VEGETATION OF THE RIVER MAROS AND ITS SURROUNDINGS (SOUTHERN HUNGARY)

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Introduction

754 km long, with a catchment area of 30,332 km² (Somogyi 1990), river Maros plays an important role in the Great Hungarian Plain both from a nature conservation and a socio-economic perspective (cf. Andó 1995, Veress 2002, Körmöczi 2011). Therefore, knowledge on this area may be useful in conservation management and landscape planning. Formerly, we investigated the land-use history and habitat types of the Bökény area near Maros (Fodor *et al.* 2011). That work was done as part of a Hungarian-Romanian cross-border project (Körmöczi 2011). In this paper, we summarize the results of the research that was an extension of the former project, focusing on four representative areas of the Hungarian Maros section. Our aim was to prepare the habitat maps of the designated areas, carry out coenological surveys and supply some floristic data.

Material and methods

Our study area is situated around the Hungarian section of River Maros. Mean annual temperature is 10.5-10.6 °C, mean annual precipitation is 550-600 mm (Ambrózy and Kozma 1990). Typical soils are alluvial protosoils and alluvial soils, to a lesser degree chernozems and alkaline soils (Rajkai 1990, Jakab 1995). A detailed description of the geohistory, climate and hydrography of the Maros catchment region are given by Andó (1995).

Natural vegetation of the area (before intensive human impact) included riverine forests and marshes (Zólyomi 2007). A brief description of the actual vegetation of the inundation area of the Hungarian Maros section was given by Margóczi *et al.* (2002). Generally, forests are in a bad condition: the proportion of poplar-willow forests is low, and the area is dominated by plantations (mainly hybrid poplar plantations), where natural undergrowth is eliminated, invasive species are abundant and protected species occur only sporadically. Gaskó (1999) gave a comprehensive description of the natural values of the Maros section in Csongrád county. He listed eleven protected species from the area.

During our field works, we recorded the localities of protected plants as well as occurrences of species that are rare on the Great Hungarian Plain. Based on GPS-coordinates, maps were drawn depicting the localities. For this purpose, we used ArcView 3.2. (ESRI). Localities are given according to settlements. In

brackets, codes of the CEU-quadrates are also supplied (Király and Horváth 2000). Names of protected species are underlined.

Two semi-natural and one sown marsh-meadows were chosen for our investigations. The meadows are parts of the floodplain of the river Maros and are located near Makó and Magyarcsanád (cf. Fig. 1 at p. 5). Coenological relevés were taken in 2012 in 2 m × 2 m plots. Percentage cover of all vascular plant species was estimated in each plot. A total of 25 relevés were taken.

To characterize the differences between the main forest types occurring along the river Maros, we made 5 relevés in the riverine willow-poplar forests and in the planted oak-elm-ash forests, respectively. In 2012, percentage cover of all vascular plant species was estimated within each 20 m × 20 m plot.

We arranged the species in the tables into syntaxonomical groups according to Soó (1980) (Tables 1-2). The spectra of the groups were calculated using cover data. In the case of the forests, only the shrub and herb layers were considered.

In order to compare the diversity of the two marsh-meadow types and of the two forest types, we applied diversity ordering. We used Rényi's diversity function, since it is one of the most useful diversity ordering methods (Tóthmérész 1995). Rényi's function is given by the equation below:

$$H(R) = \left(\log \sum_{i=1}^{S} p_i^{\alpha} \right) \Big/ (1-\alpha)$$

The relationships among the species composition of the relevés were analysed with PCoA ordination using the program package SYN-TAX 2000 (Podani 2001).

Diagnostic species of the different vegetation types were determined by statistical fidelity measures (Tichý and Chytrý 2006). The phi coefficient (Φ) for all species was computed with the JUICE 7.0.25 program (Tichý 2002). This coefficient ranges from -1 to 1, but for convenience, it is multiplied by 100 in the program. The highest phi value of 1 is achieved if the species occurs in all plots of the target vegetation type and is absent elsewhere. Species with positive phi-coefficients were considered significant diagnostic species. Fisher's exact test was carried out to exclude non-significant diagnostic species.

Species names are used according to Király (2009).

Results and discussion

Floristic survey

Localities of protected and rare plants are shown in Colour plate Figures 1 and 2.

Aster sedifolius L. ssp. *sedifolius*

Klárafalva (in a backyard, used currently as a hay-meadow) [9787.4], Deszk

(in an alkaline grassland) [9787.4]. It is relatively wide-spread in the area east of River Tisza (Farkas 1999).

Circaea lutetiana L.

Kiszombor (in a poplar-willow forest) [9888.2]. It is a sporadic plant on the Great Hungarian Plain (Simon 2000, Tóth 2003, Király 2009).

Clematis integrifolia L.

Szeged (near the mouth of River Maros, abundant on the dike) [9787.3]. Relatively common along the Maros (therefore, we do not show its occurrences on the map), but it was last mentioned from this locality by Erdős J. (in Soó and Máthé 1938).

Epipactis helleborine (L.) Crantz

Makó [9788.4, 9888.2], Kiszombor [9888.2] (in poplar-willow forests, oak and hybrid poplar plantations). Formerly, it was mentioned from Makó by Makra (2002), but has not been reported from Kiszombor (cf. Farkas 1999).

Iris spuria L.

Magyarcsanád (on the hay meadow near Bökény) [9889.2]. Although it was mentioned from the lower section of the Maros neither by Dragulescu (1995), nor by Farkas (1999), it was reported from the same site in an unpublished report of Penksza *et al.* (2001).

Lamium album L.

Magyarcsanád (along River Maros, near Bökény, in a poplar-willow forest and its edge) [9889.4]. The species is rare on the Great Hungarian Plain (Simon 2000), its nearest known locality is near Makó (Makra 2002).

Marchantia polymorpha L. emend Burgeff.

Deszk (on the Maros bank, on open soil surface) [9787.4]. Although it is relatively wide-spread in the Carpathian basin (Hazslinszky 1885), it is rare on the Great Hungarian Plain, where it is mostly restricted to artificial habitats (Soó 1964, Orbán and Vajda 1983).

Ranunculus ficaria L.

Deszk [9787.3, 9787.4], Magyarcsanád [9889.4], Maroslele [9787.4], Szeged [9787.1, 9787.3] (along River Maros, in poplar-willow forests, hybrid poplar plantations and oak plantations, exceptionally on hay meadows). It occurs sporadically along the river (Soó and Máthé 1938).

Salvinia natans (L.) All.

Szeged (on the left side of the Maros, in standing water within the inundated area) [9787.3]. It was known from the right side of the river (Gaskó 1999), from Algyő (Kováts F. in Soó and Máthé 1938) and from the Szeged section of River Tisza (Zsák 1941).

Scilla vindobonensis Speta

Magyarcsanád (near River Maros, in a poplar-willow forest) [9889.4]. It is very rare in the region east of River Tisza, its nearest known locality is in the proximity of Makó (Farkas 1999).

Trapa natans L.

Szeged (on the left side of the Maros, in standing water within the inundated area) [9787.3]. The species was known from the area near Algyő (Gaskó 1999).

Viola reichenbachiana Jord.

Szeged (in a poplar-willow forest on the Maros riverbank) [9787.3], Kiszombor [9888.2] (in a former orchard). Rare on the Great Hungarian Plain (Király 2009).

Habitat survey

Unfortunately, study areas are dominated by tree plantations (mainly oak, hybrid poplar and white poplar) and agricultural fields (Colour plate Figures 3-6). Almost all habitats are infected by invasive species, such as *Acer negundo*, *Amorpha fruticosa*, *Asclepias syriaca* and *Robinia-pseudo-acacia*. Poplar-willow forests are mostly restricted to a very narrow stripe along the river. In some cases, only a single tree line of white poplar remained along Maros. Area occupied by poplar-willow forests should be increased. As a minimum, a considerably wider stripe of these forests should be restored along the river, since they are by far more valuable than plantations. Marsh meadows, which are also valuable from a nature conservation perspective, have a high proportion in the Bökény and Makó area. In the other two study areas, semi-natural grasslands are mostly limited to the dikes. Their slopes facing towards the river are moister, with typical marsh species such as *Clematis vitalba*. Their dryer slopes, facing the other direction, support grassland more similar to the degraded loess grasslands. Orchards of the study region are small, but they may be valuable both from conservation and from a cultural point of view, thus their detailed study would be necessary.

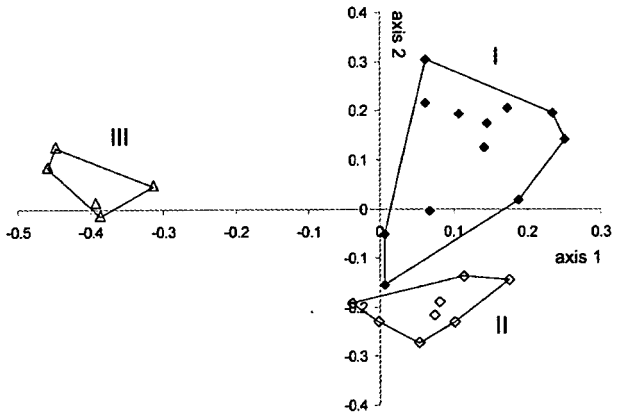

Figure 1. PCoA ordination diagram of the relevés of different meadow types along the river Maros. I: semi-natural marsh-meadows near Maroslele; II: semi-natural marsh-meadows near Makó; III: sown marsh-meadows near Magyarcsanád.

Ecological survey

The PCoA shows remarkable differences among the relevés made in the different marsh-meadow types along the river Maros (Fig. 1).

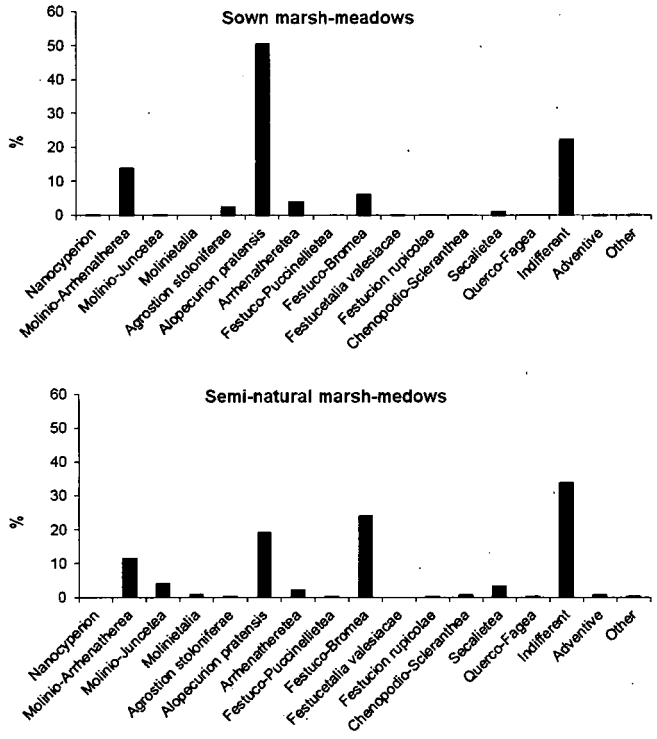

Figure 2. Proportions of the different coenological groups in semi-natural marsh-meadows and sown marsh-meadows.

The semi-natural marsh-meadows are dominated by marsh species (Alopecurion pratensis, Molinio-Arrhenatherea, Molinio-Juncetea) and dry grassland species (Festuco-Bromea), but indifferent species also play an important role in this vegetation type. Dominant species include: *Alopecurus pratensis, Carex preacox, Elymus repens, Galium verum, Poa pratensis* s. str. Frequent species are *Alopecurus pratensis, Carex praecox, Cirsium arvense, Convolvulus arvensis, Elymus repens, Galium verum, Geranium pusillum, Myosotis arvensis, Poa pratensis* s. str., *Veronica arvensis, Vicia angustifolia* and *Vicia hirsuta.* The proportion of marsh species is higher, but the proportion of dry grassland species is lower in the sown marsh-meadows than in the semi-natural marsh-meadows (Fig. 2). Dominant species of the sown marsh-meadows are *Alopecurus pratensis,*

Poa pratensis and *Cirsium arvense*. Frequent species include: *Alopecurus pratensis, Bromus hordeaceus, Cirsium arvense, Geranium pusillum, Myosotis arvensis, Poa pratensis* s. str. There are 8 diagnostic species (*Carex praecox, Convolvulus arvensis, Elymus repens, Galium verum, Myosotis arvensis, Ranunculus polyanthemos, Valerianella locusta, Veronica arvensis*) of the semi-natural marsh-meadows and 5 diagnostic species (*Bromus hordaceus, Epilobium* sp., *Galium aparine, Myosotis stricta, Potentilla supina*) of the sown marsh-meadows. Diversity profiles of the marsh-meadows are presented in Figure 3. Since profiles are not intersecting, we conclude that the semi-natural marsh-meadows are more diverse than the sown marsh-meadows.

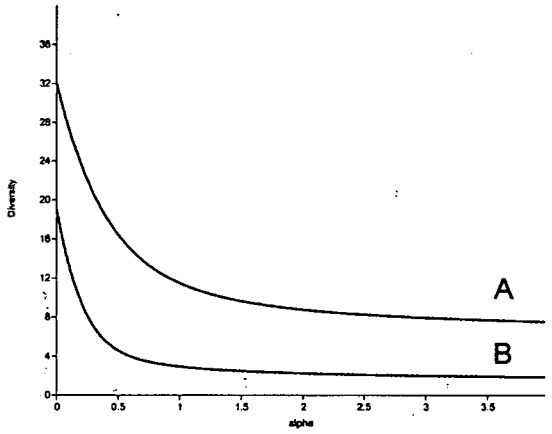

Figure 3. Diversity profiles of the semi-natural marsh-meadows (A) and sown marsh-meadows (B).

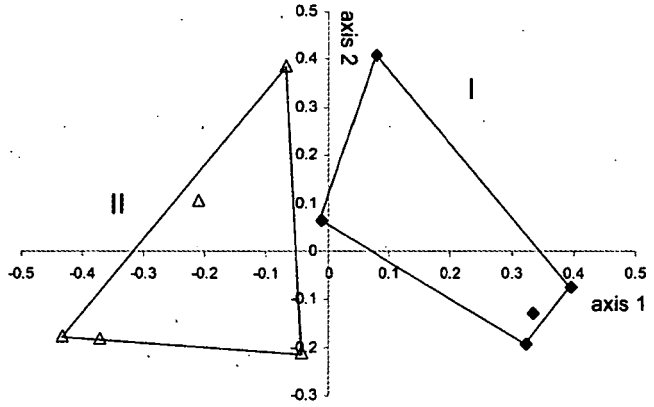

Figure 4. PCoA ordination diagram of the relevés of different forest types along the river Maros. I: riverine willow-poplar forests; II: planted oak-elm-ash forests.

The PCoA ordination scatter plot indicates a clear separation of the relevés of the different forest types (Fig. 4). Dominant species of the riverine willow-poplar forests are *Acer negundo*, *Galium aparine*, *Populus alba*, *Ulmus laevis*. Frequent species include: *Acer negundo*, *Fraxinus pennsylvanica*, *Galium aparine*, *Morus alba*, *Populus alba*, *Rubus caesius*, *Sambucus nigra*, *Ulmus laevis*, *Urtica dioica*, *Vitis riparia*.

Considering the cover data, the proportion of indifferent species is the highest in the riverine willow-poplar forests, while that of adventives is the highest in the planted oak-elm-ash forests (Fig. 5). Except *Quercus robur*, the planted oak-elm-ash forests are dominated by adventive species (*Acer negundo*, *Amorpha fruticosa*, *Fraxinus pennsylvanica*). Frequent species are *Acer negundo*, *Amorpha fruticosa*, *Quercus robur*, *Rubus caesius* and *Vitis riparia*. Only 2 diagnostic species can be distinguished between the forest types. *Sambucus nigra* is diagnostic for the riverine willow-poplar forests, while *Quercus robur* for the planted oak-elm-ash forests. According to the diversity profiles (Fig. 6), willow-poplar forests are more diverse than the planted oak-elm-ash forests.

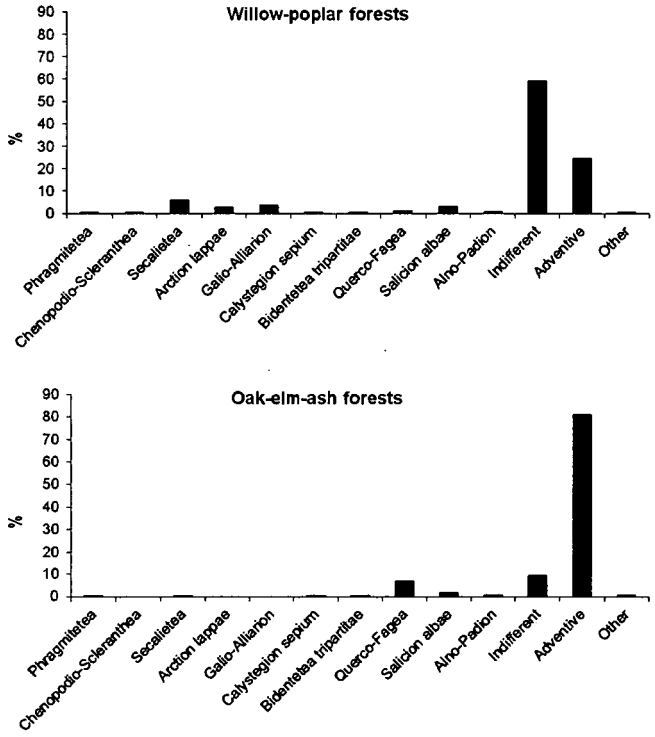

Figure 5. Proportions of the different coenological groups in riverine willow-poplar forests and planted oak-elm-ash forests.

Considering the results of other studies (cf. Borhidi 2003, Kevey and Tóth 2006, Kevey 2007, Bölöni *et al.* 2011) we can conclude that the major part of the riverine forests along the river Maros (from Szeged to Nagylak) are in poor conditions according to their species numbers, species compositions and vegetation texture. Nevertheless, some willow-poplar forest stands show an almost natural structure and also harbour a few riverine and oak forest species (e.g. *Circaea lutetiana*, *Cucubalus baccifer*, *Humulus lupulus*, *Lamium album*, *Viola reichenbachiana*). Marsh-meadows are in a better condition and therefore are more important from a nature conservation point of view. Habitat management should focus on the protection and improvement of those habitats which are natural elements in the landscape.

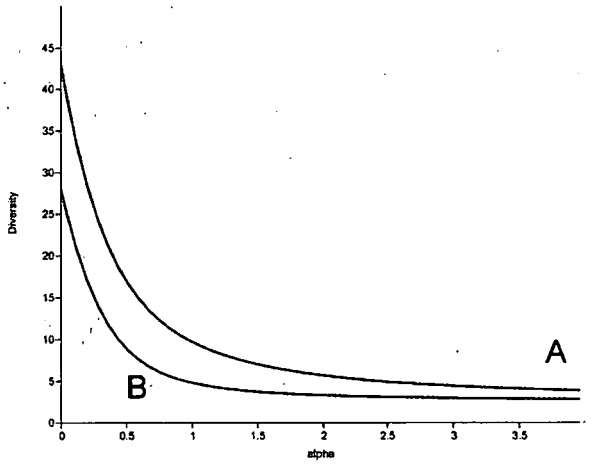

Figure 6. Diversity profiles of the riverine willow-poplar forests (A) and planted oak-elm-ash forests (B).

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Table 1. Analytical table of the semi-natural marsh-meadows (1-12: Magyarcsanád; 13-20: Makó) and sown marsh-meadows (21-25: Makó).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Nanocyperion																								
Potentilla supina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
	Molinio-Arrhenatherea																								
Clematis integrifolia	-	-	-	1	-	-	-	-	-	-	10	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-
Daucus carota	-	-	-	-	-	-	-	0.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poa pratensis s. str.	20	10	1	20	15	10	7	25	20	15	15	20	2	3	10	1	5	10	10	2	25	10	10	15	25
Rumex crispus	-	0.1	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	1	-	-	2	0.1	1	-	-
	Molinio-Juncetea																								
Carex distans	-	0.1	60	0.1	10	3	4	1	-	0.1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Symphytum officinale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-
	Molinietalia																								
Iris spuria	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thalictrum lucidum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
	Agrostion stoloniferae																								
Bromus hordeaceus	0.5	-	-	-	-	-	0.1	-	-	-	0.1	0.1	-	-	-	-	-	-	-	-	5	1	2	5	3
Rorippa × armoracioides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3	1	-	-	-	-	-	-
	Alopecurion pratensis																								
Alopecurus pratensis	40	5	5	5	30	10	5	15	3	5	5	5	2	35	25	10	5	30	50	5	60	70	70	75	50
Bromus commutatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-
Galium rubioides	-	-	-	-	-	-	-	-	-	-	-	-	80	-	-	-	-	-	-	-	-	-	-	-	-
Valerianella locusta	1	0.1	0.5	2	5	2	4	-	1	1	0.5	1	-	-	-	1	-	-	-	-	-	-	-	-	-
	Arrhenatheretea																								
Arrhenatherum elatius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Crepis biennis	-	-	-	-	-	-	-	-	0.5	-	2	0.5	-	2	-	-	-	1	-	-	-	-	-	-	-
Myosotis arvensis	2	5	0.5	2	1	7	5	0.1	2	1	0.1	0.1	0.1	0.1	0.1	1	1	2	0.1	0.5	0.1	0.1	0.1	0.1	-
Veronica arvensis	1	0.1	-	-	1	0.1	1	-	0.5	2	0.1	0.1	0.1	0.1	0.1	1	0.1	0.1	0.5	0.1	0.1	-	-	-	-
	Festuco-Puccinellietea																								
Podospermum canum	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
	Festuco-Bromea																								
Ajuga genevensis	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arenaria serpillyfolia	-	-	-	-	-	-	-	0.1	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carex praecox	5	25	-	25	10	55	-	25	25	-	25	40	10	35	25	5	25	20	30	30	-	-	-	-	-
Cerastium brachypetalum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-
Cerastium	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

semidecandrum																									
Eryngium campestre	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Festuca rupicola	-	-	-	-	-	-	2	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Geranium pusillum	2	0.1	0.1	-	-	-	0.1	-	-	-	2	1	0.5	0.1	0.1	0.1	0.1	0.1	1	-	-	0.1	0.1	0.1	0.1
Myosotis stricta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
Ranunculus	-	-	-	-	0.5	1	-	-	0.1	-	3	3	0.1	0.5	4	0.1	1	3	-	-	-	-	-	-	-
polyanthemos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salvia nemorosa	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trifolium campestre	-	-	-	-	-	-	-	0.1	1	-	-	0.1	5	3	-	-	10	-	-	8	-	-	-	-	-
Vicia angustifolia	1	5	-	1	3	0.5	0.5	1	4	5	4	1	-	1	-	1	5	1	1	0.1	0.1	0.1	-	-	0.1
Festucetalia valesiacae																									
Geranium columbinum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-
Festucion rupicolae																									
Astragalus cicer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-
Chenopodio-Scleranthea																									
Capsella bursa-pastoris	0.1	1	0.1	-	0.1	0.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-
Lactuca serriola	-	0.5	-	-	-	-	-	0.1	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Lamium amplexicaule	0.1	1	0.1	0.1	3	1	3	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sonchus asper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-
Secalietea																									
Adonis aestivalis	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lamium purpureum	-	-	0.5	-	-	0.1	0.5	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lathyrus tuberosus	-	-	1	-	-	-	-	-	-	-	-	-	2	2	1	1	-	-	5	5	-	0.1	-	-	-
Papaver dubium subsp. albiflorum	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Veronica polita	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vicia grandiflora	10	-	0.1	-	5	0.5	-	-	-	5	-	-	1	5	-	0.5	-	0.1	-	-	-	-	-	-	-
Vicia hirsuta	2	-	0.1	0.5	0.1	0.1	-	0.1	1	2	1	1	1	2	-	1	3	3	1	0.5	-	0.1	0.1	-	-
Querco-Fagea																									
Ranunculus ficaria	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indifferent																									
Allium vineale	-	0.1	-	-	-	-	-	-	-	-	-	0.1	-	0.5	-	1	-	0.1	-	0.1	-	-	-	-	-
Carduus nutans	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carex hirta	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cirsium arvense	-	0.1	15	5	2	2	-	2	2	-	3	6	0.5	15	2	0.1	10	3	7	0.5	15	20	20	15	20
Convolvulus arvensis	2	1	-	-	2	-	0.1	-	0.1	0.1	-	-	2	5	5	15	30	10	7	-	-	-	-	-	-
Cynodon dactylon	-	-	-	-	-	-	-	-	0.1	-	-	-	0.1	-	0.5	-	-	-	-	-	-	-	-	-	-
Elymus repens	-	40	2	15	0.1	0.1	15	0.1	1	-	10	30	1	1	-	5	25	30	10	4	-	-	-	-	-

Erophila verna	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Euphorbia virgata	0.5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Galium aparine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
Galium verum	30	25	15	15	15	20	6	20	35	70	-	-	-	-	25	50	0.5	1	-	50	-	-	-	-	-
Linaria vulgaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-
Ornithogalum umbellatum s.l.	1	0.1	-	1	1	0.1	-	-	2	1	-	-	-	-	-	0.1	-	-	-	0.1	-	-	-	-	-
Silene alba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	3	0.5	-	-	-	-	-	-	-	-
Taraxacum officinale	0.1	0.1	-	-	-	-	-	-	-	-	2	0.1	-	-	-	0.1	-	-	-	0.1	-	-	-	-	-
Tragopogon dubium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	0.5	-	-	-	-	-
Verbena officinalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	0.5	-	-	-	-	-	-	-	-
	Adventive																								
Amorpha fruticosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Asclepias syriaca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Robinia pseudoacacia	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xanthium italicum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-
	Other																								
Achillea sp.	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-
Artemisia sp.	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Centaurea sp.	0.1	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epilobium sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	0.1	0.1

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Table 2. Analytical table of the forest types (1-5: riverine willow-poplar forests; 6-10: planted oak-elm-ash forests).

		1	2	3	4	5	6	7	8	9	10
	Phragmitetea										
Typha angustifolia	C	-	-	-	0.1	-	-	-	0.1	-	-
	Chenopodio-Scleranthea										
Lactuca serriola	C	-	-	-	0.1	-	-	-	-	-	-
	Secalietea										
Aristolochia clematitis	C	-	-	-	-	-	-	-	0.1	0.1	-
Cirsium arvense	C	-	-	-	0.1	-	-	-	0.1	-	-
Lamium purpureum	C	20	2	5	-	-	-	-	-	-	-
	Arction lappae										
Anthriscus cerefolium	C	3	5	4	-	-	-	-	-	-	-
Arctium lappa	C	-	-	-	0.1	-	-	-	-	-	-
	Galio-Alliarion										
Chaerophyllum temulum	C	0.1	0.1	-	15	-	-	-	-	-	-
Parietaria erecta	C	-	1	-	-	-	-	-	-	-	-
	Calystegion sepium										
Lamium album	C	1	-	-	-	-	-	-	-	-	-
Solanum dulcamara	C	0.1	0.1	-	0.1	-	-	-	0.1	0.1	-
Stachys palustris	C	-	-	-	0.1	-	-	-	-	-	-
	Bidentetea tripartitae										
Lycopus europaeus	C	-	-	-	0.1	-	-	-	-	-	-
Lycopus exaltatus	C	-	-	-	0.1	-	-	-	0.1	-	-
Lysimachia nummularia	C	-	0.5	0.1	-	-	-	-	-	-	-
	Querco-Fagea										
Acer campestre	C	0.1	-	-	-	0.1	-	-	-	-	-
Clematis vitalba	C	0.5	0.1	-	-	-	-	-	-	-	-
Clinopodium vulgare	C	-	-	-	-	-	-	-	0.1	-	-
Cornus sanguinea	B	0.1	1	2	-	-	-	3	-	-	-
Cornus sanguinea	C	-	0.1	0.1	-	-	-	8	-	-	-
Fraxinus excelsior	B	-	-	-	-	-	-	-	-	2	-
Geum urbanum	C	-	0.1	-	-	-	-	-	-	-	-
Ranunculus ficaria	C	0.1	0.1	-	-	-	-	-	-	-	-
Scrophularia nodosa	C	-	-	-	-	-	-	0.1	-	-	-
	Salicion albae										
Cucubalus baccifer	C	0.1	0.5	-	-	-	-	-	-	-	-
Humulus lupulus	B	-	-	0.5	-	-	-	-	-	-	-
Humulus lupulus	C	1	-	1	-	-	-	-	-	-	-
Populus alba	A1	30	-	10	25	30	-	-	-	-	-
Populus alba	B	-	-	0.1	-	-	-	-	-	-	-
Populus alba	C	0.1	-	0.1	3	2	0.1	-	-	-	-
Rubus caesius	B	0.1	-	0.1	-	-	-	1	-	-	-
Rubus caesius	C	-	2	2	0.5	1	-	1	1	0.1	0.1
Salix alba	A1	-	35	-	-	20	-	-	-	-	-
	Alno-Padion										
Quercus robur	A1	-	-	-	-	-	60	45	40	50	65
Quercus robur	C	0.1	-	-	-	-	0.1	0.1	0.1	0.1	0.1
Ulmus laevis	A1	-	35	-	25	10	-	-	10	-	-
Ulmus laevis	A2	10	-	15	-	-	-	5	5	10	-
Ulmus laevis	B	0.1	-	1	-	-	-	-	-	-	-
Ulmus laevis	C	0.1	1	0.1	-	-	-	1	-	-	-
	Indifferent										
Sambucus nigra	B	3	20	15	0.5	-	-	-	-	-	-
Alliaria petiolata	C	1	-	-	-	-	-	-	-	-	-
Chelidonium majus	C	-	-	-	-	0.1	-	-	-	-	-

Galium aparine	C	30	60	60	20	-	-	-	2	15	-
Glechoma hederacea	C	-	-	-	4	-	-	-	0.5	-	-
Prunella vulgaris	C	-	-	-	-	-	-	-	0.1	-	-
Ranunculus repens	C	-	-	-	-	-	-	-	0.1	-	-
Sambucus nigra	C	0.5	-	-	-	-	-	-	-	-	-
Stellaria media s. str.	C	30	15	10	-	-	-	-	-	-	-
Taraxacum officinale	C	0.1	-	-	-	-	-	-	-	-	-
Urtica dioica	C	0.1	2	-	2	0.1	-	-	0.1	0.5	-
Veronica hederifolia agg.	C	3	1	1	-	-	-	-	-	-	-
	Adventive										
Acer negundo	A2	40	10	30	-	30	5	2	10	10	30
Acer negundo	B	2	20	15	-	3	-	-	1	-	2
Acer negundo	C	-	-	-	-	-	-	2	-	0.1	-
Amorpha fruticosa	B	-	-	-	2	-	-	-	10	40	15
Amorpha fruticosa	C	-	-	-	0.1	-	0.1	-	1	-	1
Celtis occidentalis	B	-	-	-	-	2	-	-	-	-	-
Celtis occidentalis	C	-	-	-	1	2	-	-	0.1	-	-
Fraxinus pennsylvanica	A1	5	-	-	-	-	-	25	-	-	-
Fraxinus pennsylvanica	A2	-	-	3	5	5	30	-	5	-	-
Fraxinus pennsylvanica	B	-	-	1	20	1	15	15	5	-	-
Fraxinus pennsylvanica	C	-	1	5	15	10	3	5	40	-	-
Gleditsia triacanthos	C	-	-	-	-	-	-	-	0.1	-	-
Morus alba	A2	-	2	-	5	3	-	-	-	-	-
Morus alba	B	-	-	-	2	-	-	0.1	1	-	-
Morus alba	C	-	-	0.1	0.1	-	-	-	-	-	-
Parthenocissus quinquefolia	C	0.5	0.5	-	-	-	-	-	-	-	-
Robinia pseudoacacia	A2	2	-	-	-	-	-	-	-	-	-
Robinia pseudoacacia	B	0.1	0.1	0.1	-	-	-	-	-	-	-
Vitis riparia	A1	-	-	-	5	-	-	-	-	-	-
Vitis riparia	B	-	3	1	0.5	1	-	-	1	-	-
Vitis riparia	C	0.5	-	5	0.1	1	0.1	-	1	1	0.5
	Other										
Cardamine sp.	C	-	-	-	-	-	-	-	0.1	-	-
Poa sp.	C	-	-	-	-	-	-	-	0.1	-	-
Populus × *euramericana*	A1	5	-	3	-	-	-	10	-	-	-
Prunus domestica agg.	A2	-	-	-	-	-	-	2	-	-	-
Prunus domestica agg.	C	-	-	-	-	-	-	1	-	-	-
Rumex sp.	C	-	0.1	0.1	-	-	-	-	-	-	-

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