



SOME ASPECTS OF THE ROMANIAN BLACK SEA SHORE PHYTODIVERSITY

Marius FĂGĂRAȘ

Department of Botany, Faculty of Natural and Agricultural Sciences "Ovidius" University
Constanța, Romania

SYNOPSIS

Key words:
seashore area,
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habitats,
conservation.

This paper contains a short geomorphologic and climatic presentation of Romanian Black Sea shore. It involved also, general data of seashore specific flora, plant communities and the main littoral habitat types. Short consideration about rare and threatened plants from sea coast area, about the IUCN Red Data taxa percentages has been made. The specific plant communities of the main littoral habitats are presented.

INTRODUCTION

The Romanian Black Sea shore, situated between Chilia Danube branch (in the North) and Vama Veche village (in the South) (Fig. 1), is 245 km long and can be divided in two distinct zones by their origin and evolution.

The northern zone (Chilia branch-Cape Midia) is a low shore with large beaches (100-500 m), bounded by some littoral lakes (Tașaul, Corbu, Razelm-Sinoe lacustrine complex). This coastal area is protected as a part of the Danube Delta Biosphere Reservation. The southern part of Romanian seashore has a variable height littoral cliff (20-50 m), broken at places by the backwaters, separated by sandy beaches of variable width (20-300 m).

Within littoral area, the climate type is continental-temperate, with a short and mild winter and a long and hot summer. The sea and littoral lakes have a moderate influences on the climate. The yearly average temperature is 11.5°C and the sum of average precipitation is 350-400 mm/year. The air moisture is 81-83% and the sun radiation value is higher than 125 kcal/ cm²/ year. The intense evaporation (800-1000 mm/year) leads to raising of the ground water saturated by chlorides and sulphates and consequently soil salinization.

The seashore area is made of more or less fixed dry sand dunes, separated by low moist or swampy areas. The lower places with soluble salt accumulation are

covered by the salty sandy soils, especially in the Danube Delta as well as on the sandbanks from the south of the Danube Delta (Chituc, Saele). Smaller areas of sandbanks are covered by the strong salty soils (solonchaks).

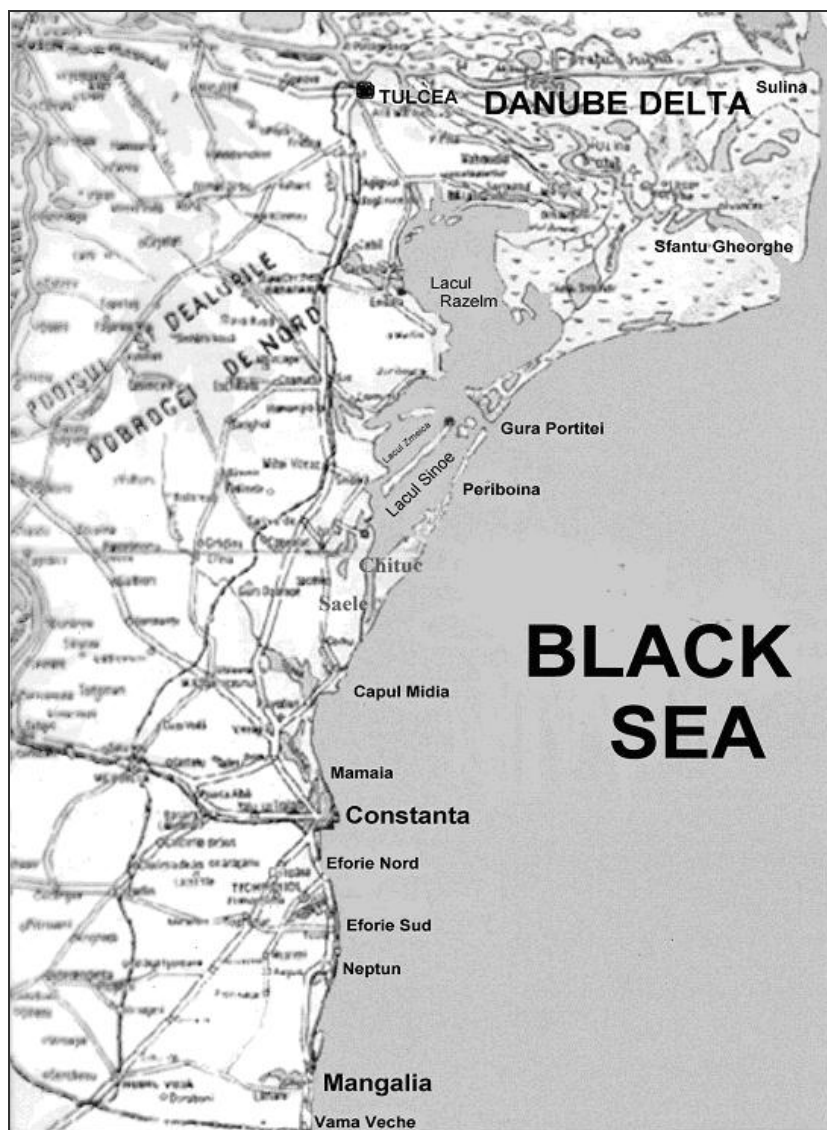


Fig. 1. The Romanian Black Sea shore

MATERIAL AND METHOD

Nomenclature for most plant species follows the “*Flora Europaea*” (Tuttin et al., 1964-1980) or “*The Illustrated Romanian Flora*” (Ciocârlan, 2000). Nomenclature for vegetation communities and higher syntaxes is based on “*Coenotic Structure and Ecological Characterization of Romanian Phytocoenosis*” (Sanda, Popescu, Stancu, 2001).

RESULTS AND DISCUSSIONS

During our research of the Romanian coastal area between Vama Veche and Periboina, as well on the maritime sandbanks (Chituc and Saele), there were identified 702 vascular taxa (650 species and 52 subspecies), which belong to 45 orders, 73 families and 310 genera. The identified taxa means 18.49% of the Romanian Flora, which has 3795 taxa (Ciocârlan, 2000).

The mentioned taxa represent 68,89% of the Danube Delta flora (Table 1), another region with almost the same geomorphologic and floristic aspects, but with a larger surface (3446 km²).

Table 1 – Comparative Data on Romanian Flora, the Danube Delta and Black Sea Shore Flora

Compared areas	Romanian Flora (Ciocârlan, 2000)		Danube Delta Flora (Ciocârlan, 1998)		Black Sea shore Flora (Făgăraș, 2002)	
	species	subspecies	species	subspecies	species	subspecies
Pteridophyta	69	3	13	0	3	0
Spermatophyta	3228	495	942	64	647	52
Total taxa	3795		1019		702	
Taxa percentages	100 %		26,85 %		18,49%	
-	-		100 %		68,89 %	

The biological forms spectra (Fig. 2) show the high rate of therophytes (45.86%), hemicryptophytes (36.6%) and cryptophytes (12.53%), other categories (chamaephytes, phanerophytes, epiphites) having lower percentages. The phanerophytes are represented by some spontaneous tree and brush species (*Elaeagnus angustifolia*, *Tamarix ramosissima*, *Hippophae rhamnoides*).

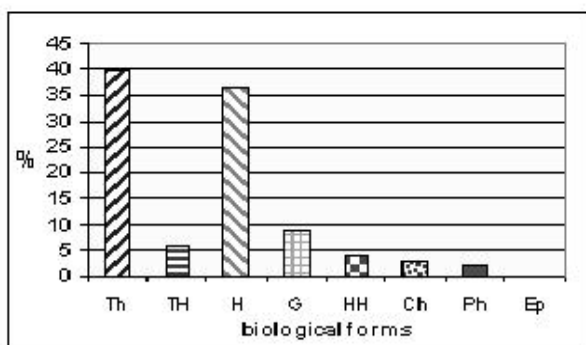


Fig. 2 – Biological forms spectra

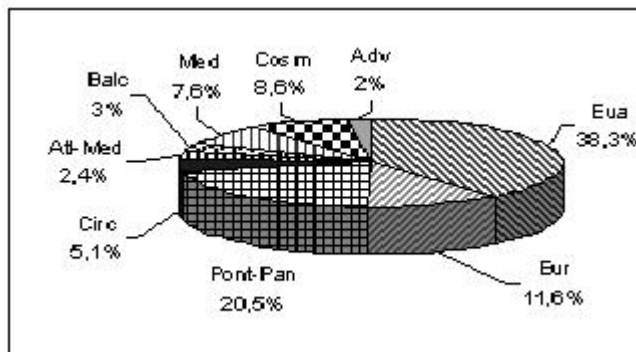


Fig. 3 – Phytogeographical elements spectra

Among the phytogeographical elements (Fig. 3), prevalent are the Eurasiatic (38.31%), pontic (20.51%), European (11.68%), cosmopolite (8.68 %), Mediterranean (7.69%) and circumpolar (5.12%) elements.

On the littoral cliff and in the dune habitats area, the xero-mesophilous (40%) and xerophilous plant percentages (17%) are remarkable (Fig. 4). The mesophilous (17.48%) and meso-hygrophilous (10.54%) plants are well represented in proximity of the littoral lakes and in the moist or swampy low surfaces among sand dunes or behind it as well. High percentages have also the moderate-thermophilous (42.91%) and micro-mesotherm (41.61%) plant species.

The majority of species are low acid-neutrophile (51.30%), indicating the light alkalinity of sandy soils within seacoast area.

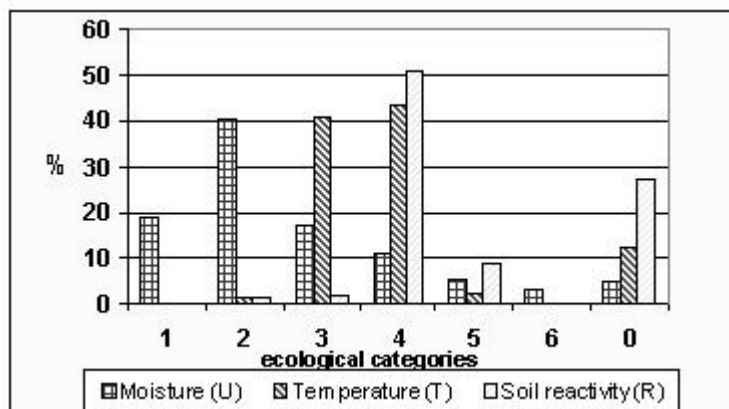


Fig. 4 - The ecological plant categories spectra

From all mentioned taxa, 20.22% are rare and threatened, listed in Romanian Red Lists (Negrean, 2001; Oltean et al., 1994; Dihoru et al., 1994). In the studied area, the IUCN Red Data taxa rates are as follows (Fig. 5): rare - R (8.5%), vulnerable - V (6.83%), endangered - E (4.69%).

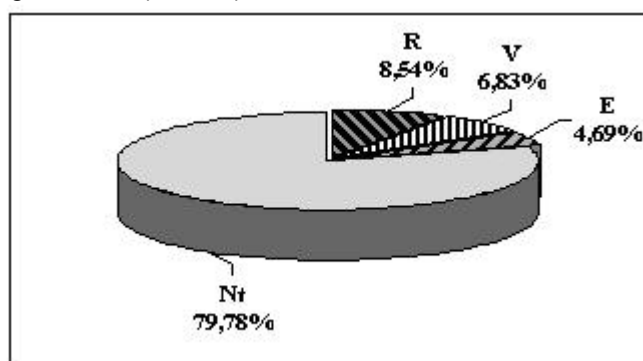


Fig. 5 - The rate of IUCN Red Data taxa

From the small populations and limited spreading on the Romanian seacoast endangered taxa, we mention: *Ammophila arenaria* (L.) Link ssp. *arundinacea* H.

Lindb. fil., *Silene thymifolia* Sibth. & Sm., *Astrodaucus littoralis* (Bieb.) Drude, *Alyssum borzaeanum* Nyár., *Merendera sobolifera* C.A.Meyer, *Convolvulus persicus* L., *Medicago marina* L., *Onosma arenaria* Schur. ssp. *arenaria*, *Polygonum maritimum* L., *Glaucium flavum* Crantz.

Other taxa are subendemic [*Cakile maritima* L. ssp. *euxina* (Pobed.) Nyár., *Elymus farctus* (Viv.) Runemark ex Melderis ssp. *bessarabicus* (Săvul & Rayss) Melderis, *Daucus guttatus* Sibth. & Sm. ssp. *zahariadi* Heywood, *Linaria genistifolia* (L.) Miller ssp. *euxina* (Velen) D.A.Sutton, *Silene exaltata* Friv., *Silene thymifolia* Sibth. & Sm., *Syrenia montana* (Pallas) Klokov] or endemic [*Dianthus bessarabicus* (Kleopov) Klokov, *Festuca beckerii* ssp. *arenicola* (Prodan) Ciocârlan]. These threatened plants urgently require conservation measures.

The rich flora and heterogeneous vegetation are due to diversity of habitats, given by the soils and microclimates variety. The following main habitat types can be found in Romanian littoral:

- nude sands, in proximity of sea;
- unfixed and partly fixed sand dunes;
- light salty and moderately moist plane surfaces;
- swampy low surfaces, behind sand dunes;
- strong salty soils depression;
- dry littoral cliff habitats (with steppe vegetation).

Some plant communities from sea proximity (*Atripliceto hastatae-Cakiletum euxinae* Sanda, Popescu 1999, *Lactuco tataricae-Glaucietum flavae* Dihoru & Negrean 1976, *Crambetum maritimae* (I. Șerbănescu 1970) Popescu, Sanda, Doltu 1980, *Tournefortietum sibiricae* Popescu & Sanda 1975, *Salsolo ruthaenicae-Xanthietum strumarii* Oberd. & Tx.1950) make the littoral weeds.

The sand dunes are populated by psammophilous plant communities, such as: *Artemisietum arenariae* Popescu & Sanda 1977, *Agropyretum juncei* (Br.-Bl. & De L. 1936) Tx. 1937, *Elymetum gigantei* Morariu 1957, *Secali sylvestris-Brometum tectorum* Hargitai 1940, *Aperetum maritimae* Popescu & al., 1978, *Plantaginetum arenariae* (Buia & al. 1960) Popescu, Sanda, 1987, *Carici colchicae-Holoschoenetum vulgaris* Ștefan & Sârbu 1995 etc.

In the seashore area, the medium salt tolerant vegetation (*Juncetum littoralis* Popescu & al.1992, *Juncetum maritimi* (Rubel 30) Pign. 1953, *Orchido-Schoenetum nigricantis* Oberd. 1957, *Juncetum gerardi* (Warming 1906) Nordh 1923, *Acorelletum pannonicum* (Soó 1933) Wendelbg. 1943, *Agropyretum elongati* I.Șerbanescu 1965), grow in mosaics with the slightly salt tolerant meadow (*Agrostetum ponticae* Popescu & Sanda 1973, *Hordeetum hystricis* (Soó 33) Wendelbg. 1943, *Carici distantis-Festucetum arundinaceae* Rapaics 1927, *Puccinelieta distantis* Soó 1937, *Lythro-Calamagrostetum epigei* I.Pop 1968, *Staticeto-Artemisietum monogynae* (*santonicum*))

Țopa 1939) and bushes (*Elaeagnus angustifolia*, *Tamarix ramosissima*, *Hippophae rhamnoides*).

On the heavily salty soils (solonchak), widespread on the maritime sandbanks, grow a strong salt tolerant vegetation, such as: *Salicornietum prostratae* Soó (1947) 1964, *Suaedetum maritimae* Soó 1927, *Aeluropetum littoralis* (Prodan 39) Șerbanescu 1965; Krausch 1965, *Aeluropo-Salicornietum* Krausch 1965, *Puccinellietum limosae* Rapaics 1927, *Halimionetum verrucifere* (Keller 25) Țopa 1939, Prodan 1939, *Halimionetum pedunculatae* I. Șerbănescu 1965, *Halocnemetum strobilacei* (Keller 25) Țopa 1939, etc.

On the lower surfaces behind dunes, fed by fresh or saltish ground water, there grow many hygrophilous and meso-hygrophylous plant communities, as follows: *Scirpo-Phragmitetum* W. Koch 1926, *Typhaetum angustifoliae* (All.22) Pign.1943, *Astero tripolii – Phragmitetum humilis* Krisch (1972) 1974, *Bolboschoenetum maritimi* Eggler 1933, *Schoenoplectetum tabernaemontani* Soó 1947, *Eleocharidetum palustris* Schennikov 1919, etc.

In spite of Romanian sea coast high biodiversity, the littoral habitats protection and conservation measures, especially in the southern zone (Vama Veche-Cape Midia), are insufficient. The economical activities in beaches proximity, threaten with extinction of a lot of rare plants, psamphilous plant communities and some dune habitat types of European interest for conservation (included in Habitats Directive and Bern Convention). These tendencies have been limited only within Agigea Maritime Sand Dunes Reservation (25 ha surface), the single protected area on the southern part of Romanian seacoast (Fig. 1).

The conservation of typical dunes flora and vegetations is achieved in acceptable condition only in the northern part of Romanian seashore (the Danube Delta Biosphere Reservation).

CONCLUSIONS

On the Romanian seacoast between Vama Veche and Periboina, we have identified 702 vascular plant taxa, which represent 18.49% of Romanian flora and 68.89% of the Danube Delta flora.

From the rare and threatened plant taxa (20.22%), 8.5% are rare, 6.83% are vulnerable and 4.69% are endangered. These facts increase the importance of conservation of sand dunes habitats and their specific flora.

The pontic character of Romanian littoral meadows, rich in east origin steppe taxa is due to the high rate of pontic plants. This confirms the littoral area affiliation to the Danubian-Pontic district.

In the investigated area there have been identified 102 plant communities, classified in accordance with Central European Coenotaxonomic System in 16 vegetation classes, 23 orders and 35 alliances.

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Summary

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In the investigated area there have been identified 102 plant communities, classified in accordance with Central-European coenotaxonomic system in 16 vegetation class, 23 orders and 35 alliances. Remarkable is the Romanian littoral area affiliation to the Danubian-Pontic district.

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