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CNIDIUM DUBIUM (SCHKUHR) THELL.: DISTRIBUTION IN ROMANIA, ECOLOGY AND PHYTOSOCIOLOGY

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Abstract: *Cnidium dubium* (Apiaceae), a species with ecological preferences for flooded meadows, is affected by the contraction of this habitat throughout Europe, because of the construction of dykes along rivers. In Romania too, this species is very rare and some literature data on its distribution need to be critically verified. Studies of the ecology and phytosociology of *Cnidium dubium* were carried out in a site on meadows of the Râul Negru (central compartment of the Braşov Depression), where a large population was identified. The affinities of the species for phytocoenoses dominated by *Deschampsia cespitosa* (*Cnidio-Deschampsietum* association) and developed on soils rich in uninflatable clay (pelosol) are quite obvious. The meadows of *Cnidium dubium* and *Deschampsia cespitosa* are located especially in the north-eastern part of Central Europe, but in Romania they had not been reported until now. In Romania, as well as in the Braşov Depression, another phytocoenosis of the association is reported from the Ciuc Depression, in the Olt floodplain.

Keywords: *Cnidium dubium*, *Cnidio-Deschampsietum*, priority habitats, meadow vegetation

Introduction

Cnidium dubium (Schkur) Thell. (Apiaceae) is a continental species with a southernmost limit of distribution that crosses the central part of Romania. Due to its scarcity, little is known about the chorology, ecology and vegetation communities in which this plant grows. Similarly, Soó [25] emphasizes that, in Hungary, vegetational data on the plant are few, and Ellenberg *et al.* [12], because of a lack of data, did not establish the value of the ecological index for the nutrient supply of the soil.

According to Pop [18], based of the circumstances of the distribution in Romania, this species appears to be a glacial relic, and the Red List criterion applied in the case of our country [14] is Rare (taxa with small populations which at present are not endangered, but are under risk). In Germany, the species is considered to be highly endangered (Korneck & Sukopp 1988 in [12]).

A recent discovery of *Cnidium dubium* was made between Ozun and Băcel. Here, the species reaches a high abundance within some parts of the widespread meadows located toward the confluence of the alluvial plain of the Braşov Depression with the lower Râul Negru river, a tributary of the Olt river. Our phytocoenotic and ecological investigations across these vegetation communities emphasize that the phytosociological optimum of *Cnidium dubium* is hay-meadows of the association *Cnidio-Deschampsietum* Passarge 1960. This syntaxon is known especially from the north-eastern lowlands of Central Europe [6, 16], but had not previously been reported from Romania [10].

Material and Methods

For taxa identification floristic works for the Romanian [8] and European floras (*Flora Europaea*) [27] were used. Phytosociological relevés were recorded in accordance with the

Braun-Blanquet method. A soil profile was dug in a site where *Cnidium dubium* shows an optimum development as resulted from the highly frequencies and vitality of the individuals in the population. Soil samples were analyzed as follows: humus content – Schollenberger method; soil pH – potentiometric in aqueous suspension having the ratio soil/solution 1/2.5; total nitrogen – Kjeldahl method, mobile phosphorus and potassium acetate extract of ammonium lactate; soil texture – Kacinski treatment, sifted and pipetted.

The map and locality co-ordinates follow Lehrer & Lehrer [13].

Abbreviations used for herbaria: CL – Herbarium of the University of Cluj-Napoca; SIB – Herbarium of the Bruckenthal Museum, Sibiu; HBV – Herbarium of the Faculty of Forestry, Braşov.

Results and Discussions

The distribution of the species in Romania

Cnidium dubium has been reported from the Mohoş peat bog since the time of Baumgarten [1]. Another two localities, between Veştem and Bradu, and Şura Mică respectively, were mentioned [24] by the end of the same century. In "*Flora României* 6" [26] another seven localities were added: Târgu Mureş in the Cocoş Forest, Remetea, Joseni, Voşlăbeni, Căpâlnița, Reci and Măgurele. Subsequent research led to the identification of some new distribution sites. The current status of localities identified so far in Romania is presented below and illustrated in Figure 1.

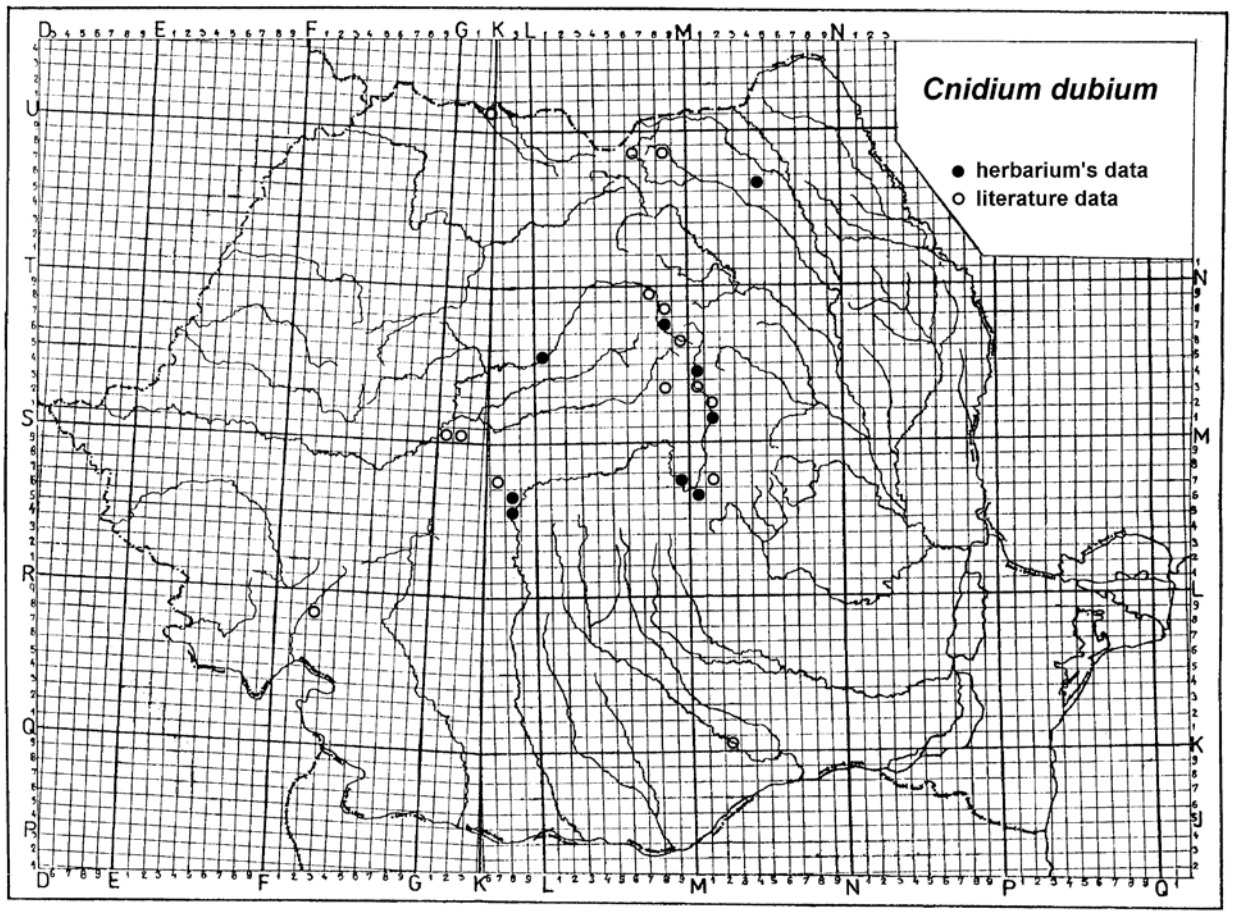

Fig. 1: The distribution of *Cnidium dubium* in Romania

Literature data: Tisa (Virişmort) – jud. Maramureş GU21 [15]; Lucina – jud. Suceava LN68 [15]; Moldovița – jud. Suceava LN88 [7]; Toplița – jud. Harghita LM79 [17]; Remetea – jud. Harghita LM88 [17, 26]; Joseni – jud. Harghita LM87 [17, 26]; Voşlăbeni – jud. Harghita

LM96 [19]; Căpâlnița – jud. Harghita LM83 [26]; Racu and Mădăraş – jud. Harghita MM04 [20]; Miercurea Ciuc – jud. Harghita MM03 [11]; Sânsimion – jud. Harghita MM12 [17]; Vrabia – jud. Harghita MM11 [17, 21]; Tuşnadu Nou – jud. Harghita MM11 [17]; Tuşnad Băi, on „Mohoş" peat bog – jud. Harghita MM11 [1]; Reci – jud. Covasna ML17 [26]; Straja – jud. Alba GS00 [4]; between the Secaşe rivers – jud. Alba GS10 [4]; Şura Mică – jud. Sibiu KL77 (Barth 1879 in [24]); between Bradu and Veştem – jud. Sibiu KL86 [24]; Veştem – jud. Sibiu KL86 [9]; Tălmaciu – jud. Sibiu KL85 [9]; Cheile Țeşnei – jud. Caraş Severin FQ28 [22]; Gherman - com. Măgurele – jud. Ilfov MK20 [26].

Herbarium data: Mihăieşti – jud. Suceava MN46 (HBV – I. Morariu 1951), Joseni – jud. Harghita LM87 (SIB, CL – E.I. Nyárády 1941), Vrabia – jud. Harghita MM11 (HBV – M. Danciu et A. Indreica 2005), Racu – jud. Harghita MM04 (Fl.Rom.Exs. nr. 3353 – F. Rațiu, I. Gergely, I. Toader 1971), Băcel – jud. Covasna ML06 (HBV – M. Danciu et A. Indreica 2001), Vâlcele, în lunca Simbrezii LL97 (HBV – M. Danciu 1972), Tălmaciu – jud. Sibiu KL85 (HBV – J. Barth 1906), Tg. Mureş – jud. Mureş LM05 (SIB – E.I. Nyárády 1912), Veştem – jud. Sibiu KL86 (SIB, CL – M. Fuss 1856).

From Figure 1 it can be seen that the species is quite rare, the main distribution being in the upper and middle basins of the Olt and Mureş rivers, and in the upper basin of the Siret river.

In its vegetative state, *Cnidium dubium* is hard to distinguish from other morphologically similar umbelliferous plants. For this reason we consider that, particularly for this case, for the chorology of the species only herbarium data are significant. Even to retrieve data from phyto-sociological relevés requires caution, if no reconfirmations are available, especially if the survey was undertaken before the plant was in fruit. In this context, subsequent checks are usually difficult to make since the period with an identifiable plant (having flowers and/or fruits) is short, because of mowing (2–3 cuts per year). Moreover, errors of species identification were encountered even in some herbarium specimens. The marginal or isolated places are questionable, considering the area of the basins mentioned. Thus Beldie [3] considers the existence of the species near Măgurele to be doubtful.

The distribution map presented could be imperfect, because many data on *Cnidium dubium* are old, in the conditions in which the plant grows on riversides, which are characterized by permanent geomorphological instability. Moreover, almost everywhere in the country, and especially in the last decades of the former century, river regulation works – dykes and drainage channels – were carried out on floodplains. The meadows with *Cnidium dubium* in other Central European countries are in a similar condition [6, 12].

Ecology

Cnidium dubium is known to grow in large flooded lowland meadows. In the site studied (alluvial plain, at 300–400 m distance from the Râul Negru river, in the central part of the Braşov depression), the soil is moderately dry to moist in summer, but temporarily waterlogged at the surface, due to the poor drainage of the middle horizons. The groundwater table is at 1–2 m depth (1.7 m in June 2006, when the soil profile was dug). Relatively accentuated fluctuations of soil moisture during the year are reflected in the composition of phytocoenoses with *Cnidium dubium*, in which 61% of the species are indicators of a fluctuating soil water regime, preferring sites that are temporary flooded or have a large amplitude of soil moisture.

In the site studied, the soil is a pelosol, very rich in uninflated clay up to *c.* 1 m depth, moderately acid in the upper horizons (pH is 5.4 in the first horizon) and slightly acid in the lower horizons [2]. For meadows with *Cnidium dubium* from Germany the measured soil pH varies between 4.3 and 5.3 [6].

Correlated with the relative high productivity of the meadows, according to the farmers from Ozun and Băcel, is the content of humus and nitrogen in the soil. The amount of total nitrogen in the first horizon is 0.538% (superior class of nitrogen content) and the humus content varies from 9.91% in the first horizon to 2.26% at 80 cm depth. The content of mobile

phosphorus and mobile potassium correspond to middle levels of availability (P = 9.1 ppm, K = 191 ppm). In the case of phosphorus it should be considered that, for sites with oscillating moisture, a single measurement has only a low informative value for the potential of the soil. The capacity for cation exchange is high in the first four horizons.

Communities

In order to determine species fidelity under the vegetation conditions in Romania, besides the investigations of meadows with *Cnidium dubium* from a flooded alluvial plain near the Râul Negru river, observations were also used from two other places: a) meadows of the Olt river in the lower Ciuc basin (in the vicinity of Vrabia village, toward the periphery of the scientific reservation Külső Égés Csemő); and b) the Simbrezii Valley in the Baraolt Mountains (in the vicinity of Vâlcele village). In all the three habitats surveyed, the high preference of the species for lawns of the *Molinion* alliance was obvious, as in other territories of Central Europe.

The site in the Râul Negru meadow covers a few hectares to the east of the river, across from the village of Lunca Ozunului. On the basis of plant abundance and vigour of growth, the preferred phytocoenotic environment is represented here by lawns belonging to the association *Cnidio-Deschampsietum* Passarge 1960. Even without computing the respective coefficient, a clear floristic similarity can be noticed between the vegetation communities studied and those from the Elbe basin [5, 16]. Among shared species are those characteristic of the *Molinion* alliance: *Cnidium dubium*, *Sanguisorba officinalis*, *Viola pumila*, *Ranunculus auricomus* agg. and *Serratula tinctoria*.

The meadows of *Deschampsia* and *Cnidium* near the Râul Negru (Table 1) show a close syndynamic relationship with hygro-mesophilous vegetation on the meadow (*Agropyro-Rumicion crispi* alliance) represented here by the association *Ranunculo repentis-Alopecuretum pratensis* Ellmauer 1933, in which phytocoenoses of *Cnidium dubium* may frequently appear (Table 2). The two community types are developed in similar soil conditions, but some significant ecological nuances could be stressed by computing the mean of moisture and nutrient indices (using the 9 level scale – Ellenberg 1992) for the species in the association tables. Thus, the phytocoenoses of *Alopecurus pratensis* with *Ranunculus repens*, having a higher forage value and a lower number of species, are slightly more demanding of soil moisture (mean index for soil moisture is 6.52, against 5.96 which applies to meadows of *Deschampsia cespitosa* with *Cnidium dubium*) and also for soil nutrient supply (mean index 4.93, against 4.33). The presence of the species in the *Alopecurus pratensis* meadows is also typical in other parts of the species area [25]. In other types of meadows developed in the flood-plain of the Râul Negru, the occurrence of *Cnidium dubium* is: very rare (recorded only in one of five relevés) in the meadows dominated by *Phalaris arundinacea*, and absent in the meadows with *Arrhenatherum elatius*.

Table 1: *Cnidio-Deschampsietum* Passarge 1960

Ecol. index		Relevé nr.	1	2	3	4	5	6	7	
U	N	Altitude (m)	505	505	505	505	505	505	505	
		Vegetation cover (%)	100	95	100	90	95	100	100	
		Height (cm)	70	80	75	100	75	150	140	
		Area (m^2)	100	100	100	100	100	100	100	K
		Char. ass.								
8~	?	*Cnidium dubium*	1.5	1.5	1.4	1.5	1.5	1.5	1.5	V
		Molinion								
7~	4	*Viola pumila*	1.4	1.4	1.4	1.5	+.2	1.4	+.3	V
x	3	*Serratula tinctoria*	1.5	2.5	2.5	1.5	1.5	+.1	1.5	V
x	x	*Ranunculus auricomus* agg.	1.4	+.2	1.4	.	1.4	+.1	+.3	V
x~	3	*Stachys officinalis*	+.1	+	+.3	+.2	+	+.2	1.4	V
3~	2	*Filipendula vulgaris*	1.5	1.4	1.5	.	1.5	+.1	+.1	V

4~	3	*Galium verum*	+.2	1.4	1.5	1.4	+.1	+	.	V
4~	2	*Ranunculus polyanthemos*	+	1.5	.	.	.	.	.	II
7~	x	*Carex tomentosa*	.	.	.	.	.	+	1.4	II
		Molinietalia								
6~	5	*Sanguisorba officinalis*	1.5	1.5	1.5	1.4	1.5	+.1	1.5	V
7~	3	*Deschampsia cespitosa*	2.5	2.5	2.5	2.5	3.5	2.5	3.5	V
6~	x	*Colchicum autumnale*	+.1	+.2	+.2	.	+.1	+.3	+.1	V
7~	x	*Lychnis flos-cuculi*	.	+.1	.	.	+	+.3	+.2	III
8=	5	*Scutellaria hastifolia*	.	.	.	+.1	.	.	.	I
7	8	*Symphytum officinale*	.	.	.	.	+	.	.	I
		Molinio-Arrhenatheretea, Arrhenatheretalia								
5	6	*Poa pratensis*	1.5	1.5	1.5	+.3	1.5	2.5	1.5	V
6	6	*Lathyrus pratensis*	1.5	1.5	1.4	+.3	+.2	1.4	+.1	V
6	6	*Festuca pratensis*	1.4	1.5	1.5	.	1.4	+	+.1	V
6	7	*Alopecurus pratensis*	1.4	+	+.2	1.5	1.4	+.2	+.1	V
6	x	*Vicia cracca*	1.5	1.4	+	+	1.4	+	+.3	V
6~	2	*Rhinantus angustifolius*	+	+.3	+	+	.	+.1	1.5	V
4	3	*Lotus corniculatus*	+.3	+.1	1.5	+.2	.	+.1	.	IV
6	x	*Ranunculus acris*	+.3	.	.	.	1.4	1.4	1.4	III
x	4	*Agrostis capillaries*	+.3	.	+.3	.	+.2	1.5	+.3	IV
x	6	*Rumex acetosa*	.	+.1	+.1	.	+	.	.	III
5	3	*Stellaria graminea*	.	+	+.1	.	1.4	1.5	1.4	IV
4	3	*Leucanthemum vulgare*	.	.	1.4	+.1	.	.	.	II
6~	3	*Carex pallescens*	.	.	.	.	.	+.1	+.3	II
x	x	*Plantago lanceolata*	.	.	.	+.1	.	+	.	II
		Agropyro-Rumicion crispi								
x~	7	*Elymus repens*	+.2	+.1	+.2	+.2	1.4	+	+.2	V
6	5	*Potentilla reptans*	+.3	1.5	+.2	+.1	1.5	+.1	.	V
8~	2	*Allium angulosum*	+	.	.	.	1.4	.	.	II
8=	5	*Carex vulpine*	.	.	.	+.3	+.1	+	.	III
6~	5	*Carex hirta*	.	+.1	.	.	+	.	.	II
6	5	*Trifolium hybridum*	.	.	.	1.4	+.3	+	.	III
7=	5	*Inula britannica*	.	+	.	+.1	.	.	.	II
6	7	*Glechoma hederacea*	.	+	.	.	+.1	.	.	II
7~	6	*Rumex crispus*	.	+	.	.	.	.	.	I
6~	7	*Potentilla anserine*	.	.	.	+.3	.	.	.	I
6~	x	*Lysimachia nummularia*	.	.	.	.	1.5	.	.	I
7~	7	*Ranunculus repens*	.	.	.	.	1.4	.	.	I
		Varia								
9=	7	*Poa palustris*	.	.	.	+.3	+.2	+.1	+	III
8~	7	*Phalaris arundinacea*	+.3	.	.	+	.	.	.	II
4	3	*Trifolium medium*	.	.	1.5	.	.	+.2	.	II
9	2	*Agrostis canina*	.	.	.	1.5	+.1	.	.	II
3	2	*Festuca rupicola*	+	.	+.2	.	.	.	.	II
3~	4	*Carex praecox*	.	.	.	.	.	+.3	1.5	II
2	1	*Potentilla argentea*	.	+	.	.	.	.	.	I
7~	3	*Carex ovalis*	.	.	.	.	.	.	1.4	I
3	2	*Dianthus carthusianorum*	.	.	+	.	.	.	.	I
5	5	*Leontodon autumnalis*	.	.	.	+	.	.	.	I
9=	7	*Iris pseudacorus*	.	.	.	+	.	.	.	I
8	3	*Thalictrum lucidum*	.	.	.	.	+	.	.	I
3	1	*Hieracium bauhinii*	+	.	.	.	.	.	.	I
5.96	**4.33**	**Average values**								

Relevé locations: the meadow from left side of Râul Negru River across Lunca Ozunului village;
Relevé dates: 1-4 – 18.07.2004; 5 – 14.07.2001; 6-7 – 28.06.2006

Table 2: ***Ranunculo repentis-Alopecuretum pratensis*** **Ellmauer 1933**

Ecol. Index		Relevé nr.	1	2	3	4	5	6	7	
U	N	Altitude (m)	505	505	505	505	505	505	505	
		Vegetation cover (%)	95	100	100	95	85	95	95	
		Height (cm)	110	110	120	105	100	120	120	
		Area (m^2)	100	100	100	100	100	100	100	K
		Agropyro-Rumicion crispi, Plantaginetalia								
6	7	*Alopecurus pratensis*	4.5	3.5	2.5	2.5	4.5	4.5	5.5	V
7~	7	*Ranunculus repens*	1.4	1.5	+.2	.	1.5	+.1	1.4	V
6	5	*Potentilla reptans*	+.3	1.5	1.5	1.5	1.5	.	.	IV
8=	5	*Carex vulpina*	+.2	1.4	1.5	.	+.1	+	.	IV
x~	7	(D) *Elymus repens*	.	1.5	1.5	+.3	.	.	+.3	III
6	5	*Trifolium hybridum*	1.5	+.2	1.5	.	1.4	.	.	III
7=	8	*Rorippa austriaca*	.	.	.	+	.	+.2	+.3	III
8~	2	*Allium angulosum*	+.3	+.3	+.3	.	.	.	.	III
7=	5	*Inula britannica*	.	+.2	.	+	1.4	.	.	III
6~	5	*Carex hirta*	.	.	.	.	+.2	+.2	1.5	III
6~	X	*Lysimachia nummularia*	+.1	.	.	.	1.4	.	+.2	III
7~	6	*Rumex crispus*	.	.	.	.	.	+	+	II
x	6	*Persicaria amphibia* f. *terrestre*	+.1	.	.	.	.	.	1.4	II
6	7	*Glechoma hederacea*	.	.	.	1.4	.	.	.	II
5	X	*Prunella vulgaris*	.	.	.	.	+.3	.	.	I
5	6	*Trifolium repens*	.	.	.	.	1.4	.	.	I
6	X	*Veronica serpyllifolia*	.	.	.	.	+.1	.	.	I
		Molinion								
8~	4	*Cnidium dubium*	.	1.4	1.4	1.4	+	+	+.1	V
6~	5	*Sanguisorba officinalis*	.	.	.	+	.	.	.	I
9~	5	*Juncus atratus*	.	+	.	.	.	.	.	I
7~	4	*Viola pumila*	1.4	+.3	+.3	.	+	.	.	III
		Phragmitetalia s.l.								
9=	7	*Poa palustris*	1.5	1.5	1.5	+.3	1.5	1.5	1.5	V
9=	4	*Galium palustre*	+.3	.	+	.	.	.	+.1	III
8~	X	*Lythrum salicaria*	.	+	+	.	.	.	+	III
9=	3	*Veronica scutellata*	.	+.2	.	.	+.1	+.1	.	III
9=	7	*Iris pseudacorus*	.	.	.	.	.	+	.	I
10	8	*Alisma plantago-aquatica*	.	.	.	.	.	+	.	I
8~	7	*Phalaris arundinacea*	.	.	.	.	.	+.1	.	I
		Molinio-Arrhenatheretea s.l.								
6	X	*Vicia cracca*	1.5	+	+.3	+.2	.	.	+	IV
6~	2	*Rhinantus angustifolius*	.	.	+.1	+.1	.	+.3	+.1	III
4	3	*Lotus corniculatus*	+.2	+	.	.	1.4	.	.	III
7~	X	*Lychnis flos-cuculi*	+.1	+	.	+.1	.	.	.	III
7~	3	*Deschampsia cespitosa*	+.1	.	.	.	+	.	.	II
x	X	*Ranunculus auricomus agg.*	+	.	.	1.4	.	.	+.3	III
5	6	*Poa pratensis*	.	.	.	1.5	.	.	+.1	II
4	3	*Leucanthemum vulgare*	.	.	+.1	+	.	.	.	II
6	3	*Festuca pratensis*	.	.	.	+	.	.	.	I
x	6	*Rumex acetosa*	.	.	.	+	.	.	.	I
5	5	*Campanula patula*	.	.	.	.	.	.	+	I
5	3	*Stellaria graminea*	.	.	+	.	.	.	.	I
x	X	*Trifolium pretense*	+	.	.	.	+	.	.	I
		Varia								
3~	2	*Filipendula vulgaris*	.	.	.	1.5	+.3	.	.	II
8~	X	*Lysimachia vulgaris*	+	.	+.2	.	+.3	.	.	III

4~	3	*Galium verum*	.	.	+	.	+.3	.	.	II
5	5	*Vicia tetrasperma*	.	.	+.2	.	.	.	+	II
6~	X	*Colchicum autumnale*	.	.	.	1.4	.	.	.	I
8=	5	*Scutellaria hastifolia*	+.2	.	.	.	.	.	.	I
4	3	*Trifolium medium*	.	.	.	+.3	.	.	.	I
4	5	*Achillea millefolium*	.	.	.	+	.	.	.	I
8	3	*Thalictrum lucidum*	.	.	.	.	.	.	+	I
7	8	*Symphytum officinale*	.	.	.	.	.	.	+	I
6.52	**4.93**	**Average values**								

Relevé locations: the meadow from left side of Râul Negru River across from Lunca Ozunului village;
Relevé dates: 1-5 18.07.2004; 6-7 28.06.2006

The identified coenosis from the lower Ciuc basin occupies a small area, probably due to river regulation works. In spite of this, its floristic composition, in which could be noticed the diagnostic species of the *Molinion* alliance and *Molinietalia* order, was preserved as typical for *Deschampsia* meadows with *Cnidium dubium* (altitude 640 m, cover 100%, height 80–90 cm, area 100 m^2, date 27.07.2005):

Char. ass.: *Cnidium dubium* 1.4, **Molinion:** *Serratula tinctoria* +.3, *Succisa pratensis* 1.5, *Gentiana pneumonanthe* +.1, *Carex hartmanii* +, **Molinietalia:** *Sanguisorba officinalis* +.1, *Lathyrus palustris* +.2, *Selinum carvifolia* +.2, *Deschampsia cespitosa* 2.5, *Lychnis flos-cuculi* +.1, *Luzula multiflora* +, **Molinio-Arrhenatheretea:** *Lathyrus pratensis* +, *Alopecurus pratensis* +.1, *Vicia cracca* 1.4, *Lotus corniculatus* +.1, *Ranunculus acris* +.1, *Agrostis capillaris* +, *Leucanthemum vulgare* +, *Festuca rubra* 1.4, *Anthoxanthum odoratum* 1.4, **Varia:** *Agrostis canina* 1.4, *Oenanthe banatica* +.1, *Valeriana officinalis* +.1, *Potentilla erecta* 1.5, *Potentilla anserina* 1.4, *Filipendula ulmaria* +, *Persicaria bistorta* +.3, *Trifolium hybridum* +.3, *Viola riviniana* +.1, *Lythrum salicaria* +.1, *Achillea millefolium* var. *tenuis* +.3, *Galium rivale* +.1, *Campanula patula* +.1, *Centaurea phrygia* +.1

The meadows containing *Cnidium dubium* near Vâlcele village (in the place called Benedek–Mező) are characterized also by the richness of *Molinion* and *Molinietalia* species, but are more difficult to include within a particular syntaxonomic unit, being probably an ecological variant, with an intermediate position between *Molinia* meadows with *Juncus conglomeratus*, invaded by *Nardus stricta*, and respectively *Deschampsia cespitosa* meadows. Here, *Cnidium dubium* extended only over a small area and was represented by few individuals (alt. 620 m, cover 100%, height 60 cm, area 100 m^2, date 28.07.1972):

Molinion: *Juncus conglomeratus* 1.5, *Cnidium dubium* +.1, *Serratula tinctoria* +, *Succisa pratensis* 1.5, *Gentiana pneumonanthe* 1.4, *Carex hartmanii* +.3, *Juncus atratus* 1.4, *Achillea ptarmica* +.3, *Thalictrum cf. simplex* +, *Juncus thomasii* +, *Stachys officinalis* +.1, **Molinietalia:** *Sanguisorba officinalis* 2.5, *Veratrum album* +, (D) *Deschampsia cespitosa* 1.5, *Lychnis flos-cuculi* 1.5, *Carex panicea* +.4, *Luzula multiflora* +.3, *Climacium dendroides* +, *Trollius europaeus* +.2, **Molinio-Arrhenatheretea:** *Lathyrus pratensis* 1.5, *Ranunculus acris* 1.5, *Carex pallescens* 1.4, *Festuca rubra* +.1, *Anthoxanthum odoratum* 1.5, *Agrostis capillaris* +.1, *Briza media* 1.5, **Varia:** *Nardus stricta* 2.5, *Agrostis canina* 1.5, *Carex ovalis* 1.5, *Potentilla erecta* 1.5, *Persicaria bistorta* +.2, *Scirpus sylvaticus* +.3, *Trifolium hybridum* +, *Myosotis scorpioides* 1.4, *Lysimachia vulgaris* +.4.

Conservation aspects

Flooded meadows with *Cnidium dubium* and *Deschampsia cespitosa* are endangered in some Central European countries, this habitat type being protected throughout Europe (Ssymank *et al.* 1998 in [6]). In Romania it is also rare and, until now, not confirmed [10].

Both in the case of meadows between Ozun and Băcel, and those near the village of Vrabia, drainage works have proved to be less effective. At the same time, because the initial state of the phytocoenoses is not known, it is hard to evaluate the impact of these works upon them, both in the past and in the future, as long as this habitat is situated in large meadows exposed to floods. It can be estimated that human activities were favorable, in the beginning, for the extension of herbaceous communities when alluvial forests were cut down in order to enlarge the areas of hay meadows. Vestiges of the former alluvial forests, which tend to re-grow, are the sparse individuals or small patches of willows (*Salix cinerea*, *S. alba*, *S. fragilis*, *S. purpurea*, *S. viminalis* and *S. triandra*) or alder (*Alnus glutinosa*, rare). Towards the end of the last century,

river regulation works were extensively carried out in order to diminish the effects of flooding, doubtless affecting the meadow vegetation.

Even if the river regulation works will be not reinstated, the evolutionary trend of the *Cnidium dubium* and *Deschampsia cespitosa* meadows could be influenced by the manner of land use. Thus, it has been shown that in the case of such meadows in Germany, only extensive management of the land, with a single early mowing, permits optimal conditions for the survival for many species [6], especially *Cnidium dubium*. This species will not flower twice, after mowing, having only vegetative reproduction (stem or root shoots). Any change in the traditional manner of land use, which is being applied now to the meadow vegetation in Ozun-Băcel area (unfertilized meadow, mown 1–2 times/year), could have a negative effect upon this habitat. As stated in the literature [6, 23], repeated mowing each year, grazing and intense fertilization direct the evolution of this community type towards a commonplace meadow vegetation, i.e. lawns of the *Agropyro-Rumicion crispi* alliance, or towards a grassy species-poor vegetation.

Conclusions

The true chorology of *Cnidium dubium* in Romania is not very well known, because many data are very old or unsupported by herbarium material. As in other European countries, the species prefers floodplains that are wet in winter and spring but dry in summer, due to the continental climate – a habitat type endangered especially by river regulation works. Beside the ecological similarities, floristic similarities determine us to relate the phytocoenoses studied, with *Cnidium* and *Deschampsia cespitosa*, to the *Cnidio-Deschampsietum* association, a syntaxon new for Romania.

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CNIDIUM DUBIUM (SCHKUR) THELL.: RĂSPÂNDIRE ÎN ROMÂNIA, ECOLOGIE ŞI FITOSOCIOLOGIE

(Rezumat)

Specie cu ecologie strâns legată de zonele inundabile din luncile râurilor, *Cnidium dubium* a fost afectată, sub raportul răspândirii, de lucrările de amenajare pentru limitarea efectelor viiturilor. Din acest motiv planta a devenit tot mai rară în ultima perioadă, în întreaga Europă. În România, datele referitoare la distribuţia, ecologia şi ambianţa cenotică a speciei sunt incomplete. În lucrarea de faţă, se face o sinteză a informaţiilor deja existente dar se şi aduc informaţii noi, pe baza studiilor proprii de teren.

Analizând datele existente în literatură şi colecţiile de herbar, se poate afirma că în România specia este puţin răspândită, localizată cu precădere în bazinele superioare şi mijlocii ale Oltului şi Mureşului şi respectiv în bazinul superior al Siretului. În cazul semnalărilor vechi este necesară reconfirmarea existenţei speciei, datorită fragilităţii habitatului şi succesiunilor ce s-ar fi putut produce în timp. S-a realizat harta corologică în sistemul UTM.

O populaţie abundentă de *Cnidium dubium* a fost identificată recent în lunca Râului Negru (afluent al Oltului, în compartimentul central al Depresiunii Braşovului), iar în această staţiune s-au făcut investigaţii mai detaliate asupra ecologiei şi cenologiei speciei. S-au realizat relevee floristice şi un profil de sol, ale cărui proprietăţi fizice şi chimice au fost analizate în laborator. Condiţiile staţionale sunt: şes aluvial, la altitudinea de 505 m, sol de tip pelosol, cu reacţie moderat acidă, foarte bogat în argilă negonflabilă, cu regim hidric puternic oscilant (umed-saturat primăvara şi uscat vara). S-a constatat, cu acest prilej, că planta prezintă o electivitate destul de clară pentru cenozele edificate de *Deschampsia cespitosa* (corespunzătoare asociaţiei *Cnidio dubii-Deschampsietum cespitosae* Passarge 1960), cu toate că ea apare şi în comunităţi dominate de *Alopecurus pratensis* (corespunzătoare asociaţiei *Ranunculo repentis-Alopecuretum pratensis* Ellmauer 1933). Fânaţele de *Cnidium dubium* şi *Deschampsia cespitosa* sunt răspândite mai ales în partea nord-estică a Europei Centrale, nefiind menţionate până acum din România. Pentru ţara noastră asociaţia poate fi acreditată deocamdată din lunca Râului Negru precum şi din lunca Oltului din Depresiunea Ciucului, unde a fost găsită o mică cenoză corespunzătoare.

În lucrare sunt prezentate şi aspecte referitoare la starea de conservare a speciei, corelate cu biologia şi ecologia speciei şi respectiv cu activităţile antropice, concluzionându-se că în prezent modul de exploatare a fânaţelor din zona şesului aluvial al Râului Negru este favorabil dezvoltării speciei *Cnidium dubium*.

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