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THE AQUATIC AND PALUDINE VEGETATION OF THE PROTECTED AREA PREAJBA-FĂCĂI LACUSTRINE COMPLEX, DOLJ, ROMANIA

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ABSTRACT

The research concerning the aquatic and paludine vegetation in the protected area Preajba-Făcăi Lacustrine Complex addressed all encountered phytocenoses. In the case of well represented phytocenoses, the supplied description presents the particular features of the area, whereas for the fragmentary phytocenoses only a brief characterization is made, without including them in a cenotaxonomic system. Out of the total six identified associations, three are classified as aquatic vegetation and three as paludine vegetation. Furthermore, the present study mentions the presence in the area of some surfaces dominated by Bidens frondosa, Vallisneria spiralis, Eupatorium cannabinum, and Epilobium hirsutum; the specialized literature includes these species in independent associations, while in the researched area they do not have enough surface.

INTRODUCTION

Studies concerning the aquatic and paludine vegetation in this part of the country have been conducted by several researchers, but the climate changes in recent years triggered obvious modifications in the floristic composition of some river catchments and a significant reduction in the areas covered by aquatic and marshy lands. Therefore, we consider that this type of vegetation requires careful monitoring in order to preserve the plant gene pool, which is particularly important for - but not restricted to - protected areas.

The following botanists published data on the aquatic and paludine vegetation within Oltenia: Păun (1964, 1967), Păun & Popescu (1969, 1972); Zaharia (1972), Cârţu (1972), Roman (1974), Popescu (1974), Maloş (1977), Cârţu & Cârțu (1978), Popescu et al. (1980, 2001), Costache (2002, 2005), Răduțoiu (2006a, 2006b).

At the national level, valuable information is presented by Borza (1959), Pop (1968), Ciocârlan (1968), Dihoru (1970), Tarnavschi & Nedelcu (1970), Nedelcu (1978), Mititelu & Barabaş (1975), Sanda et al. (1979, 2006), Coldea et al. (ed.) (1997), Groza (1999), Burescu (2003), Sanda et al. (2001), Sanda (2002).

MATERIAL AND METHODS

The areas analyzed from a phytocoenological viewpoint are located northwards of the Preajba settlement and not far from the city of Craiova (Dolj county) (Fig. 1). They are part of a nature reserve of national interest, under IUCN category IV.

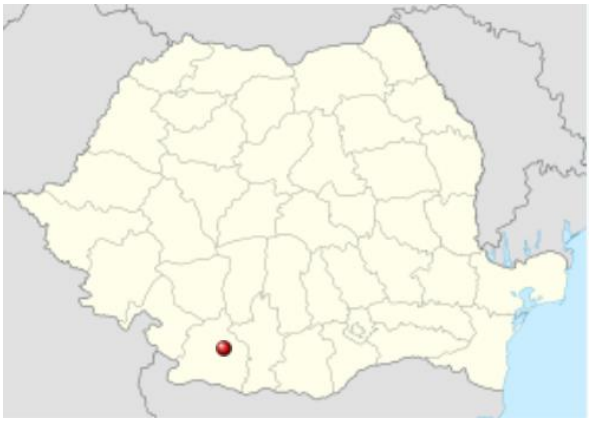

Figure 1. Location of the studied nature reserve in Romania (Internet processing)

The study of the vegetation within the researched area took into account the principles of the Central European school, elaborated by Braun-Blanquet; thus, according to the abstract concept of the association, this is represented in the field by association individuals (phytocoenoses) that share the same floristic, statistical, ecological, dynamic, chorological, and historical characters (Gehu, 1992). The coenological data were collected by the usual relevé method. The relevés were conducted in the areas where the floristic composition reflects the characteristics of the phytocenoses.

The size of the sample areas varied from 25 to 100 square meters, depending on the homogeneity of the grass layer under study at that time. The research of the composition of the phytocoenoses took into account the core of characteristic species, which induce a particular feature to the vegetation, without neglecting the general characteristic of the vegetation in Romania. In the case of the fragmentary phytocenoses, which were found in few places in the area, no classification was made in a specific association; their presence was only indicated based on a brief characterization.

Name specification and classification of plant associations into higher cenotaxa were conducted according to Chifu et al. (2015).

In order to support the characteristics stated for each type of association, the work also includes images that display the reality in the field and were taken with specialized equipment (Panasonic camera).

RESULTS AND DISCUSSIONS

The vegetation identified in the area under study falls under the following cenotaxonomic system:

Cl. Lemnetea O. de Bolós & Masclans 1955
Ord. Lemnetalia minoris O. de Bolós & Masclans 1955
Al. Lemnion minoris O. de Bolós & Masclans 1955
Lemnetum minoris Miyavaki & J. TX. 1960
Cl. Potametea pectinati Klika in Klika et Novák 1941
Ord. Potametalia pectinati W. Koch 1926
Al. Magnopotamion Vollmar 1947

Potametum crispi Soó 1927
Ceratophyllion demersi (Soó 1927 n.n.) Den Hartog et Segal 1964
Ceratophylletum demersi (Soó 1927) Hild 1956
Cl. Phragmitetea australis R. Tx. & Preising 1942
Ord. Phragmitetalia Koch 1926
Al. Phragmition communis Koch 1926
Phragmitetum australis Soó 1927
Typhetum latifoliae G. Lang 1973
Magnocaricetalia Pignatti 1953
Magnocaricion elatae Koch 1926
Caricetum ripariae (Soó 1928) Knapp et Stoffer 1962

Lemnetum minoris Miyavaki & J. TX. 1960

This association is represented in the field by small phytocenoses that cover only a few square meters, located either on the edge of lakes, near the reed and bulrush thickets, or along canals with smoothly flowing water in the area. Few species of vascular plants are to be found in their floristic composition. The water surface is almost 100% occupied by *Lemna minor* (Fig. 2). Rare specimens of *Ceratophyllum demersum* and *Lemna trisulca* are also noticed in the water mass.

From Oltenia, it is mentioned from several river catchments (Cârțu, 1972; Popescu et al., 2001; Costache 2005; Răduțoiu, 2006a).

Figure 2. Image with the phytocoenoses edified by *Lemna minor* in the studied area

Potemetum crispi Soó 1927

The phytocoenoses belonging to this association are well represented in the lakes located on the western part of the area, where they occupy almost the entire water mass. They are found in open places situated in the central part of the lakes, as well as further towards the lake shores, where they come into contact with the phytocoenoses of the association *Phragmitetum australis* Soó 1927 em. Schmale 1939 (Fig. 3). In Oltenia, it is mentioned from the Jiu – the Desnățui interfluve (Cârțu, 1972).

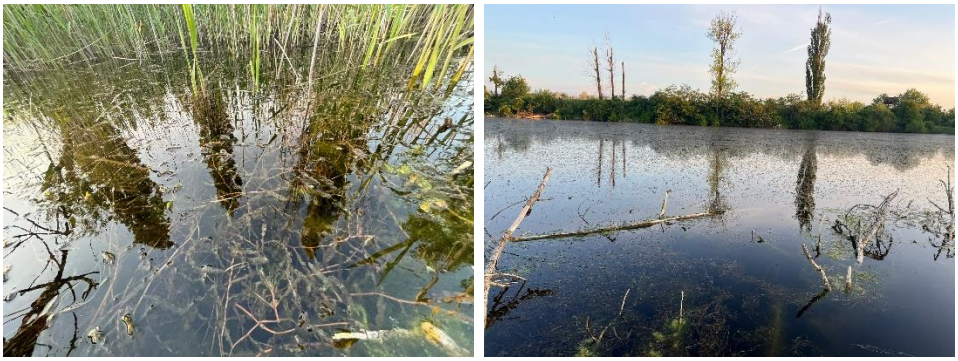

Figure 3. *Potametum crispi* in the western part of the area

Ceratophylletum demersi (Soó 1927) Hild 1956

Within the area under study, the species *Ceratophyllum demersum* is present in almost all places where water is more than 1 meter deep. There are also points where it does not form phytocenoses that can be classified in the *Ceratophylletum demersi* association. In places where it has an abundance-dominance index of 4-5, it occupies the entire water table. A few species of vascular plants can still grow alongside it (e.g. *Potamogeton crispum*, *Myriphyllum spicatum*, *Lemna trisulca*). When the species develops in impressive amounts, it damages the fish population.

Figure 4. *Ceratophylletum demersi* in the eastern part of the area

Phragmitetum australis Soó 1927 em. Schmale 1939

It is very well represented throughout the researched territory, especially on lake edges or on swampy surfaces and in the areas where the water can reach up to approximately 60-80 cm. The analysis of various Internet sources reveals the mentioning of areas occupied by water lilies. Currently, they are completely absent. Not even a single specimen of these species has been identified. It is possible that they were invaded and replaced by the phytocoenoses of the association

Phragmitetum australis Soó 1927 em. Schmale 1939, as it is also mentioned from other locations in Oltenia (Păun, 1967).

The taxa characteristic of the order and alliance are always present in the floristic composition of the phytocoenoses edified by *Phragmites australis*. Following the analysis of all the surfaces dominated by this plant, we can state that in places where water disappears during summer, *Phragmites australis* achieves almost pure phytocenoses, while in places where water is present throughout the vegetation period (a less common situation in the researched area), the species *Schoenoplectus lacustris* is always present. This explains why some researchers assign these latter surfaces to the *Scirpo-Phragmitetum* Koch 1926 association (e.g. Păun, 1967; Păun & Popescu, 1969, 1972; Cârţu, 1972; Cârţu & Cârțu 1973; Costache, 2005; Sanda et al., 2006).

Typhetum latifoliae G. Lang 1973

Phytocoenoses belonging to this association were identified in many places within the area under study. Basically, these phytocenoses cover the most extended surfaces, alongside those dominated by *Phragmites australis* (Fig. 5). In some places located in the central part of the area, monosynusial phytocenoses can be observed. It is known from numerous river catchments in Romania.

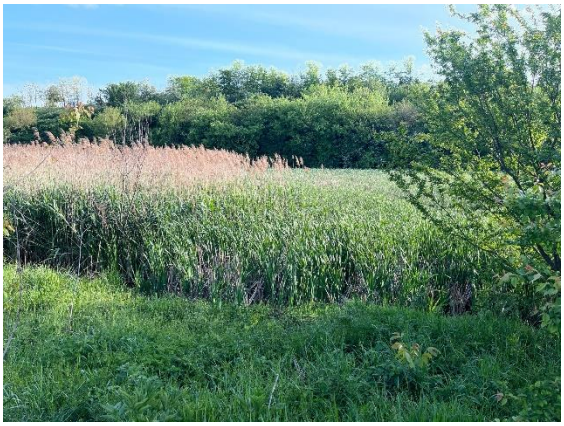

Figure 5. Surfaces dominated by *Typha latifolia* or *Phragmites australis*

Caricetum ripariae (Soó 1928) Knapp et Stoffer 1962

The surfaces dominated by *Carex riparia* were mentioned for the first time from the Danube Gorges (Sanda et al. 1968). Within the study area, they are concentrated at the edge of lakes and of clumps of *Typha latifolia* or *Phragmites australis*. They are compact phytocenoses that have a coverage degree of almost 100%. At the beginning of the growing season, domestic animals feed on them.

On the fringe of the aquatic and marshy places in the area and occasionally on lake shores, there is to be encountered a ruderal vegetation sometimes edified by invasive and potentially invasive allogeneic species. Fortunately, this type of vegetation presently occupies small areas, but the constant presence of people and domestic animals in the immediate vicinity of the area might lead to an increase of the surface covered by these species (e.g. *Bidens frondosa*) in the near future.

Within the area under study, **the surfaces dominated by *Bidens frondosa*** are very small. They are concentrated in the central-eastern part of the area, on the

fringe of swampy lands, on roadsides located near lakes, on soils with a sandy texture. Although the species *Bidens frondosa* has a weak coverage throughout the entire area, the identification of certain surfaces dominated by this taxon (Fig. 6) raises concerns because the species is on the list of invasive and potentially invasive alien plants, being known for its speed in actively renewing the population. Along with the dominant species, there are to be found: *Myosoton aquaticum*, *Persicaria lapathifolia*, *P. dubia*, *Lythrum salicaria*, *Lycopus europaeus*, *Xantium orientale* subsp. *italicum*, etc.

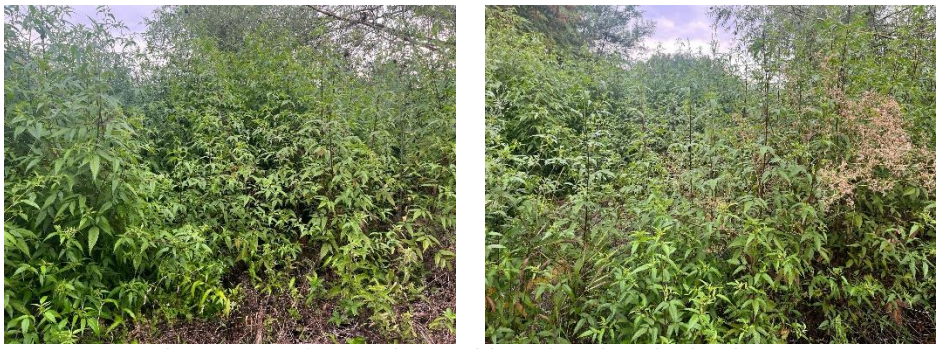

Figure 6. Surfaces where *Bidens frondosa* is dominant

The specialized literature includes the phytocenoses dominated by *Bidens frondosa* in the association *Myosoto aquatici-Bidentetum frondosae* O. de Bolòs, Montserrat et Romo 1988 (Bolòs et al., 1988; Ninot et al., 2011).

Surfaces occupied by *Vallisneria spiralis* were found only in one lake from the eastern part of the area. It develops around the lake, on its edges, covering surfaces that are 1-2 meters wide and significantly long. They are located near the shores, on muddy and deep soils (Fig. 7). In the specialized literature, these phytocenoses are classified as *Potametum-Vallisnerietum spiralis* Br. Bl. 1931 (Sanda et al., 1994). At the national level, they are reported from the Muntenia Plain (Popescu et al., 1984).

Figure 7. Surfaces dominated by *Vallisneria spiralis* in the researched area

Alongside *Vallisneria spiralis*, rare, isolated specimens of *Ceratophyllum demersum*, *Myriophyllum spicatum*, *Lemna minor,* and *Potamogeton crispum* were also observed in the study area. From Oltenia, the species was reported many years ago from the Danube ponds, respectively at Rast and Bistreț, but it has not been identified since then in any other location within this region. Considering the fact that the dominant species appears on the list of invasive and potentially invasive alien species in Romania, it is recommended to monitor them in order to maintain their areas at the current size.

The present study shows that areas where high abundance-dominance indices are observed for *Epilobium hirsutum* are very few. A phytocoenosis of about 200 square meters was identified only in the central part of the area (Fig. 8), in the swampy places between the lakes. At the national level, phytocoenoses belonging to *Epilobietum hirsuti* Westhoff 1969 are known from Bacău county (Mititelu & Barabaș, 1970), from the Neger stream valley, at Măgura. In these places, the edifying species coexists with few other species, among which we mention: *Calystegia sepium*, *Solanum dulcamara*, *Rorippa sylvestris*, *Artemisia vulgaris*, *Oenothera biennis*, *Polygonum hydropiper*, etc.

Figure 8. Surfaces dominated by *Epilobium hirsutum*

Surfaces of several tens of square meters in which the species *Eupatorium cannabinum* registers high abundance-dominance indices were identified within the study area, on the fringe of lakes and of the areas edified by species of the Salix genus. Alongside the dominant species, the following also develop in these places: *Torilis arvensis*, *Lythrum salicaria*, *Calystegia sepium*, *Erigeron annuus*, *Cirsium arvense*, *Agrostis stolonifera*, *Myosoton aquaticum*, etc. Opinions are divided with regard to the cenotaxonomic classification of these surfaces. Some authors consider that it is more appropriate to assign them as facies to other associations, while others propose to withdraw the cenotaxa that have the species *Eupatorium cannabinum* in the name of the association (ex. *Eupatorietum cannabini* Tüxen 1937, *Convolvulo-Eupatorietum* Görs 1974) (Gehlken, 2005).

Moreover, surfaces where the species *Cyperus longus* L., *Pulicaria dysenterica* (L.) Bernh. and *Mentha longifolia* (L.) L. have high abundance-dominance indices (AD=4-5) were observed in some locations within the study area. These surfaces cannot be assigned to a certain association, but perhaps as facies. As they do not appear in the existing cenotaxonomic systems, a longer analysis is required in order to be able to achieve an appropriate assignment. The results thus obtained will be published in a future paper.

CONCLUSIONS

To conclude, we can state that the aquatic and paludine ecosystems in the researched area display permanent dynamics, with very rapid seasonal, annual, and multiannual variations. Two sets of factors contribute to this situation. The first triggering factor is represented by climate changes that are increasingly evident in this part of the country and are characterized by very high temperatures during summer and extended lack of precipitation. The second influence is exerted by the zoo-anthropogenic factor, which induces obvious changes in the floristic composition of the paludine vegetation, especially through the illegal dumping of household waste, the burning of marshland vegetation and the irrational grazing from spring to the end of summer, as during this period only the surfaces near the lakes remain green in the area.

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