VEGETAL COMUNITIES FROM THE CLASS *ISOËTO-NANOJUNCETEA* BR.-BL. et TX. 1943 FROM BANAT

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Abstract: *The paper describes some phytocoenoses from the Isoëto-Nanojuncetea Br. Bl. et Tx. 1943 class, exemplified by Mentha pulegium L. and Pulicaria vulgaris Gaertn., from two protected areals from Timiş county, the Surduc lake and the Murani-Pişchia Marshes. Our samplings were carried out during summer 2011, during the period when these vegetal communities displayed maximum occurrence. One can find a number of 50 species in the synthetic table, with an average of 13.5 species / lot, at Surduc and 16.25, at Murani. The characteristic species nucleus agrees with the data found in specialty literature (COLDEA, 1997, SANDA et al., 2008). A number of 28 species from our list can also be found in the national synthesis comprised by COLDEA (1997). We consider these phytocoenoses important for the overall humid area biodiversity, for the preservation of some species (e.g. Lindernia procumbens (Krock.) Philcox, species from Annex II of the Directive 92/43/CEE, identified in the Surduc phytocoenoses) and in the vegetation dynamics process, since they represent pioneering stages and depend on the flooding of the ground they occupy. What is more, the two lakes suffer water level oscillations and undergo high anthropic pressure, which determines an uncertain existence for these communities.*

Key words: *humid depressions, pioneering vegetation, Mentha pulegium L., Pulicaria vulgaris Gaertn., Lindernia procumbens (Krock.) Philcox, protected areas*

INTRODUCTION

The ISOËTO-NANOJUNCETEA Br. Bl. et Tx. 1943 class includes pioneering phytocoenoses occurring on depression surfaces, arid during the drought periods, and puddled during various periods of the autumn season, until spring. Their presence depends on the soil water, the duration of flooding periods and the accumulation of vegetal matter. The characteristic species nucleus is formed by *Juncus bufonius* L., *Lythrum hyssopifolia* L., *Mentha pulegium* L., *Ranunculus sardous* Crantz., *Centunculus minimus* L., *Lindernia procumbens* (Krock.) Philcox, *Pulicaria vulgaris* Gaertn. (COLDEA *et al*, 1997, SANDA *et al*., 2008). CHIFU *et al.*, 2014 considers a larger characteristic species nucleus: *Cyperus flavescens* L., *C. fuscus* L., *C. hamulosus* M. Bieb., *C. michelianus* (L.) Delile, *Eleocharis palustris* (L.) Roem. & Schult., *Lindernia procumbens* (Krock.) Philcox, *Matricaria tricophylla* (Boiss.) Boiss., *Mentha pulegium* L., *Pulicaria vulgaris* Gaertn., *Ranunculus lateriflorus* DC. Secondary species, as considered by the same authors, are: *Cyperus glomeratus* L., *Marsilea quadrifolia* L., *Ranunculus sardous* Crantz, *Sagina procumbens* L., *Schoenoplectus supinus* (L.) Palla, *Veronica anagalloides* Guss, *Veronica serpyllifolia* L.

The *Nanocyperetalia* Klika 1935 order, presented by some authors as *Cyperetalia fusci* Müller-Stoll et Pietsch. 1961 (COSTE, 1974), is considered in western European literature to have the same chorology with the *Nanocyperion* Koch ex Libbert 1932 allience, extended in the South-East of Europe, by the inclusion *Verbenion supinae* Slavnic 1951 thermophile alliance. The

Verbenion supinae Slavnic 1951 alliance has been described as a thermophile association group developed in the marshy depressions, in plain and hilly areas, well represented in the South-East of Europe.

In the ISOËTO-NANOJUNCETEA Br.-Bl. et Tx. 1943 class, depending on species combination, ecology, biologic and phenology forms, two orders may be separated, *Isoëtalia* Br.-Bl. 1931, in the Mediterranean region and *Cyperetalia fusci* Müller-Stoll et Pietsch. 1961, in the mild climate areas of East and Central Eurasia. Amphibious vegetation on the muddy soils from Eastern Asia pertains to *Lindernion procumbentis*, and the one on the nutrient poor soils, to *Eriocaulion atratae* and *Eriocaulion hondoensis* (DEIL, 2005, http://www.sussex.ac.uk/affiliates/halophytes).

MATERIAL AND METHOD

The research method used is specific to the central European floristic school, where the vegetal association is considered to be the basic syntaxonomic unit in the vegetal carpet study. Our samplings were carried out in 2011, during the period when these vegetal communities displayed maximum occurrence, in summer, in two protected areas in Timiș county, Surduc (Nature reserve) and Murani (ROSPA0079 Special Protection Area, as well as Nature reserve). The synthetic table includes 6 phytocoenoses described in the two locations. The sample surface is of 4 x 4 m (16 m²). the species are organised according to the alphabetic criterion. The phytocoenoses categorisation and description were based on the floristic criterion, taking into account the presence of characteristic species, dominant and differential, and using COLDEA, 1997, SANDA *et al.* 2008, who achieved the synthetic description of these communities, in Romania. Our data were analysed in comparison with the phytocoenoses described in Banat, by BOSCAIU, 1966, POP, 1968, GRIGORE, 1970, COSTE, 1974, OPREA, 1976, HOBORKA, 1980, LOVASZ, 1995.

RESULTS AND DISCUSSIONS

The described phytocoenoses are part of the *Pulicario vulgaris-Menthetum pulegii* Slavnic 1951 association.

Synonymy (SANDA *et al.*, 1980, 1998): *Pulicaria vulgaris-Lythrum hyssopifolia-Mentha pulegium* I. Pop 1963; *Pulicario* (*prostratae*)*-Lythretum hyssopifoliae* Țopa 1971; *Lythreto-Pulicarietum vulgaris* Timár 1954.

Cenotaxonomic categorisation (COLDEA, 1997)

Cls. ISOETO-NANOJUNCETEA Br.-Bl. et Tx. 1943
Ord. *Nanocyperetalia* Klika 1935
Al. *Verbenion supinae* Slavnic 1951

The association cenotaxonomy does not pose special problems; it has a unitary structure and a well established position inside the alliance, which refer it to the sphere of thermophile vegetation.

Chorology

The association was mostly described in the Western part of the country (The Timiș and Crișuri Plains) and, rarely, in the South and East. It is cited in Banat, by BOSCAIU (Lugoj), 1966, GRIGORE (Timiș-Bega), 1971, COSTE, 1974 (Locvei Mountains). OPREA *et al.*, 1970 mentions this community at Satchinez. They are also represented in the Sînnicolaul Mare Plain (OPREA, 1976). HOBORKA, 1980 cites the association in the Dognecei Mountains. In the Buziașului Plain and on

the Silagiului Hills, LOVASZ, 1995 describes the subassociation *menthetosum pulegii* GRIGORE 1971 (although the subassociation author does not cite it in ulterior papers).

In Crişana, POP, 1962, 1968 describes a saturated soil association (sensitive aspect reflected in the floristic composition with many halophytes), humid, present as various size clusters, at Salonta and surroundings.

The association is cited in the same region by DRĂGULESCU & MACALIK, 1997, in the hilly and plain sections of the Crişul Alb, Crişul Negru and Crişul Repede rivers. MORAR, 2012 mentions the association in the Oradea Hills. ARDELEAN & KARÁCSONYI, 2002 idetified the association in the Ierului Valley (Satu-Mare), adding the fact that it can be found frequently, occupying large surfaces here and there.

The association chorology, in Romania (according to SANDA, 2002): BOSCAIU, 1966 (Lugoj), GRIGORE, 1971 (Timiş-Bega), MITITELU & BARABAS (Bacău), CÎRTU, 1973 (Jiu-Desnăţui), SÂRBU, 1978 (Drăculeşti, Brăneşti), ROMAN, 1974 (Mehedinţi Plateau), POP, 1968 (Câmpia Crişurilor), CHIFU *et al*., 1998 (Moldova), ŞTEFAN, 1996 (Caraorman).

RODWELL *et al*., 2002 present phyto-sociologic syntaxons (formations, classes and vegetation alliances) related to the EUNIS habitats.

Our communities present the following correspondence:

E Springs, shoreline and swamp vegetation

22 Isoëto-Nanojuncetea

Pioneer ephemeral dwarf-cyperaceous vegetation on periodically flooded soils

22C Nanocyperetalia

Pioneer ephemeral dwarf-cyperaceous vegetation on periodically flooded soils in temperate Europe

22C08 Verbenion supinae

Submediterranean and Mediterranean periodically flooded muddy, nutrient-rich and saline banks

C3.4 Species-poor beds of low-growing water-fringing or amphibious vegetation

E5.4 Moist or wet tall-herb and fern fringes and meadows.

GAFTA & MOUNTFORD (2008) specify the communitarian interest habitat 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*.

Synecology

The phytocoenoses we analyzed (tab. 2) are mostly constituted by therophyte species (e.g. *Peplis portula* L., *Verbena officinalis* L., *Xanthium italicum* Moretti) and hemicryptophyte (e.g. *Gratiola officinalis* L., *Trifolium repens* L., *Plantago media* L.). The geographic distribution shows that most species are Eurasian (e.g. *Gnaphalium uliginosum* L., *Leontodon autumnalis* L., *Hibiscus trionum* L.), Followed by cosmopolite ones (e.g. *Lythrum hissopifolia* L., *Polygonum lapathifolium* L., *Eleocharis palustris* (L.) Roem. & Schult.), though less represented, as compared to the phytocoenoses described by GRIGORE, 1970. Most species are meso-hygrophile, under the humidity aspect (e.g. *Bidens tripartita* L., *Echinochloa crus-galli* (L.) P. Beauv., *Lindernia procumbens* (Krock.) Philcox). Regarding the temperature, meso-thermic ones predominate (e.g. *Cichorium intybus* L., *Gypsophila muralis* L., *Inula britannica* L.), and with regards to the reaction to the soil, most species are amphi-tolerant (e.g. *Juncus bufonius* L., *Oenanthe aquatica* (L.) Poir., *Lycopus europaeus* L.).

Around the Surduc lake, the presence of these ephemeral communities, aside from depending on periodic flooding, is endangered by a strong anthropization. During the last years, observations of the phytocoenoses were rendered impossible by their deterioration through grazing and camping activities. At Murani, fishing and other entertainment activities negatively influenced these vegetal communities. Also, agricultural practices applied on the land neighbouring both humid areas exercise a negative influence (NEACSU *et al.*, 2009).

In the phytocoenoses described at Surduc, we signal the presence of the *Lindernia procumbens* (Krock.) Philcox species, from Annex II of the Directive 92/43/CEE. The species was also encountered (in the same humid area) in the *Elocharidetum acicularis* W. Koch 1926 em. Oberd. 1957 association phytocoenoses (NEACSU *et al.*, 2010).

According to COLDEA *et al*., 1997 these phytocoenoses occupy small depressions around the lakes and marshes, on alluvial soils, with clayish texture, flooded periodically in spring time, and dry, towards summer end. The soils of these very sunny stations are often slightly saline, with a neutral or slightly basic reaction (pH = 7.5 - 8).

The maximum phytocoenoses closure degree and the characteristic structure are accomplished in the second summer half. The dominant layering note is given by the development of edifiers which form a compact layer, which results in larger size species (*Juncus inflexus* L., *Lythrum salicaria* L. ş.a.). The vegetal carpet may be interrupted here and there by dried ponds where water stagnated for a long time and where phytocoenoses may develop ulterior with *Cyperus flavescens* L. (COSTE, 1974). This particularity was observed with our phytocoenoses as well.

The samplings which render the subassociation *typicum* (COLDEA *et al*., 1997), belong to BOSCAIU, 1966 (Lugoj), GRIGORE, 1971 (Timiș-Bega), ROMAN, 1974 (Mehedinți). POP, 1968 describes within the short meadow vegetation of brackish wetlands, the subassociation *lotetosum tenuis*, in the Crișurilor Plain. In the 15 phytocoenoses analyzed by the author, 70 species can be identified, of which 18 are halophiles. The biologic spectrum is clearly dominated by hemicryptophytes and therophytes, and under floristic aspect the Eurasian element predominates. The phytocoenoses described by GRIGORE, 1970 present a similar structure (with the observation that they are followed by cosmopolite elements, which represent a significant share - 25 %), in the Timiș-Bega interfluve.

In the phytocoenoses described by COSTE, 1974, the bioform spectrum is achieved with the similar participation of therophytes and hemicryptophytes, the author underlining the relatively stable character of the association, as well as its position in the wasteland hardening process. The phyto-geographic element spectrum indicates, through the significant participation of Mediterranean elements, the association's evidently thermophile character, though deteriorated during the ruderalization process, by the advance of cosmopolites and adventives. The communities have been identified as fragments established on wasteland from the Dunării everglade, between Moldova Veche-Măceşti and Baziaş or on depression surfaces along the Pojejena valley.

In the Mehedinți Plateau (ROMAN, 1974), these communities mingle with the *Bolboschoenus maritimus* (L.) Palla and *Agrostis stolonifera* L. phytocoenoses, while in the Crișurilor Plain (POP, 1968), they mingle with *Artemisio-Festucetum pseudovinae* (Magyar 1928) Soó 1945 or *Achilleo-Festucetum pseudovinae* (Magyar 1928) Soó 1945 (SANDA *et al.*, 1997).

ARDELEAN & KARÁCSONYI, 2002 observing the abundant reproduction of *Polygonum aviculare* subsp. *neglectum* in compact soil stations, propose a new phyto-taxonomic category,

Pulicaria vulgaris-Menthetum pulegii Slavnic 1951 subas. *polygonetosum*. The authors underline the brackish character of microdepressions where these communities occur, signalling the presence of the *Lotus tenuis* Waldst. & Kit., *Juncus gerardii* Loisel, *Ranunculus lateriflorus* DC species. Within the bioform spectrum, therophytes and hemicryptophytes are co-dominant, and within the floristic spectrum, the Eurasian ones are followed by cosmopolites. The particularities of these Western Romanian phytocoenoses are presented in table 1.

In the Czech Republic, the association was found in the Morava and Dyje river confluence area from the South of Morava, but atypical stands were identified in the South of Bohemia. This community includes vegetation dominated by dicotyledonous *Lythrum hyssopifolia* L., *Mentha pulegium* L., *Peplis portula* L., *Pulicaria vulgaris* Gaertn. and other species characteristic for humid meadows. It is found on the perturbed sites, in floodable everglades, alongside shores, on sand, gravel or clay sublayer, holes, rarely used paths or in fish basins. The habitat is flooded by shallow waters in spring, which slowly evaporates and dries out during summer (ŠUMBEROVÁ & HRIVNÁK, 2011).

KRICSFALUSY & MIHÁLY, 2009 cite the association between the 82 vegetal communities found in the Bodrog hydrographic basin (BCA - Bodrog catchement area), after monitoring 20 sites. The authors mention the importance of ecologic rehabilitation and preservation measures, because modification, insulation, habitat loss, technologic catastrophes are the strongest threats for the BCA diversity. These communities can also be found on the association check list from the Tisa basin Hungarian sector, made up by MAKRA, 2005.

DE FOUCAULT & CATTEAU, 2012 include the *Pulicario vulgaris - Menthetum pulegii* Slavnic 1951 association in the *Potentillion anserinae* Tüxen 1947 alliance, order *Potentillo anserinae - Polygonetalia avicularis* Tüxen 1947, class AGROSTIETEA STOLONIFERAE Oberd. 1983, but with uncertain presence in France. The association floristic composition comprises more or less halophile species: *Beckmannia eruciformis* (L.) Host, *Juncus gerardii* Loisel., *Trifolium fragiferum* L., *Lotus tenuis* Waldst. & Kit., alături de specii precum: *Inula britanica* L., *Teucrium scordium* L., *Gratiola officinalis* L., *Lythrum virgatum* L., *Juncus compressus* Jacq., *Rorippa sylvestris* subsp. *sylvestris* (L.) Besser, *Lythrum salicaria* L., *Lysimachia nummularia* L., *Verbena officinalis* L. etc. In total, in the DE FOUCAULT & CATTEAU, 2012 synthesis, the association is represented by 27 species, but no *Pulicaria vulgaris* can be found among them.

ALTENFENDER *et al*., 2014 observed that during the last decade the drainage, fertilization and herbiciding of agricultural land led to a severe decline of these ephemeral communities' diversity and floristic composition in the North-East of Germany, which were rich in rare plant species. Authors say that in order to develop efficient preservation strategies, it is essential to take into account all factors influencing the specific composition: water regime, soil properties and agricultural practices.

Floristic composition and synmorphology

The communities we analyzed were observed in summer 2011, at Murani (4 lots) and in the Surduc lake perimeter (2 lots). Their total species number is 50, with an average of 13.5 species / lot, at Surduc, respectively 16.25 species / lot, at Pișchia. Aside from edifying species, on our lots, occur, with a high constancy (from COLDEA's, 1997 list): *Bidens tripartita* L., *Lythrum hyssopifolia* L., *Polygonum aviculare* L., *Juncus bufonius* L., *Cyperus fuscus* L., *Gypsophila muralis* L., *Gratiola officinalis* L., *Polygonum lapathifolium* L., *Trifolium repens* L. etc.

In the synthetic table we established (tab. 2), one can find 28 from the species established by COLDEA, 1997 (as a result of the samplings carried out by BOSCAIU, 1966, POP, 1968, GRIGORE, 1971, MITITELU & BARABAS, 1972, ROMAN, 1974, SÂRBU, 1978). We can mention the following examples: *Cichorium intybus* L., *Echinochloa crus-galli* (L.) P. Beauv., *Gnaphalium uliginosum* L., *Inula britanica* L., *Stachys palustris* L., *Verbena officinalis* L. etc. High frequency species, from the phytocoenoses we described at Surduc, are: *Echinochloa crus-galli* (L.) P. Beauv., *Eleocharis acicularis* (L.) Roem. & Schult., *Lamium purpureum* L., *Lindernia procumbens* (Krock.) Philcox, *Polygonum lapathifolium* L., *Trifolium repens* L. At Pișchia, only *Elymus repens* (L.) Gould. and *Gypsophila muralis* L. occur at several points, the other species being represented by few individuals, on the analyzed surfaces.

Table 1

The particularities of *Pulicaria vulgaris* Gaertn. and *Mentha pulegium* L. phytocoenoses in western Romania

Authors	Boșcaiu, 1966	Pop, 1968	Grigore, 1970	Coste, 1974	Ardelean & Karácsonyi, 2002	Neacșu, 2008
Studied area	Lugoj (Lacul Mare)	Câmpia Crișurilor (Salonta and surroundings)	Timiș-Bega	Munții Locvei (Moldova Veche, Pojejena, Baziaș)	Valea Ierului	Surduc, Pișchia
No. surveys analyzed	2	15	7	3	9	5
No. species	19	70	62	25	42	50
Bioforms	-	H, Th	H, Th	H, Th	Th, H	Th, H
Floristic elements	-	Eua, Cosm	Eua, Cosm	Eua, Cosm	Eua, Cosm	Eua, Cosm
Other observations	invaded by *Juncus conglomeratus*	18 halophytes	a quarter of all species are cosmopolites	character termophyle	in salty micro-depressions	the absence of halophytes

Characteristic and dominant species in this association are *Pulicaria vulgaris* Gaertn. and *Mentha pulegium* L. Under floristic and ecologic aspect, the phytocoenoses can be categorised in two distinct subunits: some are developed on sandy-clayish, humid and well grazed, close, floristically, to the ones described in Voivodina (SLAVNIC, 1951), from the *typicum* subassociation and some on alluvial soils with clayish and slightly saline texture, characterized by the presence of differential species, preferable halophile, such as *Lotus tenuis* Waldst. & Kit., *Trifolium fragiferum* L. și *Lythrum hissopifolia* L., from the *trifolietosum fragiferii* subassociation.

COLDEA *et al.*, 1997 analyzes 43 phytocoenoses, in whose structure 67 species are mentioned. The following among them display a high constancy: *Pulicaria vulgaris* Gaertn. (V), *Mentha pulegium* L. (V), *Lythrum hyssopifolia* L. (III), *Bidens tripartita* L. (III), *Polygonum aviculare* L. (III), *Trifolium repens* L. (III), urmate de *Cyperus fuscus* L. (II), *Gypsophila muralis* L. (II), *Juncus bufonius* L. (II), *Ranunculus repens* L. (II), *Gratiola officinalis* L. (II), *Polygonum lapathifolium* L. (II).

SANDA *et al.*, 1997 specifies that the characteristic species *Pulicaria vulgaris* Gaertn., *Mentha pulegium* L. and *Lythrum hyssopifolia* L. (the latter, present only in a phytocoenoses we described at Surduc) forms a more or less compact layer, participating in various proportion. They

are accompanied by a series of halophiles: *Lythrum tribracteatum* Salzm. ex Spreng., *Rumex stenophyllus* Ledeb., *Pholiurus pannonicus* (Host.) Trin., *Spergularia marina* (L.) Besser, *Hordeum hystrix* Roth. Our phytocoenoses does not sport this particularity. In table 1 we present the particularities of phytocoenoses described in Banat and Crișana.

Syndynamics: In the vegetation succession, these pioneering phytocoenosesare followed by halophile practicol vegetation of the *Agrosti(det)o-Beckmannietum* (Rapaics 1916) Soó 1933 type, and by regulating the hydric regime and taking salinity elimination measures the tendency is to form mesophile practicol phytocoenoses. COSTE, 1974 claims that under natural and temporary puddle conditions, the association manifests a high stability and evolves towards a *Agrostion* Soó (1933) 1971 vegetation, when cereal crops infiltrate the phytocoenoses.

Importance: According to COSTE, 1974, maintaining the association on surfaces with temporary stagnant water, in land cultivating conditions, is not recommended. The association lacks practical importance, but today, one has to consider its importance for the biodiversity, for the preservation of some species and during the vegetation dynamics process.

CONCLUSIONS:

In the specialty literature, the *Pulicario vulgaris* - *Menthetum pulegii* Slavnic 1951 cenoses are presented as constituted by neutrophil, halophile (of verious degrees) and mesophile or meso-hygrophile species.

Edifying *Pulicaria vulgaris* Gaertn. and *Mentha pulegium* L. phytocoenoses occur in humid areas, small depressions, on land flooded during spring time and dry during summer, when they are most developed. These are pioneering communities, and because they depend on periodical flooding of the occupied surfaces, their presence is uncertain. The phytocoenoses we described at Surduc and Murani resemble those presented in the specialty literature (COLDEA, 1997, SANDA *et al*., 2008); the highest floristic similarity is presented by the cenoses described in GRIGORE, 1970, in the Timiș-Bega interfluve. They are constituted of Eurasian, therophyte and hemicryptophyte species, and the characteristic accompanying species nucleus corresponds with that of similar phytocoenoses described by us. As particularities we mention the absence of halophile species from the floristic composition. The preservation value of these cenoses corresponds to that of the Natura 2000 3130 habitat, being high and very high, when the *Lindernia procumbens* (Krock.) Philcox species we found in the Surduc cenoses, occurs in their composition.

Aside from natural causes (water regime and soil characteristics), these communities are strongly threatened by anthropization (entertainment and sports activities, fishing, grazing, agriculture etc). Ulterior observations showed their obvious deterioration, that is why we consider it essential to respect the protected natural area regime and to preserve these habitats.

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Table 2

Synthetic table with phytocoenosis by *Pulicaria vulgaris* Gaertn. and *Mentha pulegium* L.

					Altitude (m)	196	194	122	122	126	128
					Covering (%)	100	80	90	85	70	50
					Vegetation height (cm)	60	70	30	20	30	50
					Surface (m^2)	16	16	16	16	16	16
Biof.	Geoel.	U	T	R							
H	Circ (bor)	4	0	0	*Agrostis stolonifera* L.	-	-	+.2	-	+	-
Th	Eua	4,5	3	0	*Bidens tripartita* L.	+.1	-	+.3	-	-	-
HH	Eua (Med)	5	4	4	*Carex riparia* Curtis	+	-	+	-	-	+
H-TH	Eua	2,5	3,5	4,5	*Cichorium intybus* L.	+	-	+	+	+	-
Th	Eua (Med)	6	3	4	*Cyperus fuscus* L.	-	+	-	-	-	-
Th	Cosm	4	0	3	*Echinochloa crus-galli* (L.) P. Beauv.	+.3	+	+.1	+	+	-
Th	Circ (bor)	5,5	0	0	*Eleocharis acicularis* (L.) Roem. & Schult.	-	1.3	-	-	-	-
G-HH	Cosm	5	0	4	*Eleocharis palustris* (L.) Roem. & Schult.	+	-	-	-	-	-
G	Eua	0	0	0	*Elymus repens* (L.) Gould.	-	-	1.3	1.5	-	-
H	Eua	4,5	3	0	*Epilobium tetragonum* L.	-	-	-	-	-	+
H	Eua	3,5	0	0	*Festuca pratensis* Huds.	+	-	-	-	-	-
Th	Eua	3	3,5	0	*Geranium dissectum* L.	-	-	-	-	+	-
Th	Eua	5	3	4	*Gnaphalium uliginosum* L.	+	-	+	+	+	-
H	Eua	4,5	3	4	*Gratiola officinalis* L.	+	+	-	-	-	-
Th	Eua (cont)	2	3	2	*Gypsophila muralis* L.	-	-	-	+.2	+	-
TH	Eua	2,5	4	4	*Hibiscus trionum* L.	-	-	+	-	+	-
TH-H	Eua (Med)	3	3	0	*Inula britannica* L.	+.1	-	-	-	+	+
H	Circ (bor)	5	2	0	*Juncus bufonius* L.	-	-	-	-	-	+
Th (H)	Eua	3	0	4	*Lamium purpureum* L.	-	+.3	-	-	-	-
H	Eua	3	0	0	*Leontodon autumnalis* L.	-	-	+.2	-	-	-
Th	Eua (Med)	4,5	4	0	*Lindernia procumbens* (Krock.) Philcox	-	+.3	-	-	-	-
HH	Eua	5	3	0	*Lycopus europaeus* L.	-	-	+	-	-	+
Th	Cosm	4	3	0	*Lythrum hissopifolia* L.	-	+	-	-	-	-
Th-TH	Eua	0	3	3,5	*Matricaria perforata* Mérat	+	-	-	+	+	+
H (G)	Eua (Med)	4,5	3	0	*Mentha longifolia* L.	-	-	-	-	-	+
H	Eua (Med)	4	3	5	*Mentha pulegium* L.	2.5	-	3.5	+.5	+.4	2.5
HH	Eua	6	3	0	*Oenanthe aquatica* (L.) Poir.	-	+	-	-	-	-
Th	Atl-Med	4	3	0	*Peplis portula* L.	-	+	-	-	-	-
H	Eua	3	0	0	*Plantago major* L.	-	-	-	+	+	-
H	Eua	3	0	0	*Plantago media* L.	+.2	-	+.2	-	-	-
Th	Cosm	2,5	0	3	*Polygonum aviculare* L.	-	-	-	+	+	-
Th	Cosm	4	0	3	*Polygonum lapathifolium* L.	-	+.5	-	+	-	-
Th	Eua	4,5	3	0	*Polygonum persicaria* L.	-	-	+.1	-	+	+
H	Cosm	4	3	4	*Potentilla anserina* L.	-	-	-	+	-	-
H	Circ (bor)	3	3	0	*Prunella vulgaris* L.	-	-	-	+	-	-
Th	Eua (Med)	4	3	3	*Pulicaria vulgaris* Gaertn.	3.5	2.5	+.5	3.5	2.5	+.5
Th-TH	Eua	3	3	4	*Ranunculus sardous* Crantz	-	-	+.1	-	-	-
HH	Eua (Med)	6	3	4	*Rorippa amphibia* (L.) Besser	-	-	+	-	-	-
H-G	Eur	4	3	4	*Rorippa sylvestris* (L.) Besser	-	+	-	-	-	-
H	Eur	4	0	3	*Rumex obtusifolius* L.	-	-	-	-	+	-
H	Euc	5	3	3	*Scutellaria hastifolia* L.	-	-	-	-	+	-
Th	Cosm	2,5	4	0	*Setaria pumila* (Poir.) Roem. & Schult.	-	-	-	+	-	-
H (G)	Circ (bor)	4	3	4	*Stachys palustris* L.	-	-	-	-	+	-
H	Pont-Med	2	4	4,5	*Stachys recta* L.	-	-	-	-	+	-
H	Eua (Med)	3	0	0	*Taraxacum officinale* (L.) Weber ex F.H.Wigg.	-	-	-	+	-	-
H	Eua	3,5	0	0	*Trifolium repens* L.	+.4	-	-	-	-	-
Th-H	Cosm	3	3	4	*Verbena officinalis* L.	-	-	+	+	+	-
Th	Adv	3,5	4		*Xanthium italicum* Moretti	+.2	-	-	-	-	-
Th	Adv	2,5	4	3	*Xanthium spinosum* L.	-	-	-	-	+	-
Th	Eua	3,5	3,5	4	*Xanthium strumarium* L.	-	-	+	-	-	+

R_{1-2} - 29.07.11, Surduc; R_{3-6} - 10-17.08.11, Pișchia