Roadsides. GPS: (5) E5703992 N5069442
 H *Tragopogon pratensis* L. ssp. *pratensis*
 Field borders, meadows, roadsides. GPS: (5) E5704287 N5068835

M o n o c o t y l e d o n e a e*Alismataceae*

Hy *Alisma plantago-aquatica* L. Forest ponds, canals. GPS (10) E5703841 N5066474

Potamogetonaceae

Hy *Potamogeton crispus* L. Lake shores (*Javorica* lake). TM25: E5708710 N5063318

Hy *Potamogeton natans* L. Lake shores. (*Javorica* lake). TM25: E5708710 N5063318

Liliaceae

G *Allium scorodoprasum* L. Roadsides. GPS: (5) E5703984 N5069424

G *Allium ursinum* L. Forest. GPS: (9) E5707016 N5063718

G *Asparagus officinalis* L. P Roadsides. GPS: (6) E5708339 N5063260

Hy *Butomus umbellatus* L. P NT

G *Colchicum autumnale* L. P Meadows. GPS: (5) E5704263 N5068815

G *Erythronium dens-canis* L. P Forest. GPS: (9) E5709633 N5063396

G *Gagea lutea* (L.) Ker Gawl. Forest edge. GPS: (7) E5702819 N5067399

G *Ornithogalum umbellatum* L. P Grassy roadsides. GPS: (4) E5704561 N5068886

G *Paris quadrifolia* L. P Forest. GPS: (8) E5707129 N5063879

G *Polygonatum multiflorum* (L.) All. P Forest. GPS: (6) E5702084 N5069535

G *Ruscus aculeatus* L. P Forest. GPS: (9) E5702294 N5067433

G *Ruscus hypoglossum* L. P NT

Amaryllidaceae

G *Galanthus nivalis* L. P Damp forest. GPS: (9) E5703187 N5067150

G *Leucojum aestivum* L. P Damp forest, meadows. GPS: (6) E5704081 N5065987

G *Narcissus poeticus* L. Canal banks. GPS: (5) E5704614 N5068941

G *Narcissus pseudonarcissus* L. Canal banks. GPS: (5) E5704709 N5069062

Iridaceae

G *Crocus vernus* (L.) Hill P Forest, meadows. GPS: (7) E5703530 N5066699

G *Iris pseudacorus* L. SP Field canals. GPS: (6) E5705566 N5068343

G *Iris sibirica* L. Forest roadsides. GPS: (10) E5704094 N5065822

Dioscoreaceae

G *Tamus communis* L. P Forest, scrub. GPS: (16) E5709621 N5063576

Juncaceae

G *Juncus articulatus* L. Grassy pond banks. GPS: (5) E5708398 N5063417

T *Juncus bufonius* L. Meadows ditches, wet places. GPS: (5) E5704318 N5069389

G *Juncus compressus* Jacq. Meadow ditches. GPS: (6) E5704315 N5069394

H *Juncus effusus* L. Forest roadsides. GPS: (7) E5702379 N5069689

H *Juncus inflexus* L. Forest roadsides. GPS: (8) E5701623 N5068645

H *Juncus tenuis* Willd. Meadow trails, wet places. GPS: (5) E5706122 N5069330

H *Luzula forsteri* (Sm.) DC. Vineyard lawn. GPS: (5) E5704710 N5068005

H *Luzula luzuloides* (Lam.) Dandy et Wilmott Forest. GPS: (9) E5701463 N5068413

H *Luzula multiflora* (Retz.) Lej. ssp. *multiflora*

Forest roadsides. GPS: (5) E5704343 N5065899

H *Luzula pilosa* (L.) Willd. Forest roadsides. GPS: (5) E5702581 N5068192

Cyperaceae

G *Carex acutiformis* Ehrh. P NT

G *Carex brizoides* L. Forest roadsides. GPS: (19) E5702839 N5067201

H *Carex divulsa* Stokes Forest roadsides. GPS: (19) E5702839 N5067201

- G *Carex flacca* Schreb. Forest roadsides. GPS: (5) E5702995 N5067347
 G *Carex hirta* L. Wet meadows. GPS: (7) E5705655 N5068158
 H *Carex otrubae* Podp. Roadsides. GPS: (5) E5705526 N5068215
 H *Carex pendula* Huds. Forest. GPS: (7) E5702158 N5068669
 H *Carex pilosa* Scop. Forest and forest roadsides. GPS: (8) E5705073 N5066543
 G *Carex praecox* Schreb. **P NT**
 H *Carex remota* L. Forest roadsides. GPS: (7) E5702819 N5067513
 G *Carex riparia* Curtis **SP VU**
 H *Carex spicata* Huds. Meadows. GPS: (4) E5705682 N5068159
 H *Carex sylvatica* Huds. Forest. GPS: (9) E5701588 N5068567
 T *Cyperus glomeratus* L. **SP VU**
 G *Eleocharis palustris* (L.) Roem. et Schult. Canals, ditches. GPS: (5) E5706384 N5069165
 G *Scirpus sylvaticus* L. Canals, ditches. GPS: (6) E5711767 N5066061

Poaceae

- H *Agrostis gigantea* Roth Forest roadsides. GPS: (10) E5702818 N5067461
 H *Alopecurus aequalis* Sobol. **SP VU**
 H *Alopecurus pratensis* L. Field roadsides, meadows. GPS: (4) E5705510 N5068240
 H *Anthoxanthum odoratum* L. Meadows, vineyards. GPS: (5) E5704260 N5069424
 T *Apera spica-venti* (L.) P.Beauv. Roadsides. GPS: (8) E5702366 N5069681
 H *Arrhenatherum elatius* (L.) P.Beauv. ex J.Presl et C.Presl
 Meadows, roadsides. TM25: E5702455 N5069942
 T *Avena sativa* L. Arable land, roadsides. TM25: E5704524 N5068818
 H *Brachypodium pinnatum* (L.) P.Beauv. ssp. *pinnatum*
 Dry meadows. GPS: (6) E5704047 N5068491
 H *Brachypodium sylvaticum* (Huds.) P.Beauv. Forest edge. GPS: (11) E5702825 N5067487
 H *Briza media* L. Meadows. GPS: (5) E5704355 N5069345
 T *Bromus hordeaceus* L. Meadows, roadsides. TM25: E5702511 N5069905
 T *Bromus racemosus* L. Meadows, roadsides. TM25: E5702679 N5069288
 H *Bromus ramosus* Huds. Forest roadsides. GPS: (6) E5702858 N5067897
 T *Bromus sterilis* L. Roadsides. GPS: (7) E5704290 N5068499
 H *Calamagrostis epigejos* (L.) Roth Forest roadsides. GPS: (6) E5705190 N5066009
 G *Cynodon dactylon* (L.) Pers. Meadows. GPS: (5) E5704475 N5068855
 H *Cynosurus cristatus* L. Meadows. GPS: (5) E5704355 N5069345
 H *Dactylis glomerata* L. Meadows, roadsides. GPS: (4) E5705541 N5068244
 H *Deschampsia cespitosa* (L.) P.Beauv. Forest roadsides. GPS: (5) E5702825 N5067494
 T *Digitaria sanguinalis* (L.) Scop. Bare ground, roadsides. GPS: (5) E5707986 N5063211
 T *Echinochloa crus-galli* (L.) P.Beauv. Arable land, roadsides. GPS: (3) E5705637 N5068163
 G *Elymus repens* (L.) Gould Meadows, roadsides. GPS: (4) E5702482 N5070002
 T *Eragrostis minor* Host Roadsides. GPS: (4) E5702487 N5069921
 H *Festuca altissima* All. Forest and forest trails. GPS: (7) E5701453 N5068414
 G *Festuca drymeja* Mert. Koch Forest and forest edge. GPS: (6) E5709010 N5062591
 H *Festuca gigantea* (L.) Vill. Forest roadsides. TM25: E5709777 N5063797
 H *Festuca pratensis* Huds. Meadows. TM25: E5702455 N5069917
 G *Glyceria plicata* (Fr.) Fr. **SP VU**
 H *Holcus lanatus* L. Meadows. TM25: E5703028 N5069338
 T *Hordeum murinum* L. Disturbed ground, roadsides. GPS: (3) E5704451 N5068787
 T *Hordeum vulgare* L. Abandoned fields, roadsides. GPS: (5) E5704760 N5068812
 T *Lolium multiflorum* Lam. Arable land, roadsides. GPS: (5) E5705574 N5068194
 H *Lolium perenne* L. Arable land, roadsides. GPS: (5) E5706350 N5069185
 H *Melica nutans* L. Forest (eastern *Stubilovac* forest). TM25: E5710740 N5063269
 H *Melica uniflora* Retz. Forest. GPS: (8) E5705073 N5066543

- G *Milium effusum* L. Forest. GPS: (7) E5705155 N5066472
 H *Molinia caerulea* (L.) Moench ssp. *arundinacea* (Schrank) H.K.G.Paul
 Damp forest roadsides. GPS: (6) E5703484 N5066737
 H *Phleum pratense* L. Meadows, roadsides. GPS: (8) E5704179 N5069502
 G *Phragmites australis* (Cav.) Trin. ex Steud.
 Canals, ditches and damp roadsides. GPS: (5) E5704999 N5069444
 T *Poa annua* L. Lawns, roadsides. GPS: (4) E5704189 N5068344
 H *Poa bulbosa* L. Disturbed sandy ground. GPS: (6) E5703036 N5069342
 H *Poa palustris* L. **P NT**
 H *Poa pratensis* L. Meadows. TM25: E5702657 N5069212
 H *Poa trivialis* L. Field roadsides, meadows. TM25: E5704024 N5069470
 T *Setaria pumila* (Poir.) Schult. Arable land, disturbed ground. GPS: (3) E5705637 N5068163
 G *Sorghum halepense* (L.) Pers. Arable land, roadsides. GPS: (7) E5709264 N5065236
 G *Trisetum flavescens* (L.) P. Beauv. Meadows. GPS: (5) E5704261 N5069445

Orchidaceae

- G *Cephalanthera damasonium* (Mill.) Druce **SP NT**
 G *Cephalanthera longifolia* (L.) Fritsch **SP NT**
 G *Dactylorhiza incarnata* (L.) Soó **SP EN**
 G *Epipactis helleborine* (L.) Crantz **SP**
 Forest roadsides and trails. GPS: (10) E5705606 N5067277
 G *Listera ovata* (L.) R.Br. **SP** Damp forest. GPS: (10) E5707162 N5063835
 G *Neottia nidus-avis* (L.) Rich. **SP** Forest. GPS: (7) E5702158 N5068669
 G *Orchis tridentata* Scop. **SP VU**
 G *Platanthera bifolia* (L.) Rich. **SP VU**
 G *Spiranthes spiralis* (L.) Chevall. **SP** Dry meadows. GPS: (6) E5704054 N5068490

Araceae

- G *Arum maculatum* L. **P** Forest. GPS: (7) E5701178 N5068663

Lemnaceae

- Hy *Lemna minor* L. Canals, ditches, stagnant water. GPS: (4) E5704409 N5068798

Typhaceae

- G *Typha latifolia* L. **P** Canals, ditches, pond banks. GPS: (5) E5706845 N5066121

DISCUSSION

Analysis of the flora

Of the total 398 taxa found earlier by NOVKOVIĆ (1957), 95 taxa have not been confirmed in this paper. In that research, the majority of taxa belonged to *Compositae* family (*Asteraceae* + *Cichoriaceae* = 54 taxa), which is consistent with the current research where family domination is maintained (now 76 taxa). It is important to note the 5 species that are to a certain degree threatened, of which the following 4 have not been confirmed: *Ophioglossum vulgatum* L. (Near Threatened), *Fritillaria meleagris* L. (Vulnerable), *Orchis morio* L. (Near Threatened) and *Cephalanthera rubra* (L.) Rich (Near Threatened). What caused the disappearance of *Cephalanthera rubra* is uncertain even though the specific forest area (*Brežić* Forest) has been investigated. The other 3 unconfirmed species were previously noted on meadows in the far northern part of the Slatina region which has not been included in this research.

Additionally, the paper did not state any coordinates for future verification nor did it otherwise describe the sites with precision. These species have not been found within the currently researched area. In contrast, only *Gentiana asclepiadea* L. has been confirmed, but there was no previous data on its population density.

Furthermore, in the phytocenological researches (MARKOVIĆ-GOSPODARIĆ, 1965; ILIJANIĆ & ŠEGULJA, 1983) a total of 93 taxa were found in the area of Donji Meljani and Slatina, of which 9 taxa have not been confirmed. Only one IUCN Red List taxa was found, *Ophioglossum vulgatum* L. (Near Threatened) in Donji Meljani, but has not been confirmed. As in the previous case, no detailed descriptions were given which would enable confirmation. The human population in Donji Meljani has increased over the years, meadows have been used as land for house building and some have been converted to arable land; such changes could have contributed to the decline or, more likely, to the extinction of this species in the local area.

Within the values for Central Europe, Hemicryptophytes, which are typical of the forest and grassland flora, occupy half of the total life form quota (ELLENBERG, 1988). The domination of Hemicryptophytes in the Slatina region (47.82 %) fits within these data, as expected. Although forests, meadows and pastures in Slatina occupy much smaller areas than arable land (STIPANIĆ *et al.*, 2006), there is an apparent quantitative value of hemicryptophytic flora. Second place is occupied by Therophyta, characteristic of steppe and semi-arid areas, which indicates the occurrence of dry periods in the study area. In conclusion, Hemicryptophytes, Geophytes and Phanerophytes, with their significant share in this paper, represent the typical life forms of Central Europe.

By comparing the dominance of life forms with the neighboring areas (Tab. 2.), the expected trend of Hemicryptophyte domination is revealed, as well as the domination of *Asteraceae* family as the largest in the floristic inventories.

Analysis of the threatened taxa

In this research, 25 taxa have been found which bear a certain IUCN Red list status (excluding *Least Concern* taxa, which are not noted in this paper) of which 4 are *Endangered* (EN), 8 *Vulnerable* (VU) and 10 taxa are *Near Threatened* (NT). It is important to note that a genuine risk exists for the following taxa: *Carex riparia* Curtis, *Cyperus glomeratus* L., *Hibiscus trionum* L., *Alopecurus aequalis* Sobol., *Butomus umbellatus* L. and *Dactylorhiza incarnata* (L.) Soó. In addition, 3 *Data Deficient* (DD) species, namely *Polygonum salicifolium* Brouss. ex Willd., *Stellaria palustris* Retz. and *Pseudognaphalium luteoalbum* (L.) Hilliard et B. L. Burt, have been found as well.

In the following text, this paper provides: known localities using relative descriptions and coordinates for each of the 25 IUCN Red List taxa (including the number of individual specimens for a certain location, otherwise an approximation may be

Tab. 2. Comparative view of Hemicryptophytes and Asteraceae with the neighboring areas.

Author	Investigated area	Hemicryptophytes (%)	Asteraceae (%)
PANDŽA, 2010	Papuk Nature Park	47.73	8.83
TOMAŠEVIĆ, 2006	Požega Valley & surr. mountains	44.77	9.19
PRLIĆ, 2012	Slatina region	47.82	9.09

given), known threats and conservation suggestions. To facilitate standardization, causes of threat according to the IUCN standard classification (NIKOLIĆ & TOPIĆ, 2005) have been included with the taxon name and Red List status. Unthreatened taxa or possible threats with no supportive evidence have been treated as *Unknown*.

Alopecurus aequalis Sobol. VU IUCN standard: *Direct Loss* [2.]

GPS: (4) E5706410 N5069153

A single population has been found in a field canal in Sladojevački Lug. The canal is damp or flooded (rarely dry) with moderate population density. Current threat is canal maintenance. Conservation may prove difficult because canal maintenance is crucial to prevent floods on the arable land. It may be possible to clean out the canal selectively, leaving a small population intact.

Butomus umbellatus L. NT IUCN standard: *Habitat Loss* [1.1.1.], *Atmospheric Pollution* [4.2.]

GPS: (4) E5706279 N5070396

A small population is located on the field border (area of approximately 2 m²) south of Donji Meljani. Soil tillage and occasional drought present a certain threat, but further observations are necessary.

Carex acutiformis Ehrh. NT IUCN standard: *Unknown* [9.]

GPS: (7) E5707982 N5069851

A small patch located in the canal between *Prolom* and *Čelnjak* toponyms in Sladojevci. No known threats.

Carex praecox Schreb. NT IUCN standard: *Unknown* [9.]

GPS: (4) E5705658 N5068162

This species has been found on a wet meadow (area of approximately 1000 m²) in Sladojevci near the train station. Population is moderate to dense. Converting this meadow to arable land may present a possible future threat.

Carex riparia Curtis VU IUCN standard: *Direct Loss* [2.]

GPS: (5) E5704191 N5069517

Found in a canal in Donji Meljani among meadows and arable land (area of approximately 500 m²), which is sometimes dry during the flowering time. Population is moderate. Current threat is annual canal maintenance to prevent floods so conservation may include, as with *Alopecurus aequalis*, application of selective maintenance.

Cephalanthera damasonium (Mill.) Druce NT IUCN standard: *Unknown* [9.]

GPS: (6) E5701587 N5068641

Found only at the edge of *Sandelkovic*a Forest in Bistrica. This population of 3 specimens grows on the roadside near a forest stream. There is no current threat evident to this species.

Cephalanthera longifolia (L.) Fritsch NT IUCN standard: *Unknown* [9.]

GPS: (11) E5702010 N5068596 *Sandelkovic*a Forest, Bistrica

(9) E5705203 N5066437 At *Martin* Creek area, north of Radosavci. 1 specimen.

(7) E5705173 N5066469 3 specimens.

(7) E5705298 N5066511 1 specimen.

(9) E5704694 N5066151 At *Buban* toponym, north of Radosavci. 2 specimens.

(7) E5705044 N5066127 2 specimens.

(12) E5705047 N5066128 2 specimens.

(13) E5705056 N5066105 1 specimen.

TM25: E5704673 N5066068 12 specimens.

No conservation plans are necessary at this time.



Fig. 4. *Cyperus glomeratus* habitat in 2009: before and after canal maintenance.
(photo: D. Prlić)

Cyclamen purpurascens Mill. NT IUCN standard: *Unknown* [9.]

GPS: (6) E5704812 N5065838

At the forest edge near a pasture in Radosavci (at *Buban* toponym) there is a small population of 3 specimens. Roadside maintenance may present a possible threat.

Cyperus glomeratus L. VU IUCN standard: *Direct Loss* [2.]

GPS: (5) E5704204 N5069686

South of Donji Meljani; locality and threats same as for *Carex riparia*, but with a larger area of occurrence and population density moderate to dense. Despite the evident destruction of canal surface caused by maintenance (Fig. 4.), the population remained stable in 2010.

GPS: (4) E5705563 N5068301

A small population has been found in a canal close to Sladojevački Lug, about 100 m after the railroad crossing due north. About 20 m of the canal's length is taken by the species. Canal maintenance presents a likely threat.

TM25: E5705838 N5067816

Another small intermittent population is located in a canal near the main road in Sladojevci. No evident threats.

Dactylorhiza incarnata (L.) Soó EN IUCN standard: *Direct Loss* [2.]

GPS: (8) E5702609 N5068171

This species of orchids has been found on a roadside in *Markovac* Forest, south of Donji Meljani, and consisted of 2 specimens in 2009. Its location on the forest roadside makes it susceptible to roadside maintenance. In 2010 the maintenance was carried out in the early vegetation period before the flowering time, therefore no specimens have been observed since. Any conservation plan should consider excluding the locality from roadside maintenance. Further observations are necessary.

Daphne mezereum L. NT IUCN standard: *Unknown* [9.]

GPS: (9) E5702367 N5068731 Bistrica, *Sandelkovića* Forest. 5 specimens.

(8) E5702381 N5068709 Bistrica, *Sandelkovića* Forest; forest trail. 2 specimens.

(6) E5703596 N5066731 Donji Meljani, *Živkovač* Forest; forest edge. 1 specimen.

(5) E5703596 N5066731 Donji Meljani, *Živkovač* Forest. 7 specimens.

(7) E5702721 N5067694 Donji Meljani, *Živkovač* Forest; forest edge. 1 specimen.

(9) E5702585 N5067644 Donji Meljani, *Živkovač* Forest; forest roadside. 1 specimen.

(6) E5708984 N5062598 Slatina, *Ravni gaj* forest; Forest roadside. 1 specimen.

This species can occasionally be found throughout the forest of the investigated area, therefore it is perhaps even widely spread. No evident threats.

Digitalis ferruginea L. VU IUCN standard: *Unknown* [9.]

GPS: (8) E5702787 N5067831

(10) E5703036 N5067349

This vulnerable species has only been found in Donji Meljani at the edge of *Živkovač* Forest near the roadside. Populations consist of 12 specimens in total.

Equisetum hyemale L. VU IUCN standard: *Unknown* [9.]

GPS: (8) E5708415 N5064658

Area along the forest stream in *Čojljuk* Forest, Slatina. Densely populated.

(8) E5702860 N5066967

A forest canal in *Živkovač* Forest, Donji Meljani. Population density is low (area of approx. 12 m²).

Gentiana asclepiadea L. NT IUCN standard: *Unknown* [9.]

GPS: (7) E5709059 N5063210

The site of occurrence is forest edge near the main road in *Mokro brdo* Forest, Slatina. Population density is low.

Glyceria plicata (Fr.) Fr. VU IUCN standard: *Unknown* [9.]

GPS: (6) E5701688 N5068638 Damp ground at *Sandelkovića* Forest edge, Bistrica.

(11) E5702881 N5066795 Damp roadside in *Živkovač* Forest, far south from Donji Meljani.

(8) E5705622 N5067474 Damp forest edge at *Seča* Forest, Sladojevci.

Possible threats may include habitat destruction due to tractor passage in the area. Population is low at all sites.

Hibiscus trionum L. EN IUCN standard: *Habitat Loss* [1.1.1.], *Indirect Effects* [3.3.]

GPS: (5) E5704267 N5069435

The location of this species has been found near the fields in Donji Meljani, west of the toponym *Loženjak*. The population is located on what used to be a meadow roadside. Since this year's maintenance of a nearby canal, there has been some soil tillage involved at the site. The bare soil that was left has been overgrown by weeds and, consequently, this species was not observed in 2010. This population of few specimens is closely located to *Carex riparia* and *Cyperus glomeratus* sites making this small area rich in Red List species and important candidates for protection.

Hottonia palustris L. EN IUCN standard: *Unknown* [9.]

GPS: (9) E5702746 N5067995

Located in a forest swamp (area of approximately 500 m²) in *Markovač* Forest, southwest of Donji Meljani. A hunting tower is located nearby, a sign that the swamp area is visited by wild game. Even so, there is no threat indication regarding this habitat or its plant population of any kind. The population is estimated at moderate density, but further investigations are necessary to confirm this because the receding of the water level exposes new specimens, most of which are very young plants.

Orchis tridentata Scop. VU IUCN standard: *Habitat Loss* [1.3.], *Direct Loss* [2.]

GPS: (4) E5704154 N5068423

It has been found on cemetery lawn and in surrounding scrub (area of approximately 600 m²) in Donji Meljani at the toponym *Radlovac*. There are two existing threats regarding this area, one of which is enlargement of the cemetery. However, considering that the current expansion is slow, and that most of the population inhabits the surrounding scrub where expansion is impracticable, it is concluded that the population will remain intact for the most part. The other threat is presented by lawn mowing which is performed at least once a year. In 2010 it was carried out in the flowering period of the species. Current population consists of 55 specimens, of which 1 is an albino form. With the population majority (45 specimens) in the intact scrub, strict conservation may not be needed at this time.

Platanthera bifolia (L.) Rich. VU IUCN standard: *Unknown* [9.]

GPS: (7) E5701585 N5068627 Bistrica, *Sandelkovića* Forest; forest trail. 2 specimens.

(8) E5701409 N5068472 1 specimen.

(8) E5701401 N5068643 2 specimens.

(10) E5701518 N5068749 1 specimen.

(12) E5703659 N5066765 Radosavci, *Živkovač* Forest; forest edge. 1 specimen.

No known threats.

Poa palustris L. NT IUCN standard: *Unknown* [9.]

GPS: (5) E5702825 N5067494 Forest edge in *Živkovač* Forest, south of Donji Meljani.

(13) E5702108 N5068646 Forest edge in *Sandelkovića* Forest, Bistrica.

(10) E5702903 N5066711 Forest roadside in *Živkovač* Forest, far south from Donji Meljani.

No known threats. Low population at all sites.

Polygonum salicifolium Brouss. ex Willd. DD IUCN standard: *Unknown* [9.]

GPS: (6) E5702886 N5066731

A forest ditch in southern *Živkovač* Forest, west of Radosavci. The population is moderate with no known threats.

Pseudognaphalium luteoalbum (L.) Hilliard et B.L.Burtt DD IUCN standard: *Direct Loss* [2.]

GPS: (8) E5711088 N5065908

It has been found on the south side of the main building at the train station in Slatina, growing from a crack in the building foundation. Station maintenance presents a genuine threat. All specimens were cut from their habitat in 2010 during flowering time. In a later period, new specimens were observed, but in lesser numbers. Informing and instructing the maintenance staff may consequently protect the poor population at the site.

Pseudolysimachion longifolium (L.) Opiz EN IUCN standard: *Direct Loss* [2.]

GPS: (5) E5705502 N5068198

Donji Meljani, a canal near the road to Sladojevački Lug. Current threat is canal maintenance; the canal's banks were mowed in 2010 during the flowering period.

GPS: (4) E5705658 N5068162

Sladojevci, a meadow near the train station. Conversion to arable land presents a possible threat.

GPS: (4) E5705986 N5069414

Field border between the toponyms *Loženjak* and *Livadka*, Sladojevački Lug.

GPS: (4) E5706291 N5070382

A canal at the toponym *Dakinac*, north of Sladojevački Lug.

Populations at all sites range from low to moderate.

Ruscus hypoglossum L. NT IUCN standard: *Unknown* [9.]

GPS: (6) E5702724 N5068317 Donji Meljani, *Markovac* Forest; forest trail.

(7) E5703060 N5068215 Donji Meljani, *Markovac* Forest.

(6) E5709390 N5063070 Slatina, *Mokro brdo* Forest; forest edge along the main road.

TM25: E5701587 N5068383 Bistrica; *Sanđelkovića* Forest.

In this paper only four localities are noted, but this species is frequent throughout the forest area. No known threats.

Stellaria palustris Retz. DD IUCN standard: *Unknown* [9.]

GPS: (5) E5703022 N5069381 Wet soil near the soil escarpment in central Bistrica.

(5) E5704405 N5069305 A meadow north of Donji Meljani.

Both populations estimated at moderate density. No threats.

The analysis of the causes of threat for the investigated area (Fig. 5.) shows that for the most taxa threats are unknown or nonexistent. The main reason for that are the forest sites where anthropogenic influence is minimal. Additionally, other species populate areas that are of little interest (e.g. scrub) and therefore remain unthreatened.

Regarding the threatened species, the main cause is human influence and mechanization. Given that many species are located in areas subject to regular maintenance, the largest share among the causes of threat belongs to *Direct Loss*, contrary to *Habitat Loss* which is the leading cause in Croatia (NIKOLIĆ & TOPIĆ, 2005). Loss of habitat is in second place and generally refers to soil tillage where threatened species are located.

The indication that 57.1 % of species are unthreatened, or that the causes are not known, means the flora of the Slatina region is relatively safe and that, for the majority, a protection plan is not required. For taxa subject to direct loss from land maintenance, excluding a part of the locality from the maintenance process may prove necessary for conservation. This requires legislative decisions, since most taxa are on property of public interest. For some species, communication and education may prove sufficient in their conservation as in the example of *Pseudognaphalium luteoalbum* (L.) Hilliard et B. L. Burt for which cutting is the sole cause of threat.

It should also be noted that there are certain species that do not have a formal conservational status, but are of rare occurrence in the investigated area. Within Pteri-

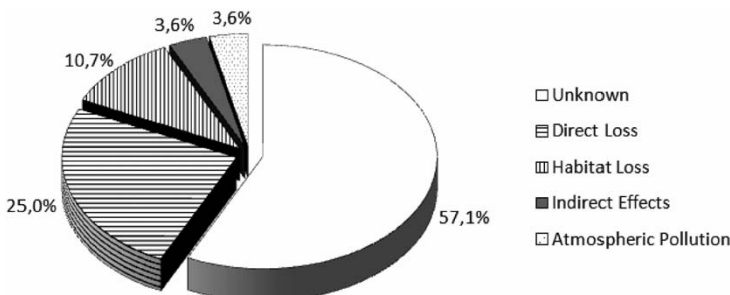


Fig. 5. Share of established causes of threat for the Slatina region.

dophyta, such a species is *Equisetum ramosissimum* Desf., which has a single known location, in Sladojevački Lug. Some rare-occurring Spermatophyta are *Carlina vulgaris* L., *Dorycnium herbaceum* Vill., *Medicago falcata* L., *Aconitum lycoctonum* L., *Helianthemum nummularium* (L.) Mill., *Saxifraga bulbifera* L., *Saxifraga tridactylites* L., *Epilobium parviflorum* Schreber, *Odontites vulgaris* Moench, *Scabiosa ochroleuca* L., *Buphthalmum salicifolium* L.

It is suggested that the condition and population size should be monitored in future research, especially of those on the Red List.

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SAŽETAK

Prilog vaskularnoj flori grada Slatine i okolice

D. Prlić

Posljednja inventarizacija flore navedenog područja napravljena je prije 53 godine. Nova istraživanja provedena su tijekom 2009. i 2010. godine, u razdoblju od ožujka do listopada, u smislu inventarizacije i kartiranja biljne raznolikosti na području grada Slatine i okolice. Uz kartiranje provedeno pomoću GPS uređaja i topografske karte, izvršena je i fotodokumentacija svojti. Tako je istraživanjem područja od oko 60 km² utvrđena prisutnost 524 vrste i 26 podvrsta u ukupno 334 roda i 94 porodice. Među navedenima, po životnom obliku najveći dio zauzimaju hemikriptofiti (263 svojte), dok prema porodicama, od ukupnog broja vaskularne flore istraženog područja, većina pripada porodici *Asteraceae* (50 svojti), a zatim slijede *Poaceae* (47 svojti) te *Fabaceae* (33 svojte).

Tijekom novog istraživanja, posebno je istaknuta obrada ugroženih svojti. Prema Crvenoj knjizi vaskularne flore Hrvatske i *online* bazi Flora Croatica Database, istraživanjem slatinskog područja utvrđeno je 25 svojti koje nose određenu IUCN kategoriju (osim LC – najmanje zabrinjavajućih). Ugrožene su 4 svojte, gotovo ugroženih je 10, dok status osjeljivih ima 8 svojti. Kategoriji nedovoljno poznatih pripadaju 3 svojte. Također, prema hrvatskom zakonu, utvrđena je prisutnost 105 zaštićenih te 29 strogo zaštićenih svojti. Glede uzroka ugroženosti, najveću prijetnju predstavlja izravan gubitak s 25 %, dok je značajnih 57,1 % neugroženo ili ugroženost nije trenutno poznata. Zbog učestalog antropogenog utjecaja, važno je naglasiti stvarnu opasnost za sljedeće vrste ovoga područja: *Carex riparia* Curtis, *Cyperus glomeratus* L., *Hibiscus trionum* L., *Alopecurus aequalis* Sobol., *Butomus umbellatus* L. te *Dactylorhiza incarnata* (L.) Soó.