NAJADETUM MARINAE FUKAREK 1961 IN THE ORĂŞTIE RIVER BASIN (CENTRAL-WESTERN ROMANIA)

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Abstract

In the current paper we present a phytocoenologic study of the phytocoenoses of the association Najadetum marinae Fukarek 1961 *found in the Orăştie river basin, lying in the central-western part of Romania. The natural habitat analysed here bears communitarian importance, has high conservational value, and therefore demands the designation of special areas of conservation.* (Doniţă et al., 2005).

The characterisation of the analysed association and the presentation of the synthetic table of the association were done through a careful selection of the most representative relevés carried out in the Sumustău Lake belonging to the Orăştie river basin.

The phytocoenoses of this particular association were analysed in terms of physiognomy and floristic composition, life forms spectrum, floristic elements, and ecological indices.

Key words: phytocoenoses, association, alliance, relevés, floristic elements, life forms, ecological indices, *Najas marina*.

INTRODUCTION

The Orăstie river basin lies between the corresponding ones of Strei (to the south and west) and of Cugir (to the east). To the north the studied river basin ends up in the Mureş river, whose tributary is the river Orăştie, in fact (Fig. 1).

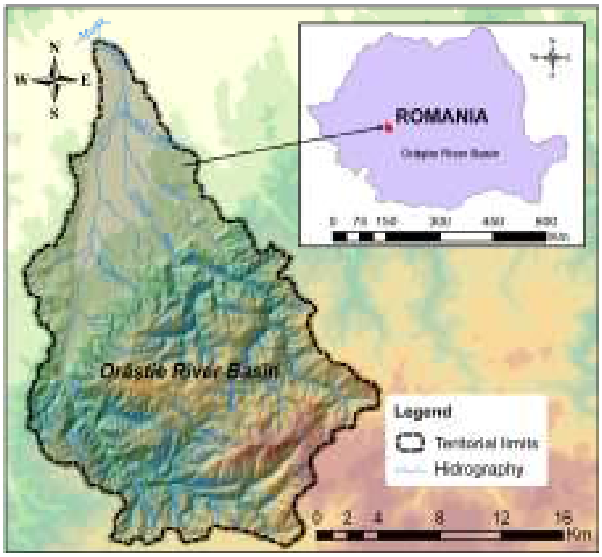

Fig. 1 Position of Orăstie River Basin in Romania

From the geographical viewpoint, there are three zones in the Orastie river basin, each one showing a distinct geographical landscape: the mountainous zone (the west-north-western sector of the Sureanu Mountains), the foothills zone (the Şureanu Piedmont) and the depressionary zone (the Orăştie Corridor).

The territory under analysis is part of the temperate climatic zone of its continental type, its maritime influenced climatic sector, the Southern Carpatians subdivision, the complex topoclimate of the Orăştie lowlands and Parâng highlands (Pătru I. et al., 2006).

The thermal differences between the outskirts of the mountains and the high ridges are of roughly 10 degrees Celsius on average. Towards their north-western limits, due to warm air incursions from the Banato-Crisana plains, the average temperatures range from 9 to 10 degrees Celsius. In winter, the average temperatures vary between minus 2 and minus 7 degrees Celsius, in spring they rise by 6 to 12 degrees, in summer they reach 8 degrees on the mountain tops and over 19 degrees on the outskirts, while in autumn the average temperatures decrease by 5.5 to 7 degrees as compared to those in the summer months (Trufaş V., 1986).

The rainfall amounts in multiannual average to approximately 550-600 mm in the outskirts and to over 1000 mm in the high altitude central parts. In the whole of Transylvania the rainfall quantum is 500 to 700 mm per year (Pătru I. et al., 2006).

In our country the association *Najadetum marinae* Fukarek 1961 has previously been spotted in the Danube Delta (Tarnavschi et al., 1979), Muntenia (Popescu et al., 1984), Crişana (Pop, 1962, 1968), Moldova (Chifu et al., 2006).

MATERIALS AND METHODS

The vegetation studies across the catchment area of the Orăştie river (central-western Romania) were carried out between the years of 2009 and 2015 and tried to target all types of sites indicative of the association *Najadetum marinae* Fukarek 1961. The vegetation research deployed the phytocoenologic survey methods drawn up by Braun-Blanquet (1964), adjusted according to the particularities of the studied region. The sampling technique and the annotations (quantitative appraisals) were performed according to the indications given by Borza et Boşcaiu (1965). The associations were identified using the marker species, without neglecting the differential and dominant species.

In order to thoroughly identify the phytocoenoses of the association, we performed a total of 10 phytocoenologic relevés, out of which 5 were included in the synthetic table of the association (Table 1). The sampling sites were carefully chosen within the characteristic patches of the phytocoenoses, and measured anywhere between 2 and 40 square metres.

The phytocoenologic table of the association was designed according to the methodology envisaged by Braun-Blanquet (1964) and developed by

Ellenberg (1974). When classifying the association into its superior coeno-taxonomic units, namely suballiance, alliance, order, class, we took into consideration the traditional ecological-floristic systems developed by Sanda et. al (2008).

The phytocoenologic table for this association (Table 1) consists of information pertaining to the floristic and coenologic composition of the plant population rendering the phytocoenosis, the life form, the floristic (phytogeographic) element, the ecological indices of humidity (U), temperature (T), soil reaction (R), the ordinal numbers of the relevés, the absolute altitude (metres above sea level), the sampled surface (square metres). In the last two columns of the table we marked the synthetic phytocoenologic index, namely the constance of species (K). The constance of species (K) whose classes are marked by Roman digits from I to V, stands for the degree of coenotic fidelity of each species towards the ambient of the association phytocoenoses. The values of the synthetic phytocoenologic index, the constance (K), were calculated using the methods proposed by Braun-Blanquet et Pavillard (1928), as well as Cristea et al. (2004).

The nomenclature of taxa was done according to Ciocârlan (2009), and the vegetal association was analysed using the main ecological indices of the component species, life forms and floristic elements, the data being shown graphically in spectra and diagrams.

RESULTS AND DISSCUSIONS

The phytocoenoses of the association *Najadetum marinae* Fukarek 1961 in the territory under scrutiny were spotted at the edge of the Şumuştău Lake of Orastie Municipality as well as in one of its bordering ponds formed subsequent to the gravel industrial diggings which caused the rainfall water to amass and stagnate (Fig. 2).

Fig. 2 *Najadetum marinae* Fukarek 1961,
Orăştie – Şumuştău (16.09.2013)

Type of habitat: Pontic-Sarmatian with *Najas marina*, code number: R2303. It is a natural habitat of communitarian importance with high conservational value, whose preservation calls for the delineation of special areas of conservation (Doniţă et al., 2005).

The first characteristic species for this association is *Najas marina*, with an average coverage of 37,5% - 62,5% (Table 1). The other 2 species: *Ceratophyllum demersum* and *Potamogeton crispus*, which characterise the **alliance *Potamion pusilli***, **order *Potamogetonetalia pectinati*** and **class *Potamogetonetea pectinati,*** add up as second characteristic. The transgressive species *Alisma plantago-aquatica*, *Phragmites australis* and *Typha latifolia*, belong to the **class *Phragmitetea australis***.

The life forms spectrum (Fig. 3) highlights the sheer predominance of helohidatophytes (100%).

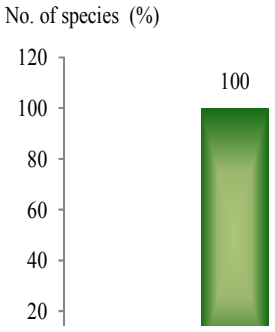

Fig. 3 Life forms spectrum of the association *Najadetum marinae* Fukarek 1961, where: Hh - Helohidatophytes.

The floristic elements spectrum (Fig. 4) highlights the fact that the Cosmopolitan elements are predominant among the association's phytocoenoses (83,33%), as compared to the circumpolar species (16,66%).

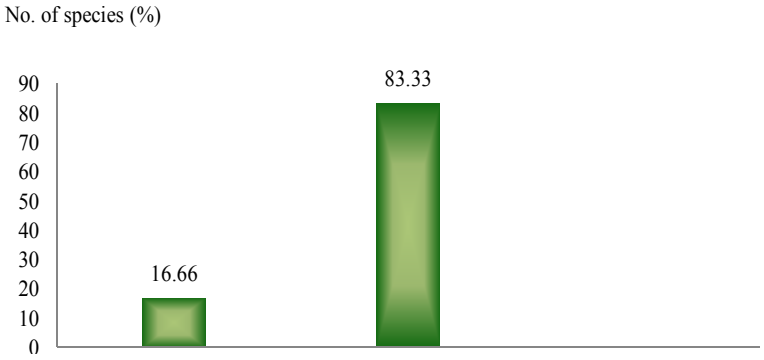

Fig. 4 Spectrum of floristic elements of the association *Najadetum marinae* Fukarek 1961, where: Cosm – Cosmopolitan, Cp - Circumpolar.

The diagram of ecological indices (Fig. 5) is dominated by hydrophile species (100%), followed by micro-mesothermophile (49,99%), slightly acid-neutrophile (50 %) and euri-ionical ones (50%).

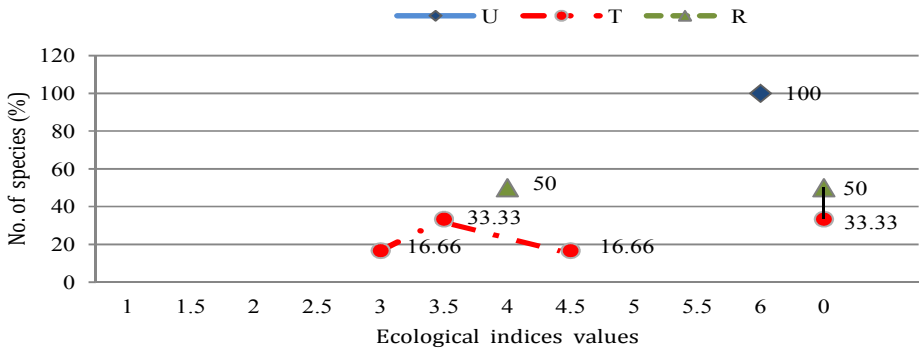

Fig. 5 Diagram of ecological indices for the association *Najadetum marinae* Fukarek 1961, where: U - humidity, T – temperature, R - the chemical reaction of the soil.

CONCLUSIONS

The association is dominated by Cosmopolitan species, whereas regarding the percentages of the ecological indices (U, T, R) one can see the preeminence of hydrophile, micro-mesothermophile, slightly acid-neutrophile and euri-ionical species.

The Şumuştău Lake belongs to the Municipality of Orăştie, covers an area of 29,455 square metres at an absolute altitude of 222 m (Fig. 6).

Fig. 6 Orăştie - Şumuştău (16.06.2014)

Alongside the association *Najadetum marinae* Fukarek 1961, with a high conservational value (Doniţă et al., 2005), there are other rare palustral associations within the Orăştie river basin: *Cyperetum flavescentis* Koch ex Aichiger 1933, *Heleochloëtum alopecuroidis* Rapaics 1927, *Glycerietum*

maximae Hueck 1931, *Oenantho-Rorippetum* Lohmeyer 1950, *Ranunculetum scelerati* Sissingh em. R. Tüxen 1950, *Sparganietum erecti* Roll 1938, *Salicetum purpureae* Soó 1930 (n.n.) Wendelberger-Zelinka 1952, *Typhetum angustifoliae* Pignatti 1953.

We think that this unique humid area within the Orăştie river basin has recreational, aesthetic, instructive and educational importance, let alone its scientific bearing.

It is worth mentioning that in 2014 we requested that a natural reserve should be established for the vulnerable species *Najas marina* (Boşcaiu et al., 1994) (Fig. 7), around the Şumuştău Lake, Orăştie (Vinţan V.I., 2014).

Fig. 7 *Najas marina* L., Orăştie – Şumuştău (16.06.2014)

Following the severe drought of summer 2015, the Şumuştău Lake dried almost entirely, causing this association to disappear for now (Fig. 8).

Fig. 8 Orăştie - Şumuştău (31.08.2015)

Najadetum marinae Fukarek 1961

Table 1

L. f.	Fl. el.	U	T	R	Nr. Land Surveys Altitude (m.s.m.) Coverage (%) Surface (m^2)	1 222 40 30	2 222 65 4	3 222 65 2	4 222 40 15	5 222 65 40	K
1	2	3	4	5	6	7	8	0	10	11	
					Car. ass.						
Hh	Cosm	6	4,5	4,5	*Najas marina*	3	4	4	3	4	V
					Potamion pusilli*, *Potamogetonetalia pectinati* et *Potamogetonetea pectinati						
Hh	Cosm	6	3	0	*Ceratophyllum demersum*	+	.	+	+	.	III
Hh	Cosm	6	3,5	4	*Potamogeton crispus*	+	.	.	.	+	II
					Phragmitetea australis						
Hh	Cp	6	0	0	*Alisma plantago-aquatica*	.	.	.	.	+	I
Hh	Cosm	6	0	4	*Phragmites australis*	.	.	.	.	+	I
Hh	Cosm	6	3,5	0	*Typha latifolia*	.	.	.	.	+	I

Place and date of relevés: 1 - 5 Orăştie – Şumuştău (25.05.2013, 16.09.2013).
Where: L.f. - life forms: Hh - Helohidatophytes. Fl.el. - floristic elements: Cosm – Cosmopolitan, Cp - Circumpolar. Ecological indices: U - humidity, T - temperature, R - the chemical reaction of the soil. Synthetic phytosociological indices: K – constancy.

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