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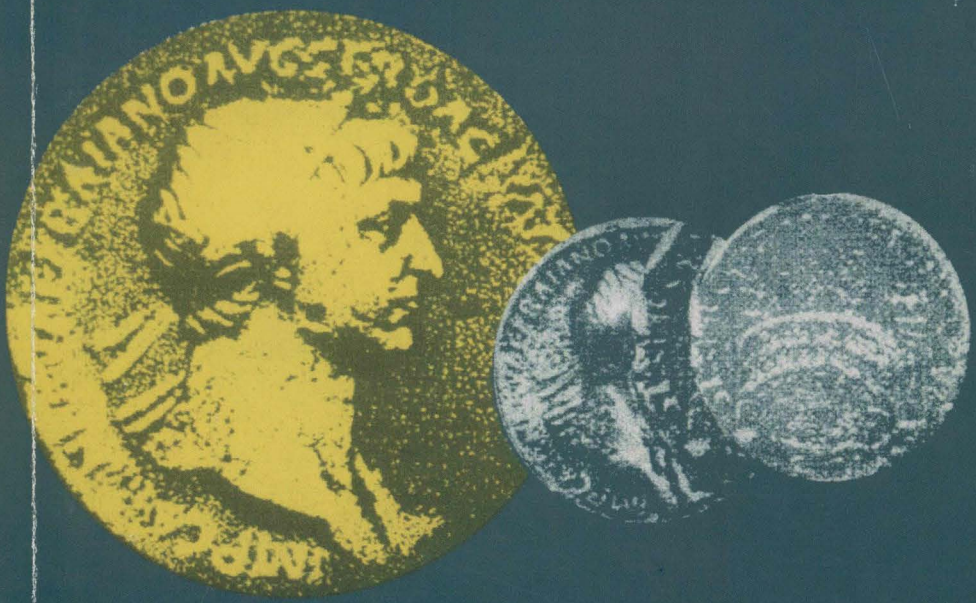

Editura Universitaria Craiova

MUZEUL REGIUNII PORȚILOR DE FIER

Seria
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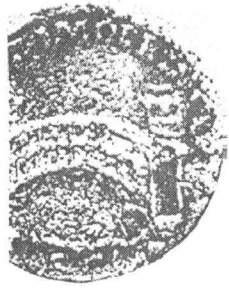

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DROBETA TURNU SEVERIN
2011

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ANANCUS ARVERNENSIS (MAMMALIA: PROBOSCIDEA) AT FÂNTÂNA DOMNEASCĂ (MEHEDINŢI DISTRICT)

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Abstract: *ANANCUS ARVERNENSIS* (MAMMALIA: PROBOSCIDEA) AT FÂNTÂNA DOMNEASCĂ (MEHEDINŢI DISTRICT)
A fragment of right mandible documents the presence of the mastodon *Anancus arvernensis* at Fântâna Domnească, in Mehedinţi District. The fossil was found in 1930 by a home-born, Barbu Lăcătuşu and remained for decades in a local school collection. The mastodon remains originated from ferruginous pebbles, belonging to the Late Pliocene (Romanian). This species of mastodon is extremely frequent in the Pliocene of Oltenia, this locality being a new one for this species in Mehedinţi District.
Key words: mastodon, Late Pliocene, Dacic Basin, Oltenia, Romania.

Introduction

The westernmost ending of the Dacic Basin may be observed in Mehedinţi District at contact with the Carpathian orogenic belt. The Pliocene evolution of the sedimentary basin was mentioned in ours recent issued paper (Codrea & Diaconu, 2010), therefore we will not insist again on these details. We just remind the geological evolution trend, from flooded (Early Dacian) towards emerged (Romanian) lands in this area (Popov et al., 2004, 2006; Jipa, 2006; Jipa & Olariu, 2009). In such environments, Upper Pliocene terrestrial large mammal populations flourished. The large herbivores as mastodons were rich represented, mainly by two mastodon species: Borson's mastodon *Mammut borsoni* (HAYS, 1834) and *Anancus arvernensis* (CROIZET & JOBERT, 1828). The first species was widespread mainly in Dacian becoming rarer later, while the second one was the most representative mastodon for the Late Pliocene (Romanian).

Near a century ago, a fossil belonging to the anancoid mastodon *A. arvernensis* was found at Fântâna Domnească, in Mehedinţi (Fig. 1). Barbu Lăcătuşu, a home-born, found in 1930 in "La Cleanu" Creek, to Dragoteşti nearby Fântâna Domnească the mastodon jaw fragment. Soon he donated the fossil to Constantin Ţurai, at that time professor at Fântâna Domnească School. This one, an autodidact interested by history, built up a local museum in this school, where the mastodon was exposed among various

other archeological items unearthed mainly at Fântâna de Piatră, as well as ethnographic objects collected form the upstate peasants. In spite of its amateur status, he emphasizes the importance of the exhibits' provenience: each one had its own label, indicating the location of origin, finder name and the year.

Systematic palaeontology

Order Proboscidea ILLIGER, 1811
Family Elephantidae GRAY, 1821
Genus *Anancus* AYMARD, 1855
Anancus arvernensis (CROIZET & JOBERT, 1828)

(Pl. I., Figs. 1, 2)

Material: fragment of the right mandible horizontal branch, with fragment of m2, Iron Gates Regional Museum, abbreviated: PFRM 1842 (dental nomenclature, according to Tobien, 1973).

Measurements (mm; $^{+}$ is indicating dimension taken in damaged parts): Length of the horizontal mandible branch = 260^{+}; Width of mandible between m2/m3 = 125^{+}; Width of m2 $_{(penult\ ridge)}$ = cca 70.5; $W_{(last\ ridge)}$ = 70.

Description: The fossil is heavily damaged and bad preserved. Obviously, the matrix of pebbles rich in limonite was not a fair environment for a convenient fossilization. The bone is broken just before the second molar. The ascending branch is completely missing. It still keeps a rear fragment of the m2, as well as the roots of the m3, without crown. Even in this bad state of preservation, one may presume that the last molar was not completely in use at the mastodon death. At its death, the mastodon was younger in age compared either to the Oradea mastodont (Jurcsák, 1973, 1983) or the one from Păgaia (Jurcsák & Popa, 1977), both from Bihor District, in western Romania. In these both specimens, the m2 were already pushed far forward towards the symphysis and the m3 had the first transverse ridges in wearing, indicating more adult animals (personal remarks of one of us, C.V.).

The remaining fragment of m2 preserving only the last two distal transverse ridges, still allows observing the anancoid pattern diagnostic for the Pliocene mastodon species. The pretrite halphlophids are shifted backward vs. the postrite ones. All the cuspids are heavily worn. The transverse valley is completely obstructed by conulus. The distal cingulum bears attrition marks. This cingulum expands also on the labial side of the molar, at least on the two last transverse ridges preserved.

Discussion

This species is often recorded in the Pliocene of Oltenia. The evidence is the large number of localities already reported by Athanasiu (1908) in the first decade of the last century. From Mehedinţi, he mentioned the following localities: Strehaia, Ghelmegioaia, Broşteni and Ţirioiu. Later,

the number of such localities increased, mainly due to several contributors, e.g. Feru et al. (1983) or Petrescu et al. (1987).

In the intra-Carpathian area it is also very frequent, also in Late Pliocene (Jurcsák, 1973, 1983; Rădulescu & Samson, 1985; Rădulescu & Samson, 2001; Rădulescu et al., 2003; Codrea & Iuga, 2006; Codrea & Ciobanu, 2008). Recently, a nearly complete skeleton, which is the best preserved specimen ever found in our country, was unearthed at Racoşul de Jos (Toth et al., 2010), also in Upper Pliocene (Romanian) coal bearing deposits.

Conclusion

This old find from Fântâna Domnească just adds an additional new Pliocene locality in Oltenia for this mastodon species. The high frequency of such discoveries in Oltenia confirms the wide regional distribution in the Late Pliocene. To the end of the Pliocene and the beginning of Pleistocene, this mastodon rarefied and soon after became extinct, probably due to the climatic deterioration and to the changes occurred in the vegetation, which lost a lot of forests *vs.* areas covered by herbs.

Acknowledgements. Both authors thank to *Alexandru Solomon* and *Mihai Dumbravă* (master geology students at Cluj) for their enthusiasm and the professional preparation of the fossil.

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Figure captions:

Fig. 1 Location of the mastodon find at Fântâna Domneacă, in Mehedinţi District.

Pl. 1 *Anancus arvernensis*, Pliocene, Fântâna Domneacă. Fig. 1: occlusal view; Fig. 2: lingual view. Scale bar: 50 mm

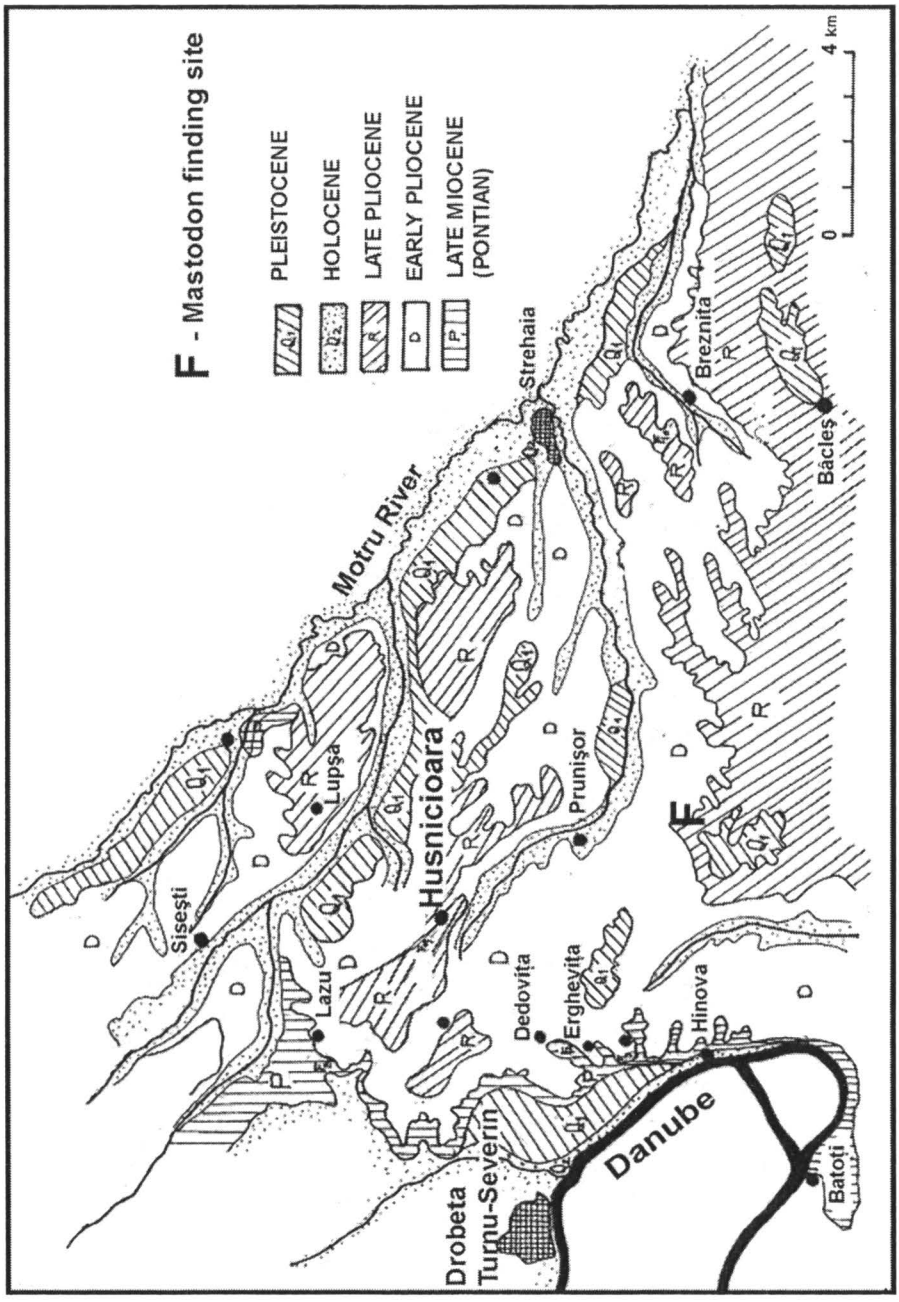
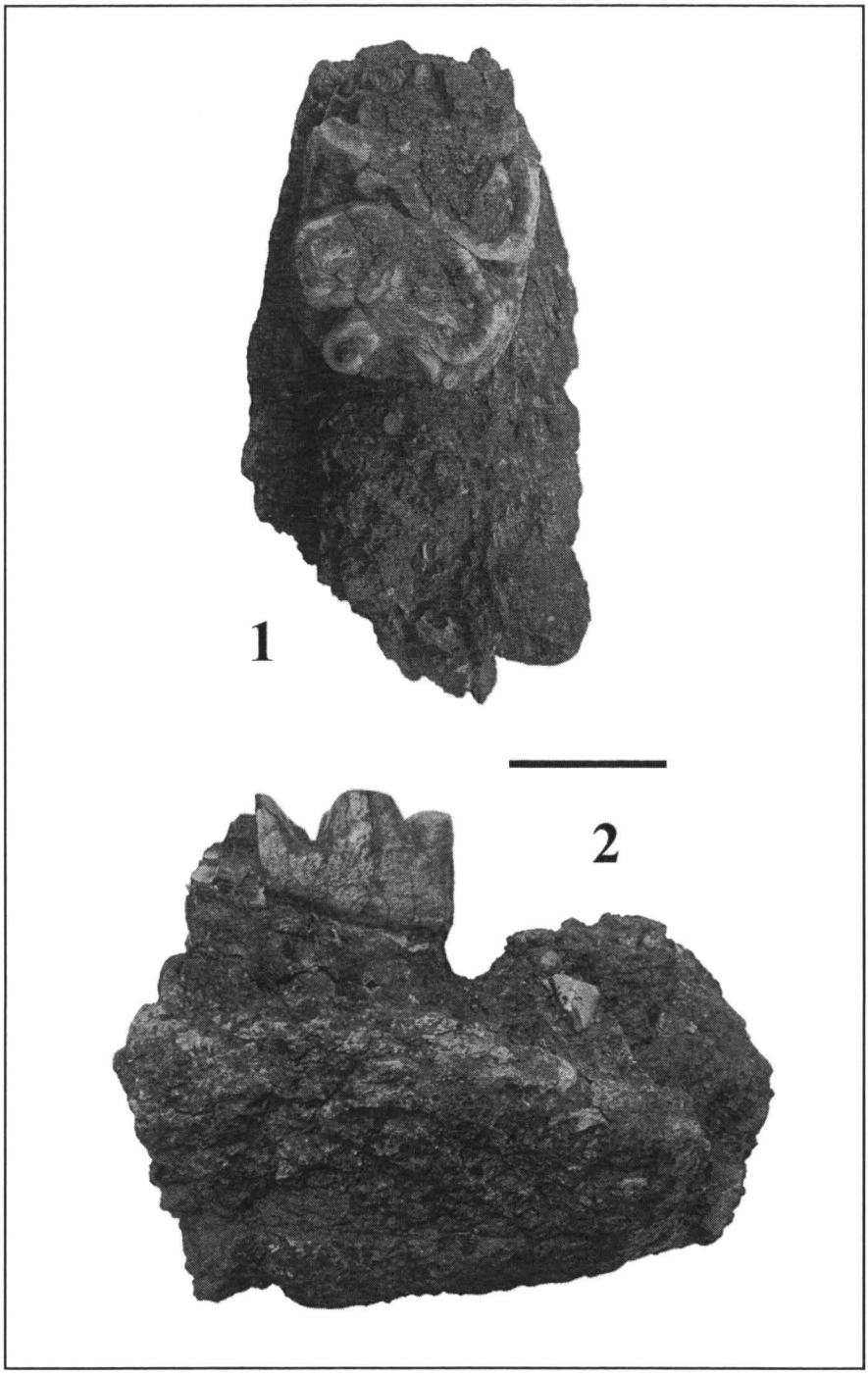


Fig. 1 Location of the mastodon find at Fântâna Domneacă, in Mehedinţi District



Pl. 1 *Anancus arvernensis*, Pliocene, Fântâna Domneacă. Fig. 1: occlusal view; Fig. 2: lingual view. Scale bar: 50 mm

PRELIMINARY RESULTS ON THE PÂRLAGELE SITE (MEHEDINȚI)

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Abstract: PRELIMINARY DATA OF THE PÂRLAGELE SITE (MEHEDINȚI)
This paper presents same preliminary results obtained from the research conducted in autumn 2011. In the Badenian Pârlagele deposits have been identified mollusk and fossil plants species.
Key words: Badenian, fossils, Pârlagele, Mehedinți.

Introduction

Pârlagele locality (Bâlvăneşti common) is located 12 km north-east from Drobeta Turnu Severin, Mehedinți County (Fig. 1), being part of the Mehedinți Geopark Plateau. This park is situated in southwestern Romania and includes 17 natural scientific reserves (Meilescu et al., 2004).

The occurrence of fossil plants in the Badenian deposits near Pârlagele, at Neagonea Valley has been mentioned for the first time by Stancu & Țicleanu (1974). In this site was pointed out 16 taxa.

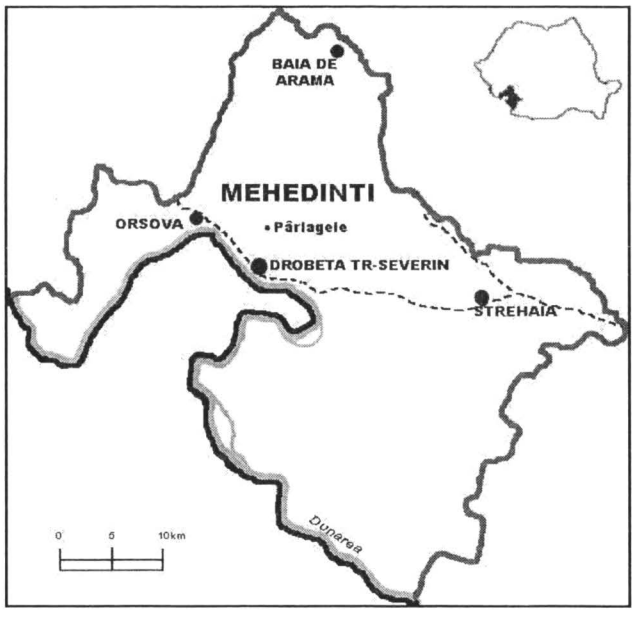

Fig. 1 Location of Pârlagele site on the map of Mehedinți County

Geological setting

From geologically point of view, the studied area represents (Marinescu, 1978) the west part of the Dacian Basin and includes marl tuffite clay with numerous globigerine equivalent "*marls with globigerine*" from Muntenia. Local, in the Bâlvăneşti sector, above them there are very fossiliferous gravel, sand and marl clay. They also include a layer of volcanic tuffite. To the north, sands and marl clays have a great thickness, replacing the gravel.

The Badenian deposits sequence exposed on the left bank of Neagonea River (Fig. 2) contains: gravel with boulder cement (2 m), fossiliferous gravel (1.5 m), clay with tuffite lens (1m), large gravel with boulders (4 m), sandy strips and blocks (5 m).

Fig. 2 The outcrops on the Neagonea valley left bank

The deposits of the outcrop on the right Neagonea valley (Fig. 3), 200 m downstream of where the mollusks were collected, include: 2.5 m of gray clay with bands of tuffite clay with foliage impressions, yellow clay from 3.5 to 4 m gray fine stratified.

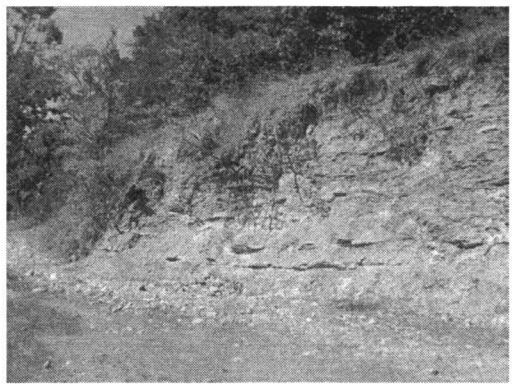

Fig. 3 The outcrops with fossils plants on the Neagonea Valley

Results

From outcrop on the left slope of the Neagonea valley were collected the following mollusks species: *Chlamys elegans* ANDRUSOV, *Chlamys seniensis* LAMCK., *Congeria panaci panaci* PAVLOVIC, *Glycymeris (G.) deshayesi* MAYER, *Cardium latisulcum* Munster, *Cardium plicatum*, *Ostrea digitalina* DUBOIS, *Cerithium europaeum* MAYER, *Conus ponderosus* BROCCHI, *Turritella sp.*

The fossil vegetal remains identified are: *Pinus* sp., *Quercus* sp. *Carpinus grandis* UNGER, *Laurophyllum* sp., *Juglans acuminata* AL. BRAUN, *Myrica lignitum* (UNG.) SAP., *Populus* sp., *Tilia josephinae* ŢICLEANU.

Conclusions

- In the Badenian Pârlagele deposits have been identified mollusk and fossil plants species;
- Based on the association of fauna found in these deposits, can be made some considerations on the paleoecological and pelogeografical evolution of the western Dacian Basin sector;
- Based on the paleoecology analysis of flora identified in the Badenian deposits from Pârlagele can be reconstituted the environmental conditions of that period;
- This interesting fossil place is probably the most important among Badenian sites of Mehedinti, including Mehedinţi Geopark Plateau.

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THE HYDROLOGIC REGIME OF THE DANUBE RIVER IN ITS LOWER REACHES

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Abstract: THE HYDROLOGIC REGIME OF THE DANUBE RIVER IN ITS LOWER REACHES

The river crosses Europe from west to the east passing through ten countries and four capitals, being the most important river of the continent from the economical point of view. The main factor which contributed to the existence of Drobeta Turnu Severin town was its setting downstream the quays of the Danube River on the international river navigation artery, which provides trade links with the other riparian European countries of this river. The hydropower system built in cooperation with the riparian state, Serbia, eased the economic development of the area, especially the existence of the European waterway, the Black Sea - North Sea.

Key words: the Danube, reach, area, flow, flood.

Introduction

Danube, the second longest river of Europe, springs from the Black Forest Mountains, in Germany. The length of the river is 2860 km and drains a hydrographical basin of 805.300 km ², representing 8% of the European continent. The river passes through Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Moldova and Ukraine. The river waters the European capitals Vienna, Bratislava, Budapest and Belgrade and it is the most important river of Europe, from the economical point of view.

At the beginning, the Danube flows in the centre of the continent from west to east up to Budapest, then from north to south in the Pannonia Basin up to its confluence with the Drava River, and then from northwest to southeast up to Calafat, sector across the Carpathians, through the "Porţile de Fier" gorge. Further, the river flows from west to east up to Calaraşi delimiting the Romanian Plain from the Prebalcanic Plateau and then from southwest to northeast up to Galati it separates the Romanian Plain from the Dobrogea Plateau and Mountains. Danube continues its course from west to east up to the mouth of the Black Sea through a delta.

Within the 2860 km length, depending on the configuration of the major units of relief crossed, the Danube is conventionally divided into three sectors: - higher (1060 km from its springs to the Devin Gate), middle (725 km from the Devin Gate to Baziaş - before entering the "Porţile de Fier" Gorge) and lower (1075 km from Baziaş to the Black Sea, where the

Danube splits into three branches - Chilia, Sulina, Sfântu Gheorghe). On leaving the gorge of the Danube, downstream Gura Văii village, there lies the basin Turnu Severin and the town with the same name.

Between Vârciorova and Gura Văii, there was built the hydropower and navigation system "Porţile de Fier I" (1971) with two locks, solving in the same time the difficulties regarding the navigation due to the raising of the level of the water and to the swirls produced, which reaches, in certain circumstances, beyond Belgrade, up to the confluence of the Danube with the Tisa River. The dam is used as a road between the two neighbouring countries (Fig. 1).

The head lake of hydropower and navigation system "Porţile de Fier I" covered 3262 ha on the left bank and 6569 ha on the right bank, summing up an area of 32.000 ha where there is stuck a volume of 2550 m3 of water. The tail of the lake stretches downstream 140 km reaching near Belgrade, where the Danube regains its original shape. The maximum depth is 60 m.

The construction of the lake led to the flooding (covering) of the Ada Kaleh island and of some Roman remains located at lower rates and all together to the raise the mouth of the Danube tributary rivers (Poloşeva, Strenica, Iuţi stream, Hlublolina, Plavişevița, Mraconia, Pârâul Satului, Pârâul Mic, Ieşelnița, Cerna, Bahn, Vodița, Jidoştița, Topolnița).

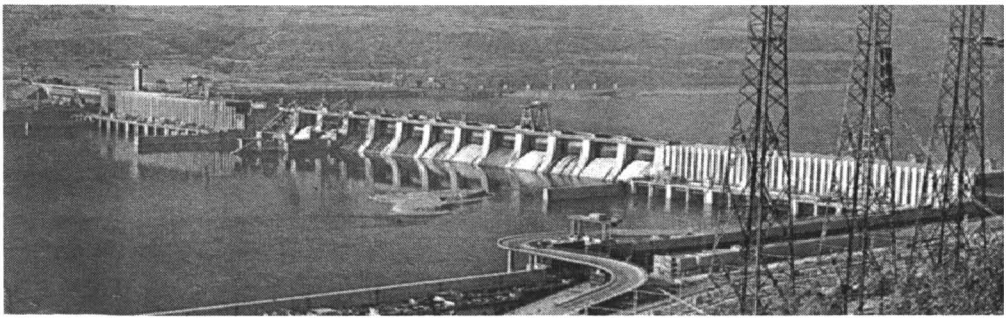


Fig. 1 The hydropower and navigation system "Porţile de Fier I" (Iron Gates I)

The Hydropower and Navigation System "Porţile de Fier I" with a capacity of 2100 MW is shared by Romania and Serbia. The water has a flow of 8700 m/s and an average drop of 27.17 m. The complexity of the work requires unique applications and technologies. One of the rivers which have a hydrologic contribution to the lake is Topolnița River.

Topolnița River flows from Mehedinti Plateau and has a length of 44 km and an annual average flow of 1.48 m^3/s. The river has a river basin area of 360 km^2 and tributary streams on the left Balt, Păuneşti and Neagonea and on the right Clişevăț, Şuşița, Pleşuva and Crihala. It flows into the Danube River right after the confluence with the Crihala stream. The Crihala stream crosses the city of Drobeta-Turnu Severin from northwest to southeast (Fig.2).

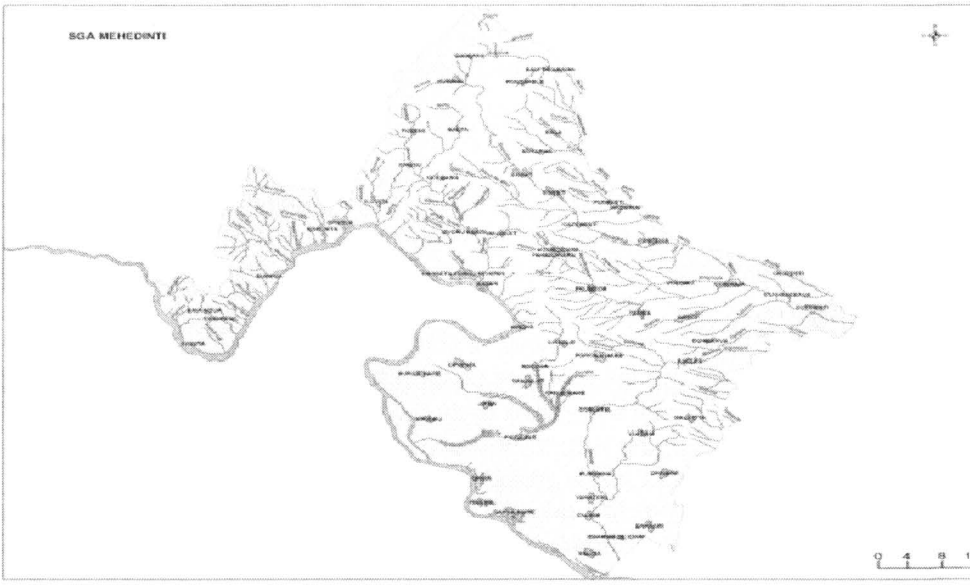


Fig. 2 The hydrographical network (The tributaries of Danube - 1st order)

Hydrologic regime

The hydrologic regime of the Danube presents during the year variations of the level and flow. In spring due to the melting of the snow and heavy rains (rain and snow alimentation) high waters of spring occur on the upper and middle reaches; and on the lower reaches due to the rain and snow alimentation, high waters occur later, in May. From the confluence with the Inn River and up to Bratislava, the Danube has high debts in June after it receives a number of tributaries which feed from the glaciers of the Alps. In autumn low waters occur, especially in September and October. In winter and summer the flow regime is characterized by moderate values of levels and flows.

In the lower reaches, after it receives the waters of three major tributaries (Drava with 670 m³/s, Tisa/s 814 m³/s and Sava to 1460 m³/s, which provides an average flow of 2944 m³/s), the Danube enters the gorge of "Porţile de Fier" (Iron Gates) with an average flow of 5565 m³/s, thus increasing its waters with 66%.

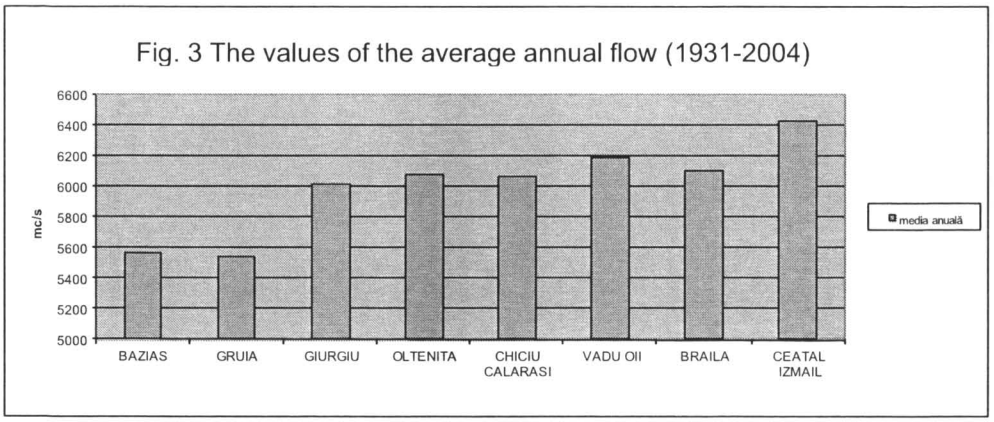
The average annual flow of the solid from the water ranges from 430 to 2480 kg/s.

In this area, the water speed of the Danube is on average 2-4 m/s. In the gorge (between Drencova and Şvinița) due to a pronounced slope (0.20 ‰), the river water speed reaches 3.6 m/s. The most prominent discharge of waters (> 4.0 m/s) is between km 950 and 940 (Vârciorova - Gura Văii).

During the period 1931 - 2004 the average water flow recorded the value of 5565 m³/s at Baziaş hydrometric station and it increased towards the downstream (Table 1, Fig. 3).

Table 1 The multiannual average values of the flow registered at hydrometric stations (1931 -2004)

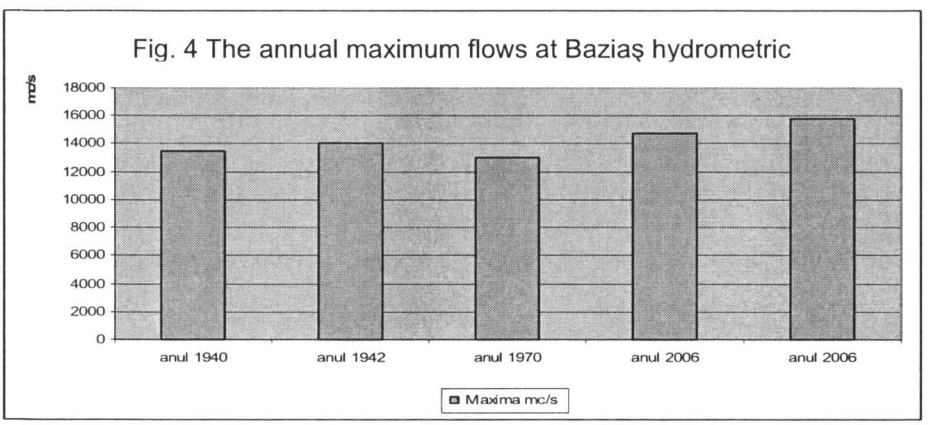
Station	Baziaş	Gruia	Giurgiu	Oltenița	Chiciu Călărasi	Vadu Oii	Brăila	Ceatal Izmail	average
Multiannual average values m³/s	5565	5548	6019	6075	6068	6199	6110	6436	6003



The maximum flows reach high values during the spring high waters. Thus, at Orşova there was a maximum flow of 15.100 m³/s (13.IV.1940). These extraordinary flows produce overflow and floods in the area downstream the quay on the whole water meadow and Delta, under natural conditions which lack dams. The analysis of annual maximum flow of the Danube at Baziaş hydrometric station shows that the highest values were recorded in the spring and summer months in 1940, 1942, 1970, and 1981. The highest rate was recorded in 2006. (Table 2, Fig. 4.)

Table 2 The annual maximum flow at Baziaş hydrometric station

Year/station	year1940	year 1942	year 1970	year 2006	year 2006
Baziaş annual maximum mc/s	13520	14020	13040	14800	15800



According to the hydrological data provided by "HIDROELECTRICA" – Drobeta Turnu Severin, the maximum flow of a flood wave recorded in the spring of 2006 was 15 800 m³/s downstream the dam of "Porţile de Fier I". (fig.5)

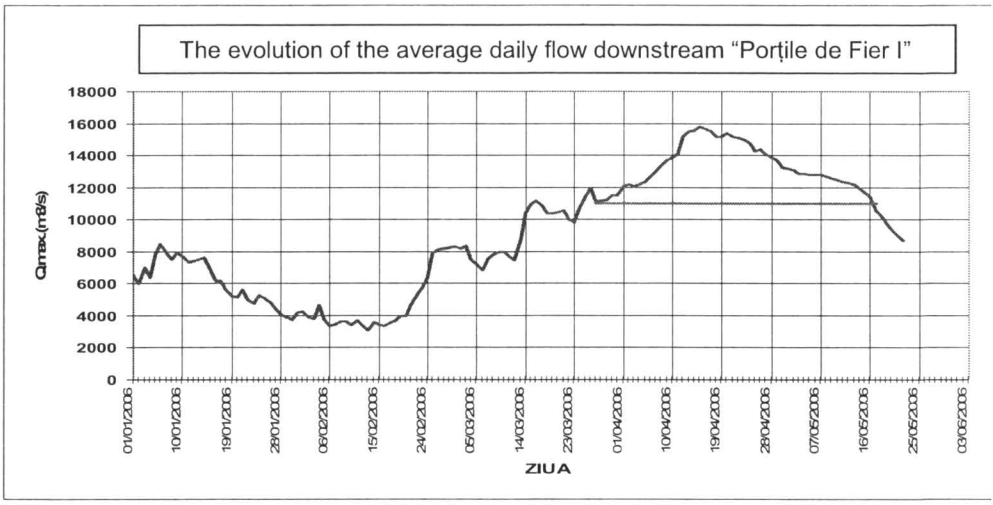


Fig. 5 The evolution of the average daily flow downstream "Porţile de Fier I" (01.01.2006 – 22.05.2006)

The highest recorded floods on the Danube at Orşova hydrological station, were those registered in 1888 (15 500 m³/s), 1895 (15 900 m³/s), 1897 (15 400 m³/s) and 1940 (15 100 m³/s), 1970, 1981, 1985 and the flood from 2006 was the largest since the hydrological records were registered.

From Table 3, Fig. 6 it can be seen the difference between the lowest and the highest instantaneous flow rates in the period 1931-2004 and the peak flood flows of spring 2006.

Table 3 The characteristic values and maximum water flow in 2006

station	Baziaş	Gruia	Giurgiu	Oltenița	Chiciu Călărasi	Vadu Oii	Brăila	Ceatal Izmail
Max. array 2004	14800	14700	15370	15290	15800	15100	15020	15540
Max. array 2006	15800	15800	16500	16500	16200	16000	15800	16500
Min. array 2004	1040	990	1485	1490	1530	1400	1460	1790

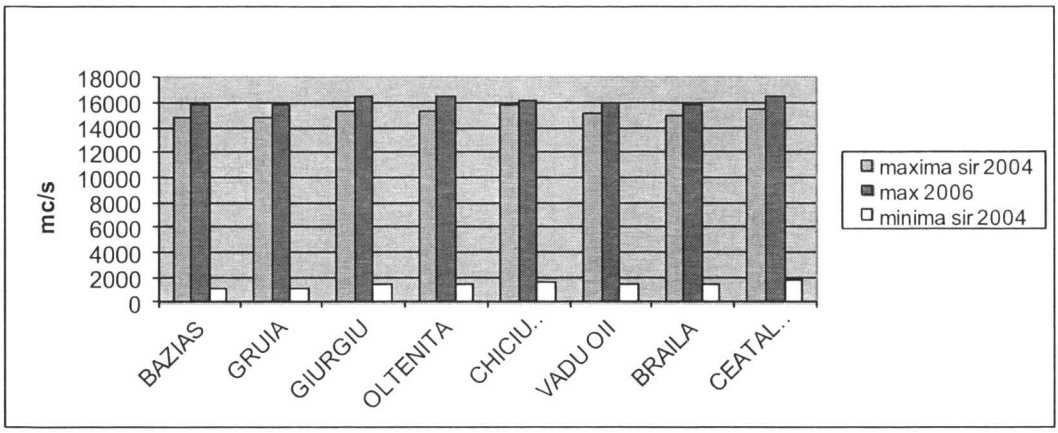


Fig.6 The characteristic values and maximum water flow in 2006

On entering Romania the intake of water upstream superimpose on a background of 12,000 m³/s flow, high above the annual average of April (7900 m³/s) and it began to increase significantly since the 5th of April. In the first six days there was an accumulation of 1800 m³/s, the increase being greater in between 11th to 15th of April, with an addition of 1900 m³/s, which resulted in the production of maximum flow 15.800 m³/s on April 15th and 16th (Fig. 7).

The decrease occurred slowly, therefore at the end of April the Danube flow on entering the country was 13.400 m³/s.

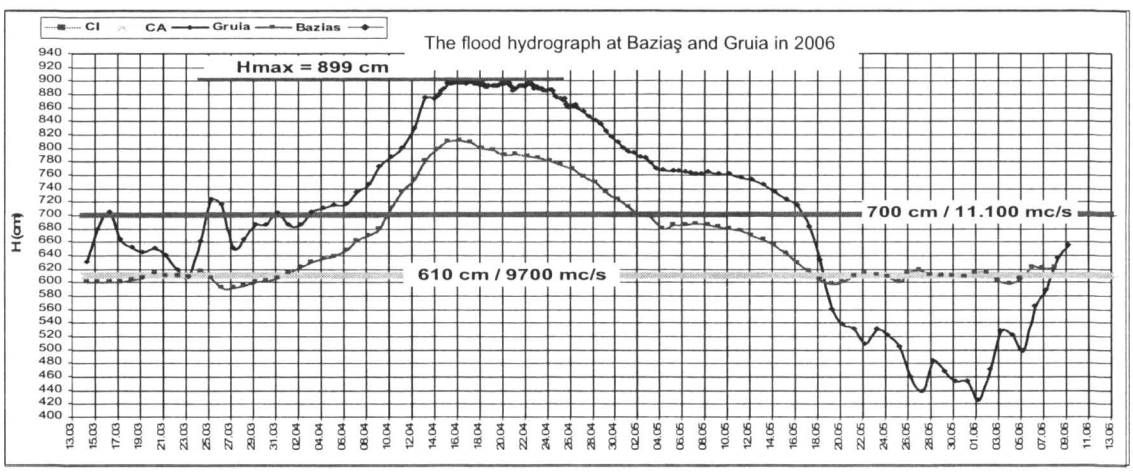


Fig. 7 The flood hydrograph at Baziaş and Gruia in 2006

The minimum flows occur at low waters in autumn and in some cases also in winter when they reached values of 1040 m³/s at Baziaş in 1949 and 1250 m³/s at Orşova (12.I.1954). During the period 1931 - 2004 at Baziaş station the multiannual minimum flow was 1040 m³/s. (Table 4, Fig. 8).

Table 4 The multiannual minimum water flow registered in the period 1931-2004

Station	Baziaş	Gruia	Giurgiu	Oltenița	Chiciu Călăraşi	Vadu Oii	Brăila	Ceatal Izmail
Min. array 2004	1040	990	1485	1490	1530	1400	1460	1790

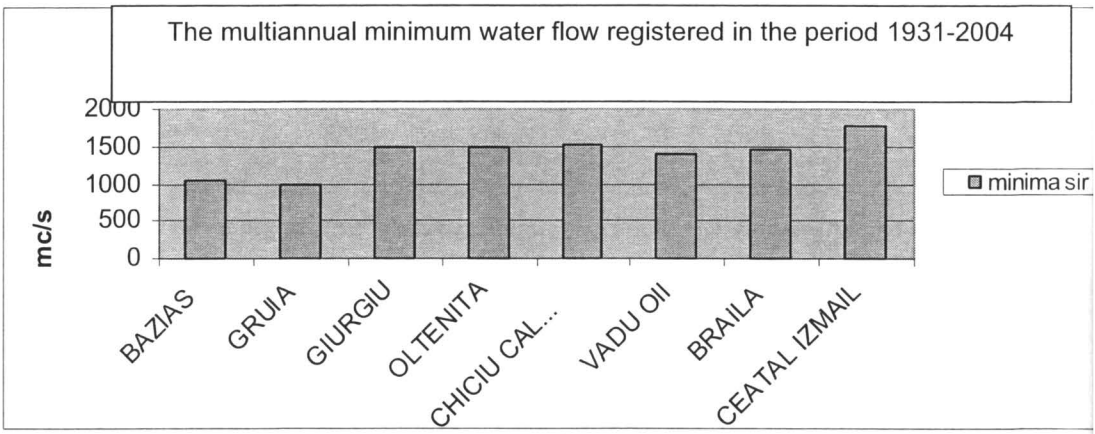


Fig. 8 The multiannual minimum water flow registered in the period 1931-2004

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COENOTIC INTEGRATION OF MAIN SOZOLOGICAL CATEGORIES FROM FLORA OF ROMANIAN FAGARAS MOUNTAINS

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Abstract: COENOTIC INTEGRATION OF MAIN SOZOLOGICAL CATEGORIES FROM FLORA OF ROMANIAN FAGARAS MOUNTAINS

From the estimated number of Romanian flora (species and subspecies of higher plants, more than 4000) a significant proportion is growing on Arges County. The information from the literature and personal researches in the fi eld, shown the existence of 2009 species and subspecies in the Fagaras Mountains chormoflora of the Arges County. All these systematic categories belong to 584 genera and 144 botanical families. It are included in neither categories of the Red List, 411 species and subspecies being distributed by the following categories: rare, vulnerable, endemic to Romania, endemic to Romania not endangered, species having rare European specific spreading area, having endangered European specific spreading area (IUCN Red List, Habitats Directive Annex IIb, IVb and Bern Convention-App I).

The scientific valuation and documentation of the diversity of plants is necessary. This is possible by knowing the present chorology and the weight of the various sozologic categories, for their preservation. For main sozological categories we made a presentation and integration chorology coenotic to indicate how to save and protect endangered species.

Key words: sozological, Romanian flora, endangered species, Arges County.

Introduction

From the estimated number of Romanian flora (species and subspecies of higher plants, more than 4000) a significant proportion is growing on Arges County. The information from the literature and personal researches in the field, shown the existance of 2009 species and subspecies in the Fagaras Mountains chormoflora of the Arges County. All these systematic categories belong to 584 genera and 144 botanical families. It are included in neither categories of the Red List, 309 species and subspecies being distributed by the following categories: rare, vulnerable, endemic to Romania, endemic to Romania not endangered, species having rare European specific spreading area, having endangered European specific spreading area (IUCN Red List, Habitats Directive Annex IIb, IVb and Bern Convention -App I).

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For main sozological categories we made a presentation and integration chorology coenotic to indicate how to save and protect endangered species.

Material and methods

The establishment of the protected plants was made on the basis: *Red List of extinct endangered, vulnerable and rare higher plants of Romania flora* (Boşcaiu N., Coldea Gh., Horeanu Cl., 1994), *Rare vulnerable and endemic plants of Romania flora - The Red List* (Dihoru Gh., Dihoru Alexandrina, 1994), *The Red List of higher plants of Romania flora* (Oltean M., Negrean G., Popescu A., Roman N., Dihoru G., Sanda V., Mihăilescu S., 1994), *Critical list of vascular plants in Romania*, (Oprea A., 2005), *Arges county cormoflora* (Alexiu V., 2008), *Red book of vascular plants in Romania* (Dihoru G., Negrean G., 2009).

The IUCN Red List of Threatened Species (also known as the IUCN Red List or Red Data List) is the world's most comprehensive inventory of the global conservation status of plant and animal species.

A series of Regional Red Lists are produced by countries or organizations, which assess the risk of extinction to species within a political management unit.

Species are classified in nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.

1. Extinct (EX) - No individuals remaining
2. Extinct in the Wild (EW) - Known only to survive in captivity, or as a naturalized population outside its historic range
3. Critically Endangered (CR) - Extremely high risk of extinction in the wild
4. Endangered (EN) - High risk of extinction in the wild
5. Vulnerable (VU) - High risk of endangerment in the wild
6. Near Threatened (NT) - Likely to become endangered in the near future
7. Least Concern (LC) - Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category.
8. Data Deficient (DD) - Not enough data to make an assessment of its risk of extinction.
9. Not Evaluated (NE) - Has not yet been evaluated against the criteria.

Results

Until now, 309 species and subspecies are integrated in 29 classe, 47 orders, 83 alliances and 214 associations. Vulnerable species belong to classes of vegetation: Phragmitetea australis, Festucetea vaginatae, Asplenietea trichomanis, Thlaspietea rotundifolii, Salicetea herbaceae, Juncetea trifidi, Nardo-Callunetea, Carici rupestris-Kobresietea bellardi, Seslerietea albicantis, Mulgedio-Aconitetea, Molinio-Arrhenatheretea,

Festuco-Brometea, Querco-Fagetea, Quercetea pubescenti-petraeae, Eriko-Pinetea and Vaccinio-Piceetea.

Table 1 Coenotic framing of endangered species

CR	DD	EN	LC	NT	VU
2	8	1	14	254	30

Here are some vulnerable species with their coenotaxonomic classification:

Angelica archangelica L.
Synonymies: *Archangelica officinalis* Hoffm.
Family: Apiaceae its use as medicine.
Geographical Distribution: Eua-bor
Frequency in Romania: Occasionally
IUCN Category: VU
Located in Arges: Massif Râiosu-Buda; Massif Iezer-Păpuşa; Mountains Leaota; Făgăraş Massif.
Coenotic integration:
- *Angelico - Cirsietum oleracei* R. Tx. 1937

Galanthus nivalis **L.**
Family: Amaryllidaceae
Geographical Distribution: Eur
Frequency in Romania: Frequent
IUCN Category: VU
Located in Arges: Massif Piatra Craiului, Montains Ghimbav, Massif Iezer-Păpuşa; Massif Râiosu-Buda.
Coenotic integration:
- *Corno - Fraxinetum orni* Pop *et* Hodişan 1964
- *Melampyro bihariensis - Quercetum roboris* SANDA *ET* POPESCU 1999 (Syn.: *Melampyro bihariensis - Carpinetum* (BORZA 1941) Soó 1964 em. COLDEA 1975; *Querco robori - Carpinetum* auct. transs. non SOÓ *ET* POCS 1957).

Gentiana lutea **L.**
Family: Gentianaceae
Geographical Distribution: Alp-Carp
Frequency in Romania: Occasionally
IUCN Category: CR
Located in Arges: Massif Râiosu-Buda; Massif. Piatra Craiului; Massif Iezer-Păpuşa;, Mountains Ghimbav.
Coenotic integration:
- *Festuco saxatilis - Trisetetum* (*macrotrichum*) POPESCU et SANDA 1989

Leontopodium alpinum **Cass.**

Synonymies: *Antennaria leontopodium* (L.) Gaertn.
Family: Asteraceae
Geographical Distribution: Eua
Frequency in Romania: Occasionally
IUCN Category: VU
Located in Arges: Massif Piatra Craiului, Montains Ghimbav, Massif Râiosu-Buda.
Coenotic integration:
- *Oxytropido carpaticae - Onobrychidetum transsilvanicae* TĂUBER 1987
- *Achilleo schurii - Campanuletum cochleariifoliae* FINK 1977
- *Saxifrago rochelianae - Gypsophiletum petraeae* BOŞCAIU, TĂUBER, COLDEA 1977

***Narcissus poeticus* L.** subsp. ***radiiflorus* (Salisb.) Baker**
Synonymies: *Narcissus radiiflorus* Salisb.; *Narcissus angustifolius* Curtis ex Haw.; *Narcissus poeticus* L. subsp. *angustifolius* Hegi).
Family: Amaryllidaceae
Geographical Distribution: Euc
Frequency in Romania: Occasionally
IUCN Category: VU
Located in Arges: „Poiana Narciselor" (Meadow with daffodils), Negasi
Coenotic integration:
- *Peucedano rocheliani - Molinietum caeruleae* BOŞCAIU 1965
- *Clematido recti - Laserpitietum latifolii* SCHNEIDER-BINDER 1984

***Arnica montana* L.**
Family: Asteraceae
Geographical Distribution: Eur
Frequency in Romania: Relativ Occasionally
IUCN Category: VU
Located in Arges: Massif Piatra Craiului, Montains Ghimbav, Massif Iezer-Păpuşa.
Coenotic integration:
- *Vaccinio - Callunetum vulgaris* BÜK. 1942. (Syn.: *Nardo - Callunetum* CSÜRÖS 1964, *Agrosteto - Callunetum* RESMERIŢĂ et CSÜRÖS 1966, *Arnica montana – Calluna vulgaris* ass. Ghişa *et al.* 1970)
- *Scorzonero roseae - Festucetum nigricantis* (PUŞCARU et al. 1956) Coldea 1978 (Syn.: *Festucetum rubrae fallax* PUŞCARU et al. 1956, *Festucetum rubrae montanum* CSÜRÖS et RESMERIŢĂ 1960)
- *Violo declinatae - Nardetum* Simon 1966 (Syn.: *Nardetum strictae montanum* RESMERIŢĂ et CSÜRÖS 1963, *Nardetum strictae alpinum* BUIA *et al.* 1962, *Nardetum alpigenum austro - carpaticum* BORZA 1959)

***Rhododendron myrtifolium* Schott et Kotschy**
Synonymies: *Rhododendron kotschyi* SIMONK.; *Rhododendron ferrugineum* L. subsp. *kotschyi* (SIMONK.) HAYEK
Family: Ericaceae

Geographical Distribution: Carp-Balc
Frequency in Romania: Occasionally
IUCN Category: VU
Located in Arges: Massif Iezer-Păpuşa, Massif Râiosu-Buda, Massif Piatra Craiului

***Rhododendron myrtifolium* Schott *et* Kotschy**

Coenotic integration:
- *Triseto fusci - Salicetum hastatae* COLDEA (1986) 1990 (Syn. *Salicetum hastatae* BUIA et al. 1962)
- *Cetrario - Loiseleurietum procumbentis* BR.-BL. et al. 1939. Syn. (*Loiseleurietum procumbentis* PUŞCARU et al.1956)
- *Rhododendro myrtifolii - Vaccinietum* BORZA (1955) 1959 em. BOŞCAIU 1971 (Syn.: *Rhodoretum kotschyi* auct. rom., *Rhodoreto - Juncetum trifidi* RESMERIŢĂ 1974 *saxifragetosum panniculatae* HOREANU et VIŢALARIU 1991)
- *Rhododendro myrtifolii - Pinetum mugi* BORZA 1959 em. COLDEA 1995 (Syn.: *Pinetum mugi carpaticum* auct. rom., *Calamagrostio villosae - Pinetum mugi* SANDA et POPESCU 2002)
- *Junipero - Bruckenthalietum* HORV. 1936 (Syn.: *Juniperetum intermediae* NYÁR. 1956 n.n., *Bruckenthalietum spiculifoliae* BUIA et al. 1962 p.p., as. *Bruckenthalia spiculifolia* cu *Antennaria dioica* ŞERBĂNESCU 1961, as. *Nardus stricta* cu *Bruckenthalia spiculifolia* ŞERBĂNESCU 1961)
- *Empetro - Vaccinietum gaultherioidis* BR. - BL. 1926 (Syn.: *Cetrario - Vaccinietum gaultherioidis austro-carpaticum* BOŞCAIU 1971)
- *Campanulo abietinae - Vaccinietum* (Buia et al. 1962) BOŞCAIU 1971 (Syn.: *Vaccinietum myrtilli* BUIA et al. 1962,
- *Junceto trifidi - Vaccinietum myrtilli* RESMERIŢĂ 1976 (*Melampyro saxosi - Vaccinietum myrtilli* COLDEA 1990)
- *Salicetum retuso-reticulatae* BR. - BL. 1926 (Syn.: *Salicetum retusae* BUIA *et al.* 1962; *Salicetum reticulatae* PUŞCARU et al. 1956)
- *Rhododendro myrtifolii - Piceetum* COLDEA ET PÂNZARU 1986
- *Dryadetum octopetalae* CSÜRÖS et al. 1956 (Syn.: *Salix reticulata - Dryas octopetala* ass. BELDIE 1967, *Achilleo schurii - Dryadetum* (BELDIE 1967) COLDEA 1984).

Conclusions

The 309 species and subspecies are integrated in 29 classes, 47 orders, 83 alliances and 214 associations. Vulnerable species belong to classes of vegetation: Phragmitetea australis, Festucetea vaginatae, Asplenietea trichomanis, Thlaspietea rotundifolii, Salicetea herbaceae, Juncetea trifidi, Nardo-Callunetea, Carici rupestris-Kobresietea bellardi, Seslerietea albicantis, Mulgedio-Aconitetea, Molinio-Arrhenatheretea, Festuco-Brometea, Querco-Fagetea, Quercetea pubescenti-petraeae, Eriko-Pinetea and Vaccinio-Piceetea.

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ASPECTS OF VEGETATION FROM BUILA-VÂNTURARIŢA MOUNTAINS

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Abstract: ASPECTS OF VEGETATION FROM BUILA-VÂNTURARIŢA MOUNTAINS

In this paper are characterized the plant associations from Buila-Vânturarița Mountains. There have been identified two plant associations and one subassociation affiliated in two classes, two orders and two alliances: *Festuco rubrae-Agrostietum capillaris* Horvat 1951, *Festuco rubrae-Agrostietum capillaris* Horvat 1951 subas. *nardetosum strictae* Pop 1976 and *Seslerio bielzii-Caricetum sempervirentis* Puşcaru et al. 1956.

Key words: plant associations, alpine, subalpine level, Buila-Vânturarița Mountains.

Introduction

Buila-Vânturarița Massif is located in the central-northern part of the Vâlcea county, being a component of Căpățânii Mountains. This massif is stretched from west - Bistrița Quays to the east - Olăneşti Quays.

Buila-Vânturarița ridge has a length of 14 km and a width between 0.5-2.5 km. The absolute altitude is Vânturarița Mare Peak (1885 m).

Buila-Vânturarița Massif presents a sequence of metamorphic and sedimentary deposits. The metamorphic rocks outcrops on the north-western slopes Bistrița, Costeşti, Cheia, Olăneşti river Valleys. These formations appear from under the eroded sedimentary deposits (Curmătura Builei) in the ridge area.

The sedimentary formations are represented by Superior Jurasic and Inferior Cretacic deposits: sandstone, limestone, marleous schists, clays, conglomerates.

Buila-Vânturarița soils have not a great diversification, being different according to plant associations that were formed on them: rendsinas, podzolic, humic-feriilluvial, acid brown forest and alpine pasture soils, alluvial soils.

The climate is vertically leveled, according to the relief, with variations and inversions of climate from a slope to another. The annualy average temperatures are 1-9^{0}C, while rainfalls recorded between 700-900 mm values, in the inferior level and over 900 mm/year in the subalpine level. The dominant winds blow from NV-SE direction.

Material and methods

The phytocoenological investigation from Buila-Vânturariţa Mountains has been made in August 2011, as part of the project SOP-Environment *Studies concerning the grazing impact on grasslands biodiversity*.

Identification of the plant associations was based on edifying, characteristic and indicatory species, through recognition of the station characteristics (altitude, relief, exposition, inclination, soil type, rock, geographical location).

The research method follows the Central-European School of Zürich-Montpellier methodology, elaborated by J. Braun-Blanquet and adapted by AL. Borza to the particularities of the vegetation in our country.

Results and discussions

Researches in this massif have allowed the identification of two plant associations and one subassociation affiliated in two classes, two orders and two alliances, as follows:

MOLINIO-ARRHENATHERETEA Tx. 1937
Arrhenatheretalia PAWL. 1928
Cynosurion R. Tx. 1947
Festuco rubrae-Agrostietum capillaris HORVAT 1951
Festuco rubrae-Agrostietum capillaris HORVAT 1951 subas. *nardetosum strictae* POP 1976
SESLERIETEA ALBICANTIS Br.-Bl. 1948 em. OBERD. 1978
Seslerietalia albicantis BR.-BL. 1926
Festuco saxatilis-Seslerion bielzii (PAWL. et WALAS 1949) COLDEA 1984
Seslerio bielzii-Caricetum sempervirentis PUŞCARU et al. 1956

The plant groupings have been affiliated in three types of habitats, one of them being of community importance, as follows: 6230 * Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe, 6170 Alpine and subalpine calcareous grasslands and 6520 Mountain hay meadows.

Festuco rubrae-Agrostietum capillaris HORVAT 1951 subas. *nardetosum strictae* POP 1976

Grasslands with *Festuca rubra* and *Agrostis capillaris* are the most spreaded coenoses from the mountainous region of the Buila-Vânturariţa National Park. These plant groupings are installed on flat or moderately inclined fields, with northern, north-eastern, south-eastern and western exposition, between 1400 - 1600 m altitude.

Due to irrational overgrazing, as part of the relevés from the subalpine and alpine level, we noted a high floristic diversity (species with different coenotic characteristics). The edifying species of these grouping is *Festuca rubra* which presents a coverage of 70%. *Agrostis capillaris* realizes a coverage of 20% on the alluvial and relatively acid lands.

Due to moderate grazing, *Festuca rubra* realizes the largest coverage (90%) on the Din Dos lawn. Here we noted the presence of *Campanula serrata*, mentioned both in Annex IIb of the Habitats Directive 92/43/EEC (European threatened species) and in O.U. no. 57/20.06.2007, concerning the policy of the protected natural areas, conservation of the natural habitats, of the wild flora and fauna, Annex 3b, MO no. 442/29 June (species whose conservation requires the designation of special areas of conservation).

At the Curmătura Oale lawn, in addition to characteristics species of the alliance *Arrhenatherion* and *Arrhenatheretalia* order, we noted the presence of a contingent of the Carpathians and Carpathian-Balkan taxa (*Dianthus spiculifolius, Jovibarba heuffelii, Erysimum witmannii, Carduus kerneri*), which give a Carpathian regional tint. There are identified some specimens of *Gentiana lutea* in the coenotic ambiance of these lawn. This taxa is mentioned in Habitats Directive 92/43/EEC - Annex Vb - species of community interest whose taking in the wild and exploitation may be subject to management measures.

Often, these lawns are used as pastures, strongly influenced by the anthropogenic activity, therefore the floristic composition is edified by characteristic taxa to *Artemisietea* class (*Carduus acanthoides, Cerastium arvense*), *Arrhenatherion* alliance and *Arrhenatheretalia order* (*Achillea millefolium, Veronica chamaedrys, Leucanthemum vulgare, Medicago lupulina, Trifolium repens, Carum carvi, Taraxacum officinale, Leontodon hispidus*).

Intensive grazing causes soil nutrients depletion, so in these phytocoenoses are remarkable species as *Antennaria dioica, Hieracium pilosella* and *Nardus stricta.*

Overgrazing implies that the number of animals exceed the productive capacity of the pasture, leading to elimination of the good fodder species, soil treading and soil nutrients depletion. So, coenoses with *Festuca rubra* will develop towards those with *Nardus stricta.*

Thus for instance, the vegetal layer is dominated by *Veratrum album, Urtica dioica, Rumex alpinus*, which take away the field from a higher production (Cacova and Din Dos Lawns).

Overgrazing is the initial process leading to land degradation, besides of the modification of layer composition, we found an increased erosin of the slopes. Also, in the absence of grazing, these pastures will develop to spruce forest, either directly or through the bushes with *Vaccinium vitis-idaea, V. myrtillus, Juniperus communis.*

The pedoclimatic factors, humidity and soil fertility have an important role in the evolution of these plant groups. The coenoses with *Festuca rubra* remain for a long time, on the flat or light inclined fields, with a high quantity of nutrients. There are rapidly evolving into groups with *Nardus stricta* on the drier slopes. The high humidity in the air or soil, low temperatures limit the development of *Agrostis capillaris*, favoring predominance of *Festuca rubra.*

Seslerio bielzii-Caricetum sempervirentis PUŞCARU et al. 1956

These phytocoenoses are developed on slopes with southern exposition moderate degree of inclination, on calcareous soils, rendsinas, superficial, rich in skeletal from the alpine level of Buila-Vânturariţa Mountains. There are xeromesophilous, euritherm and low acid neutrophilous coenoses.

The characteristic species, *Sesleria bielzii* realizes a coverage of 20%. The floristic composition is edified by taxa of *Seslerion* alliance and *Seslerietalia* order (*Ranunculus oreophilus, Helianthemum oelandicum* ssp. *alpestre, Euphrasia salisburgensis, Asperula capitata, Gentiana verna, Dianthus spiculifolius, Minuartia verna*).

Installing on relatively young soils, rich in limestone and nutritive substances, is necessary a rational use of these lawns, by regulating grazing (moderate grazing), avoiding degradation of pasture, which leading to erosion. In terms of floristic composition, the basic fund is formed by Eurasian, European and Central-European species with a preponderance of 51%. Some of them are autochtonous elements (16,7%) with phytogeographic importance: Carpathian-Balkan, Carpathian-Endemic and Dacian-Balkan (*Sesleria bielzii, Dianthus spiculifolius, Campanula serrata, Peucedanum longifolium, Asperula capitata*).

Festuco rubrae-Agrostietum capillaris Horvat 1951

These mesophilous grasslands have been identified near the monastery Arnota, which are installed on slopes with different degrees of inclination, northern or eastern exposition, at 950 m altitude. Here vegetate on brown forest soils or brown podzolic, rich in humus and nitrogen, with acid reaction. The ecological character of these coenoses is xeromesophilous, microtherm and euriionic. The *Agrostis capillaris* is a dominant species (coverage of 60%) in the coenoses from Arnota, unlike of these in the subalpine and alpine level (Cacova Lawn, Din Dos Lawn, Curmătura Oale), the greatest abundance-dominance is realized by *Festuca rubra*.

The vegetal layer is formed by characteristics species for *Arrhenatherion* alliance, *Arrhenatheretalia* order (*Campanula patula*, *Achillea millefolium*, *Medicago lupulina*, *Trifolium campestre*, *Veronica chamaedrys*, *Anthoxanthum odoratum*) and *Molinio-Arrhenatheretea* class (*Lotus corniculatus*, *Plantago lanceolata*, *Trifolium pratense*, *Poa pratensis*, *Trifolium repens*).

Besides of these species, participate cormophytes from *Artemisietea* class, which are arranged in groups (*Carduus acanthoides*), which emphasize a significant anthropozoogenic influence. The overgrazing from this lawn, led, in time, both to soil denudation in certain areas and the appearance of erosion along the slopes.

Conclusions

Overexploitation, of the grasslands, in some areas from Buila-Vânturariţa Mountains, especially by excessive grazing led to degradation of

the habitats, some of them with a high conservative value at the community level. It is important, the adoption and observance of the management measures, necessary to maintain a favourable status of conservation of the grasslands habitats:
- Introducing grazing regulations by practicing rational grazing, depending on the carrying capacity of the pasture;
- Rotation grazing which prevents the starting of erosin phenomena and the selective consumption of herbaceous species;
- Pasture's fertilization by adding nitrogen amendments, avoiding to become dominant *Nardus stricta*;
- Repeated mowing, especially during the summer of the nitrophilous weeds: *Veratrum album, Urtica dioica, Rumex alpinus*;
- Observing of the grazing period (grazing starting when the plants have 15-20 cm high and ending of it with 3-4 weeks before the appearance of the permanent frost of soil;
- Awareness and training of sheperds, pastures owners concerning the importance of practicing of a rational grazing.

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PHLEO ALPINI - DESCHAMPSIETUM CAESPITOSAE (KRAJINA 1933) COLDEA 1983 ASSOCIATION IN SOUTH CARPATHIANS

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Abstract: *PHLEO ALPINI - DESCHAMPSIETUM CAESPITOSAE* (KRAJINA 1933) COLDEA 1983 ASSOCIATION ÎN SOUTH CARPATHIANS

The coenoses of this assemblage of megaforbs were identified in the investigated territory, i.e. some massifs from Southern Carpathians (Retezat, Făgăraş, mountains). Because of the presence of the species characteristic for the assemblage of the *Calamagrostion villosae* PAWLOWSKI et al. 1928 alliance and the *Calamagrostietalia villosae* PAWLOWSKI et al. 1928 order, the assemblage was included in the *Mulgedio-Aconitetea* class HADAČ et KLIKA 1944.

Key words: megaforbs, Southern Carpathians.

Introduction

Physical and geographical setting

The Southern Carpathians are the highest area of our country. These mountains are situated in central Romania, south to the Transylvanian Depression. Prahova Valley (East), Timiş-Cerna Passage (West) and hilly regions (North & South) are framing these mountains. The following groups are forming the Southern Carpathians:

- Bucegi Group, between Prahova and Dâmboviţa valleys; it is formed by three massifs: Bucegi, Piatra Craiului and Leaota;
- Făgăraş Group, between Dâmboviţa and Olt valleys, with the following mountains: Făgăraş, Frunţi, Ghiţu and Iezer-Păpuşa;
- Parâng Group, between Olt, Jiu and Strei valleys, formed by Parâng, Cindrel, Şureanu, Lotrului, and Căpăţânii mountains;
- Retezat-Godeanu Group includes Retezat, Godeanu, Vâlcan, Cernei and Mehedinţi mountains.

Unlike in the Eastern Carpathians, in Southern Carpathians the metamorphic rocks and the magmatic ones are prevalent, which control the massiveness of these mountains, being more resistant to erosion (Pelin et al., 1969).

The climate is a typically mountain one (1000 and 1800 - 2000 m), even with alpine influences (over 1800 - 2000m). The annual average temperature decreases as the height increases, from 6^0C (at 1000 m) to 2^0C (1800 m) and 0^0C (2200 m); the average temperature of the warmest and the coldest months decreases proportionally. The rainfalls increase from 800

mm to 1200 mm - 1400 mm/year. The winds are on western domination, while into the depressions bordering these mountains they have föen-like features; in Haţeg, Petroşani and Loviştea depressions such phenomena of thermo inversion had been reported (Cristea et al., 1961; Velcea et al., 1982).

Because of the rich rainfalls, the hydrographical net has continuous supply and rich flows. The main rivers are: Sebeş, Mureş's tributaries; Bistra and Rece rivers, Cerna, Jiu; Cibin, Lotru, Topolog, Olteţ, Argeşul, Ialomiţa. The Southern Carpathians have numerous lakes of glacial origin (over 150) and men-made lakes (Vidra, Vidraru, Gura Apei and other smaller fitting outs). All the mineral springs, except the geothermal spring from Băile Herculane, are situated in the coterminous areas.

Materials and methods

The conspectus of taxa was drawn upon the individual field researches as well as upon the study of the scientific materials. The syntaxonomic nomenclature was adopted according to the stipulations of the International Code of the Phyto-sociological Nomenclature elaborated by Weber et al. (2000).

Results and discussions

The edified coenoses of *Phleum alpinum* and *Deschampsia caespitosa* was identified in the following massifs from the Southern Carpathians: Retezat and Făgăraş mountains.

The floristic analysis of this assemblage underlines the presence of numerous species characteristic for the *Calamagrostion villosae* PAWLOWSKI et al. 1928 alliance and the *Calamagrostietalia villosae* PAWLOWSKI et al. 1928 order (*Calamagrostis villosa, Trisetum fuscum, Festuca picta, Luzula luzuloides, Phyteuma vagneri, Campanula*abietina, Hypericum*grisebachii, Knautia dipsacifolia*), the *Adenostyletalia* BR.-BL. 1930 order (*Adenostyles alliariae, Senecio germanicus, Aconitum tauricum, Heracleum palmatum, Salix silesiaca, Geranium phaeum, Saxifraga rotundifolia etc.*) and *Mulgedio-Aconitetea* class HADAČ et KLIKA 1944 (*Athyrium distentifolium, Cicerbita alpina, Geranium sylvaticum etc.*) which demonstrates the association statut syntaxonomic (Ciocârlan, 2000; Sanda et al., 2001).

The spectrum of the Biological forms shows a high percentage of the hemichryptophytes (94%), followed by the therophytes (23%) and the geophytes (23%), while the other categories of bioforms are being less represented in these phytocoenoses (Fig. 1).

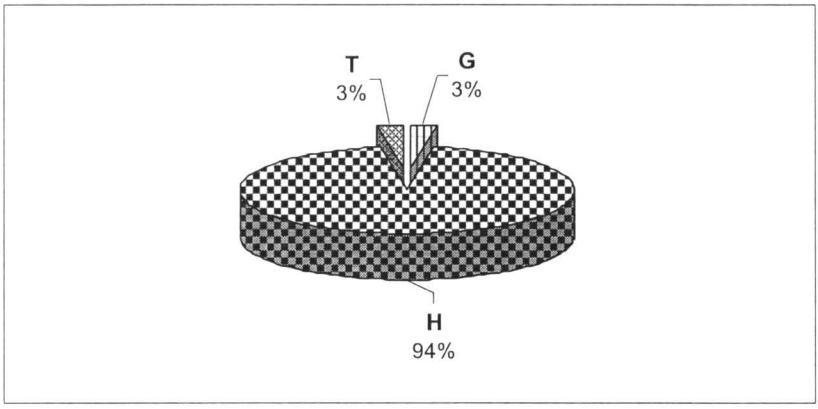

Fig. 1 The spectrum of the biological forms of the
Phleo alpini-Deschampsietum caespitosae association

The floristic elements which form the basis fundaments of the chormoflora are the Eurasian species (17.94%), followed by the European (17.94%). The Alps representatives (23.07%) underline the floristic and genetic connections with the Alps flora, while the regional character of this assemblage is shown by the presence of the Carpathians (7.69%) and Carpathians-endemic species (2.56%) (Fig. 2).

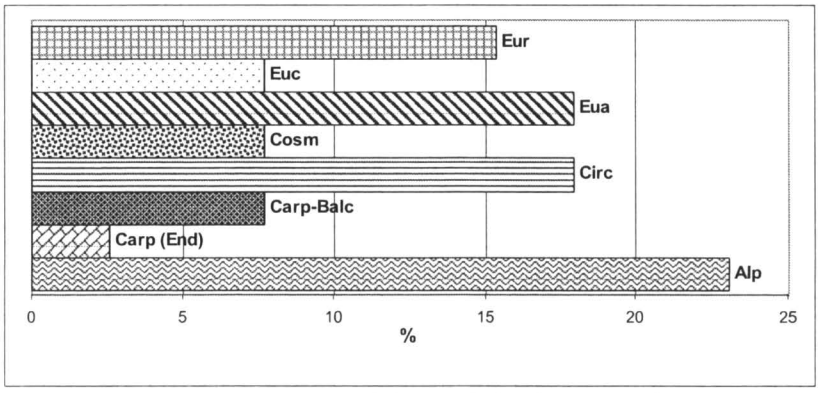

Fig. 2 The spectrum of the floristic elements of the
Phleo alpini-Deschampsietum caespitosae association

Analyzing the ecological indexes we find out the following:

- the humidity scale (U): the most of the studied megforbs are meso-hygrophilous ($U_{4-4,5}$=20%), indicating a constantly moist but not swampy soil

- the heat scale (T): the micro-termophilous ($T_{2-2,5}$=61.53%) and micro-meso-termophilous ($T_{3-3,5}$=17.94%) are best represented, indicating a cold climate with low temperatures of the water and soil during the entire vegetative season, specific to the upper mountain and sub alpine stand

- the acidity scale (R) shows the existence of the acid-neutrophilous ($R_{3-3,5}$=33.33%) and acidophilous species ($R_{2-2,5}$=20.51%). The megaforbs phytocoenoses are also edified by the low-acid-neutrophilous species ($R_{4-4,5}$=17.94%) (Fig. 3).

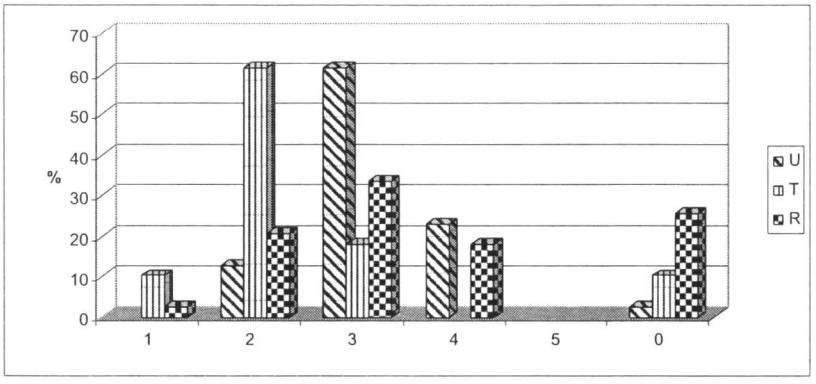

Fig. 3 The spectrum of the ecological indexes of the *Phleo alpini-Deschampsietum caespitosae* assemblage

The humification and mineralization of the organic material favour good mineral feeding, which leads to the edification of a large volume of the aerial organs as well as to the accumulation of a big quantity of substances for supply in the underground organs in few weeks.

The diploid index is 0.80 and suggesting greater resistance to enviromental conditions of species and higher competitive capacity (Fig. 4).

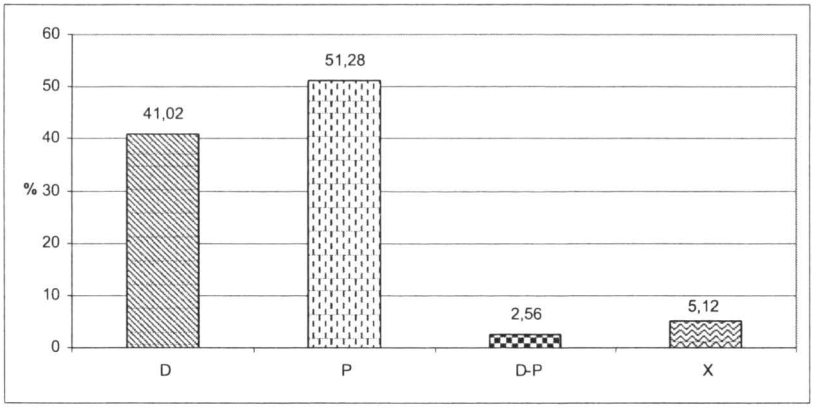

Fig. 4 The spectrum of the ecological indexes of the *Phleo alpini-Deschampsietum caespitosae* association

In order to underline the similitude between the various massifs from the Southern Carpathians the vegetal groups of weeds correspondent to these massifs were chosen. There were studied the surveys from the following massifs: Retezat and Făgăraş (Fig. 5).

The cladistic analysis I used is based on the parsimony principle, which means that a solution is enunciated in order to solve a problem and the most convenient is accepted. This is the principle which claim that when more cladograms are possible, it have to be chosen the easiest, i.e. the one that needs the smallest number of evolutionary transformations for the ensemble of the considered characters. The similitude of the vegetal groups that I studied is seen as evolutionary innovation, the so-called synapomorphys. All the branches of the cladogram, which have an analogous character, have a mutual ancestor. Cladistics is based on the identification of the similitude of the characters.

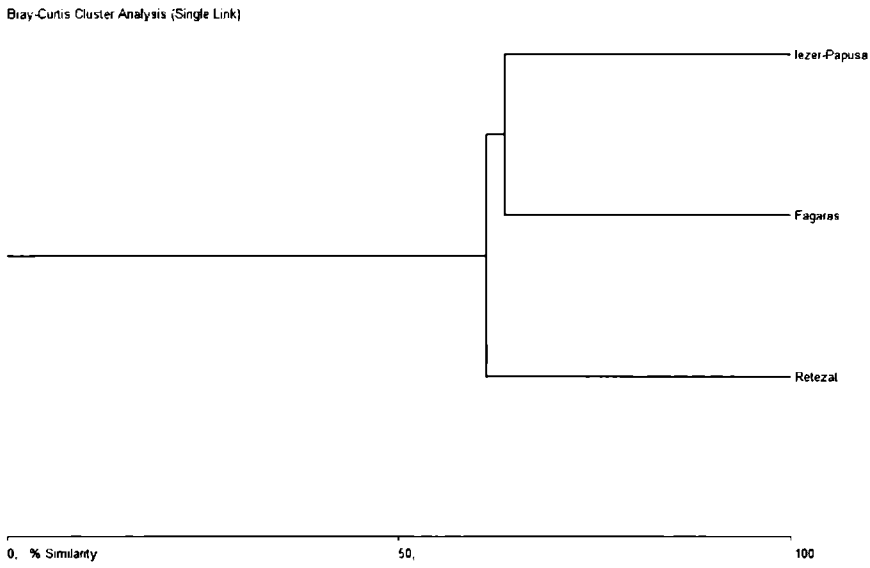

Fig. 5 The dendrogram of similitude of the *Phleo alpini-Deschampsietum caespitosae* association in Southern Carpathians

The dendrogram regarding the megaforbs from Southern Carpathians shows a repartition of the surveys from the assemblages, considered as a Carpathian unit. Though the dendrogram appears homogeneous, the floristic elements could differentiate clusters, which gather surveys having similar features. The grouping in clusters is done in conformity with the geographical distribution in the various massifs, underlining the geographical differentials of the stational, of the edaphoclimaxes typical for the studied massifs.

Conclusions

The megaforbs species which belong to *Phleo alpini-Deschampsietum caespitosae* association are prevalent hemichryptophytes.

The prevalent floristic elements are the Eurasian the European and the Central-European ones, while the regional character is underlined by the Carpathian and the Carpathian - endemic taxa.

By analyzing the ecological indexes I found out that the mountain tall weeds are mesophilous and meso-hygrophilous, micro-termophilous and micro-meso-termophilous, acid-neutrophilous and low-acid-neutrophilous.

The dendrogram shows a unitary repartition of the surveys of the *Phleo alpini-Deschampsietum caespitosae* association in the Southern Carpathians.

Although the dendrogram seems to be homogeneous, the grouping by clusters is achieved in conformity with the geographical distribution of the massifs, thus resulting geographical differentials of the stational circumstances of some specific edaphoclimaxes of the mountain massifs.

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CONTRIBUTIONS REGARDING THE CLASS *GALIO-URTICETEA* PASSARGE EX KOPECKÝ 1969 IN THE IRON GATES NATURAL PARK AREA

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Abstract: CONTRIBUTIONS REGARDING THE CLASS GALIO-URTICETEA PASSARGE EX KOPECKÝ 1969 ÎN THE IRON GATES NATURAL PARK AREA

The study of the Danube Defile's vegetation has taken a special largeness due to the activities of the "Iron Gates complex researches group" which was built in 1965, in the same time with the preliminary construction of the Hydro-energetic and Navigation System of Iron Gates. The road and railway arrangements occasioned by the construction of the Iron Gates Hydroelectric Power Plant and Iron Gates navigation power-reservoir, works which submerged a surface of 3562 ha on the Romanian bank of the Danube, created the possibility to access into biotypes inaccessible before. So, some of the vegetal associations have been reconsidered and others analysed in the perspective of the new progresses of taxonomy and phytogeography and especially of the phytohistorical information. There was analyzed the association *Telekio-Petasitetum hybridi* (MORARIU 1967) RESM. et RAŢIU 1974, which was identified on the Eşelniţa and Vodiţa Valley from the Iron Gates Natural Park.

Key words: phyto-sociology, vegetal association, Iron Gates Natural Park.

Material and metods

For the Iron Gates Natural Park vegetation study, there were used phytosociological research methods for the central European school, based on principles and methods invented by J. Braun-Blanquet (1921) and readjusted by A. Borza (1934) to the vegetal cover's particularities of our country.

The technical execution of the relevee, the quality and quantity assessments were made taking in consideration the recommendations of the authors A. Borza, N. Boşcaiu (1965) şi V. Cristea (2004).

The association's synthetic tables contains information about the floristic structure of the association. The sequence of species in the table corresponds to fidelity, presented using the numerical scale established by J. Braun-Blanquet. The first line of the table represents the order number of the releve, exhibition, declivity (^{0}), cover (%), analyzed surface (m^2). The last line of the table represents the constancy of species (K).

For every syntaxonomic unity were mentioned: spreading in the investigated territory, floristic composition, biologic structure, based on bioform spectrums, phytogeographic structure, presented through the floristic elements spectrums and ecologic behavior, reflected through the eco indications report (U,T,R) represented graphically. For every association, the diploid index's been calculated (S. Pignatti, 1960, 1961, 1966), which represents the ratio between the total diploid species that exist in the associations' phytocoenological table and the total polyploidy species that exist. The distribution of the diploid and polyploidy species was also graphically reproduced.

Results and discussions

GALIO-URTICETEA PASSARGE ex KOPECKÝ 1969

The class contains nitrophile associations on the sea/water shore and forest outskirts, which vegetates on brown soils, more or less soggy. Some of the representative species are: *Aegopodium podagragria, Petasites hybridus, Chaerophyllum hirsutum, Chaerophyllum aromaticum, Urtica dioica, Telekia speciosa.*

Code Natura 2000: 6430

Convolvuletalia sepium R. Tx. 1950 em. MUCINA 1993

The order contains micro-mesoterm associations on rivershores.

Petasition officinalis SILLINGER 1933

Natural associations in this alliance grow on sandy or skeleton-like soils with lots of humidity.

Telekio-Petasitetum hybridi (MORARIU 1967) RESM. et RAŢIU 1974

The hygrophil coenoses with *Petasites hybridus* and the Charpatian-Balkan-Anatolic-Caucasian (*Telekia speciosa*) developed dramatically in meadows on which *Alnus glutinosa* had been cleared (Table 1).

Table 1 Telekio-Petasitetum hybridi (MORARIU 1967) RESM. et RAŢIU 1974

			Releve	1	2	3	4	5	
			The exhibition	NE	NE	NE	NE	NE	
			Declivity (°)	-	-	-	-	20	
			Cover (%)	90	90	90	90	70	
F.b.	E.f.	Cyt.	Surface (m^2)	100	100	100	100	100	K
			Petasition officinalis						
G-H	Eua	P	*Petasites hybridus*	5	5	5	5	4	V
H	Carp-Balc-	D	*Telekia speciosa*	-	+	+	+	-	III
H	Cauc-Anat	D	*Chaerophyllum hirsutum*	-	-	+	+	-	II
	Euc(Mont)		***Aegopodion podagrariae***						
H-G	Eua	D-P	*Aegopodium podagraria*	+					I
			Galio-Alliarion						
H	Eur	D	*Mycelis muralis*		+				I
			Senecion fluviatilis						
H	Eua	D	*Eupatorium cannabinum*	+	+	+	+	1	V
Th(TH)	Eua(Med)	D	*Stellaria aquatica*	-	-	-	+	-	I
			Galio-Urticetea						
H(G)	Cosm	P	*Urtica dioica*	+	+	+	+	+	V
			Epilobion angustifolii						
H	Circ(Bor)	P	*Epilobium angustifolium*			+	-		I
			Molinietalia						
H-HH	Eua	D	*Lycopus europaeus*		+		+		II
			Alno-Ulmion s. l.						
H	Cosm	P	*Athyrium filix-femina*	+	+	+	-		III
H	Med-Atl	D	*Carex pendula*	-	-	+	+		II
			Variae Syntaxa						
H-G	Eua(Med)	P	*Mentha longifolia*	+	+	+	+	+	V

G	Cosm	P	*Equisetum arvense*	+	+	+	-	-	III
H	Cosm	P	*Juncus effusus*	+	+	+	-	-	III
H	Euc	P	*Festuca arundinacea*	+	+	-	-	-	II
H	Circ(Bor)	P	*Poa nemoralis*	+	-	+	-	-	II
G	Circ(Bor)	P	*Equisetum hyemale*	+	-	-	+	-	II
Th	Circ(Bor)	P	*Galium aparine*	-	+	-	+	+	III
H	Eua	D	*Angelica sylvestris* ssp. *sylvestris*	-	+	1	+	-	III
H	Circ(Bor)	D	*Carex remota*	-	+	+	-	-	II
Th	Eua	D	*Galeopsis speciosa*	-	+	-	+	-	II
H	Euc(Cont)	D	*Chaerophyllum aromaticum*	-	+	-	+	-	II
H	Circ(Bor)	P	*Milium effusum*	-	+	+	+	-	III
H	Alp-E	D	*Rumex alpinus*	-	-	+	+	-	II
N	Eur	P	*Rubus hirtus*	-	-	+	+	-	II
H	Med	D	*Parietaria officinalis*	-	-	-	+	1	II
H	Eua(Med)	D	*Brachypodium sylvaticum*	-	-	-	+	+	II

Existing species in a single releve: *Elymus caninus* (1): H, Eua(Med), P; *Hypericum maculatum* (1): H, Eua, D; *Hieracium murorum* (1): H, Eua, P; *Luzula luzuloides* ssp. *luzuloides* (1): H, Eur, P; *Campanula rapunculoides* (1): H, Eua(Med), P; *Tanacetum macrophyllum* (2): H, Carp-Balc-Cauc, D; *Solanum dulcamara* (2): Ch-N, Eua(Med), P; *Ajuga reptans* (2): H, Eur, P; *Crepis paludosa* (3): H, Eur(Mont), P; *Senecio hercynicus* (3): H, Eua, P; *Gentiana asclepiadea* (3): H, Euc(Mont), P; *Mentha aquatica* (3): H-HH, Eur, P; *Cardamine pratensis* ssp. *pratensis* (3): H, Circ(Bor), P; *Dactylis glomerata* ssp. *glomerata* (3): H, Eua(Med), P; *Scrophularia umbrosa* (4): H, Eua, P; *Carex sylvatica* (4): H, Circ(Bor), D; *Equisetum telmateja* (4): G, Circ(Bor), P; *Asperula taurina* ssp. *taurina* (4): H, Eua, D; *Circaea lutetiana* (5): G, Eua(Med), D; *Circaea* x *intermedia* (5): G, Euc(Med), D; *Ranunculus repens* (5): H, Eua(Med), P; *Stachys sylvatica* (5): H, Eua, P.

Place and date of releve: 1-Eşelniţa Valley (11.05.2001); 2,3,4- Eşelniţa Valley (19.08.2000); 5- Vodiţa Valley (10.07.1999).

The most numerous biologic forms are hemycryptophytes (78%). Depending on humidity, coenosis are mesophitic (50,98%), meso-hygrophilous (33.33%), euryhidres (9.8%), depending on temperature they are micro-mesothermic (60.78%), microthermic (25.49%), eurithermic (5,88%), and depending on the soil's reaction they are euryionic species (33.33%), acido-neutrophilous (29.41%), weak acido-neutrophilous (27.45%).

The cariological spectrum has 39.21% diploid species, 56.86% polyploid species, 1.96% diplo-polyploid. The subunit value of the diploid index (I.D. = 0.67) can be explained by the relatively high frequency of the circumboreal species (18%).

Along with the circumboreal species, in the association's floristic composition, there are: Eurasian elements (40%), European elements (12%), central - European elements (10%), Mediterranean elements (6%), Carpathian (4%).

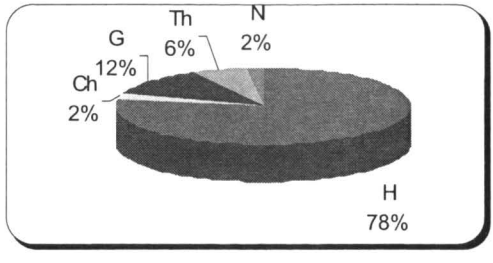

Fig. 1 Bioform spectrum of Telekio-Petasitetum hybridi association

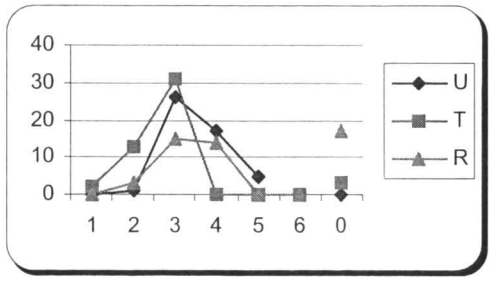

Fig. 2 Ecological indexes of Telekio-Petasitetum hybridi association

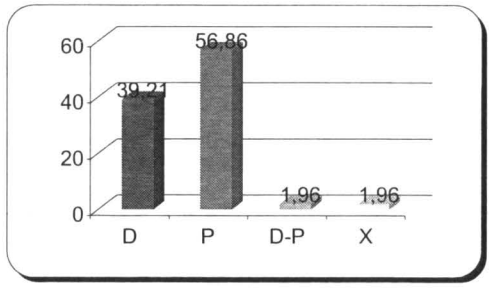

Fig. 3 Caryological spectrum of Telekio-Petasitetum hybridi association

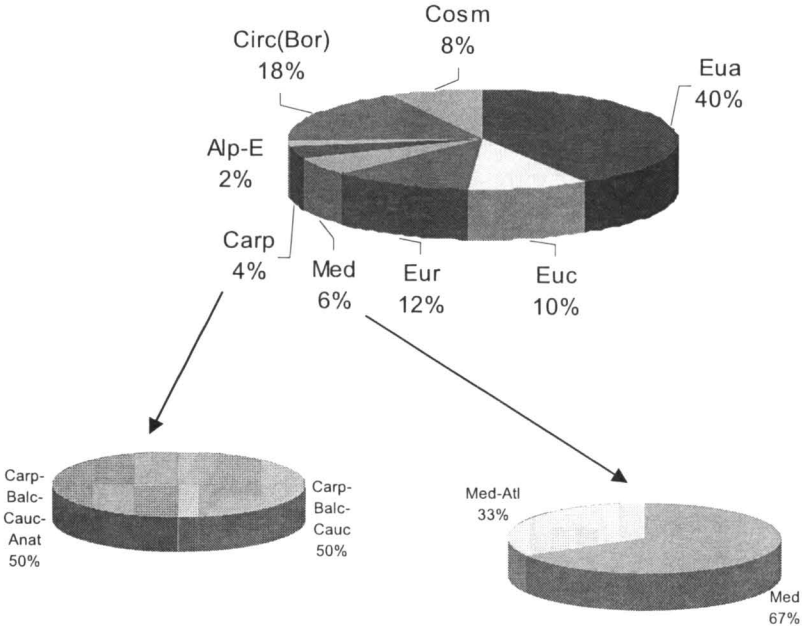

Fig. 4 Floristical elements of Telekio-Petasitetum hybridi association

Conclusions

The sites which need protection in the Europeam Community are represented by certain species of endangered plants and animals, and also by endangered habitats. *Telekio-Petasitetum hybridi* vegetal association identified in the Iron Gates Natural Park is reported to *GALIO-URTICETEA* PASSARGE ex KOPECKÝ 1969 class (Code Natura 2000: 6430, Hydrophilous tall herb fringe communities of plain and of the montane to alpine levels).

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RESEARCH CONCERNING THE BEHAVIOUR OF THE *PRUNUS SERRULATA* IN THE PROCESS OF *IN VITRO* MICROPROPAGATION

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Abstract: RESEARCH CONCERNING THE BEHAVIOUR OF THE *PRUNUS SERRULATA* IN THE PROCESS OF *IN VITRO* MICROPROPAGATION

The paper presents aspects regarding in vitro rooting and acclimatization percentages of *Prunus serrulata* var. *Kanzan* vitroplants. During in vitro rooting stage, good results were obtained using a nutrient medium with the following composition: halved Murashige - Skoog mineral salts, Linsmaier–Skoog vitamins, gibberellic acid (GA) 0.1 mg/l, indolilacetic acid (IAA) 1.0 mg/l, activated carbon 0.3 mg/l, iron chelate 38 mg/l, 30 g/l dextrose, 7 g/l agar. The substrate recommended for acclimatization of in vitro plants is composed of black peat + perlite (1:1), at pH = 6.0.

Keywords: 'Kanzan', vitroplants, rooted shoots, rooting percentage, auxins, acclimatization.

Introduction

Studies on the establishment of *in vitro* biotechnology of ornamental variety *Prunus serrulata* "Kanzan" presented till this moment described the explants and microshoots evolution during the initiation and multiplication phase (Duţă et al., 2009) (Fig.1). The research continued with the transfer of microshoots on rooting nutritive media, followed by their acclimatization.

Materials and methods

For *in vitro* rooting of ornamental cherry microcuttings resulted from the *in vitro* multiplication phase were tested six experimental variants (Table 1). The experience is bifactorial.

A Factor: The rooting nutrient medium

- ⇨ A.1
- ⇨ A.2
- ⇨ A.3

B Factor: Photoperiodism

- ⇨ B.1 – 14 hours photoperiodism
- ⇨ B.2 – 12 hours photoperiodism

For all nutrient medium variants, the basic components, macroelements, microelements, vitamins, gibberellic acid, iron chelate, dextrose, agar and activated carbon are constant and have the same

concentration, the variable factor is represented by auxin's concentration (AIA) (Table 2).

For vitroplants acclimatization, the experience was monofactorial, being tested two nutrient substrates (Table 3).

During acclimatization, the rooted shoots were passed on a substrate with light texture, treated with rooting biostimulators, ensuring high atmospheric humidity (80%) and constant temperature.

Results and discussions

Analyzing the interaction between the nutrient medium and photoperiodism (A x B), the results obtained have shown that the nutrient medium has a significant influence, the most effective one proved to be A.2 with 82% rooted plants, followed by nutrient medium A.3 with 74% rooted plants (Fig. 2). Interpreting the data regarding the interaction of each nutrient medium with each photoperiodism graduation it was found that for photoperiodism of 14 hours, the best results with 85.0% rooted plants obtained on nutrient medium A.2. Differences from other nutrient media are significant and provided statistically. For the 14 hours photoperiodism, the influence of nutrient media A.1, A.2 and A.3 on the *in vitro* rooting process is greater than photoperiodism of 12 hours. In this case we can state that the nutrient media tested are more effective at 14 hours photoperiodism (Fig. 3). The rooting period lasted 30 days. Plants obtained at the end of this *in vitro* culture stage replicate all the vegetative organs of vitroplants (Fig. 4). Looking at the interaction between the two nutrient mixtures tested as a support for acclimatization of "Kanzan" variety vitroplants, as an average effect, it is found that the highest degree of acclimatization was determined by A.1 nutrient mixture. The influence of this nutritional support is quantified to 72.0% of plants adapted, the difference from the other prescription being provided statistically (Fig. 5). The explanation of obtaining the highest percentage of acclimatized plants on nutrient medium A.1 is given by the presence in the nutrient composition of black peat and perlite, proportion of 1:1, providing continuous moisture to the substrate, comparable to that of culture vessels where plant roots occurred. Acclimatization phase was marked by the onset of plantlets active growth, emerging the first leaflets. Acclimatization period lasted 15 days (Fig. 6).

Table 1 Experimental variants for *in vitro* rooting phase

Variants	Variable factors	
	A: Nutrient medium	B: Photoperiod
V.1	A.1	B.1
V.2	A.1	B.2
V.3	A.2	B.1
V.4	A.2	B.2
V.5	A.3	B.1

V.6	A.3	B.2

Table 2 Nutrient media components tested for ornamental cherry *in vitro* rooting

Components	Medium variants		
	A1	A2	A3
M.S. Macroelements	1/2n	1/2n	1/2n
M.S. Microelements	1/2n	1/2n	1/2n
L.S Vitamins	n	n	n
Gibberellic acid(mg/l)	0.1	0.1	0.1
AIA(mg/l)	0.5	1.0	1.5
Activated carbon (g/l)	0.3	0.3	0.3
NaFeEDTA(mg/l)	38	38	38
Dextrose (g/l)	30	30	30
Agar (g/l)	7	7	7

Legend: M.S – Murashige & Skoog, L.S - Linsmaier & Skoog

Table 3 Nutrient substrates tested for ornamental cherry vitroplants acclimatization

Variable A factor Substrate components	Components proportion	pH
A.1. Black peat (Biolan) + Perlite	1:1	6.0
A.2. Red peat (Biolan) + Perlite	1:1	5.0

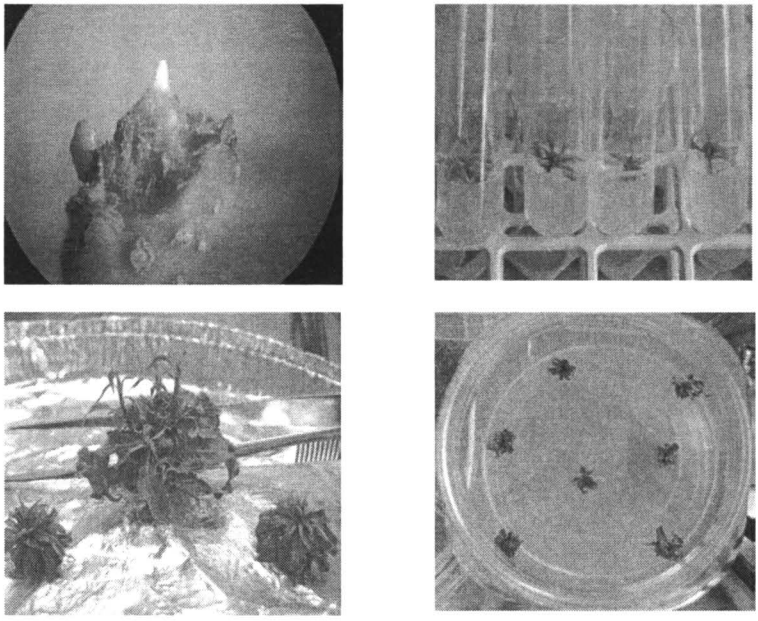
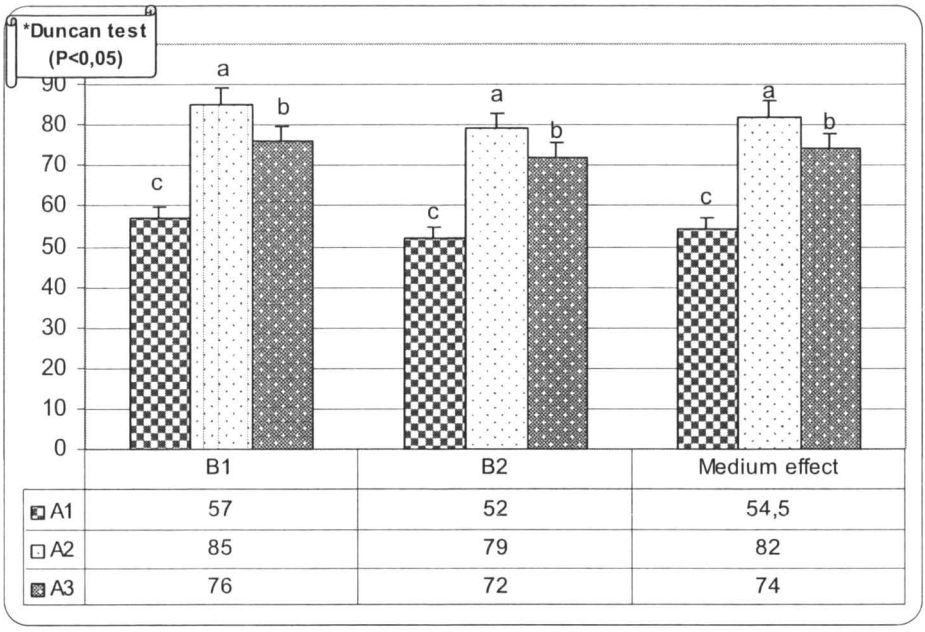
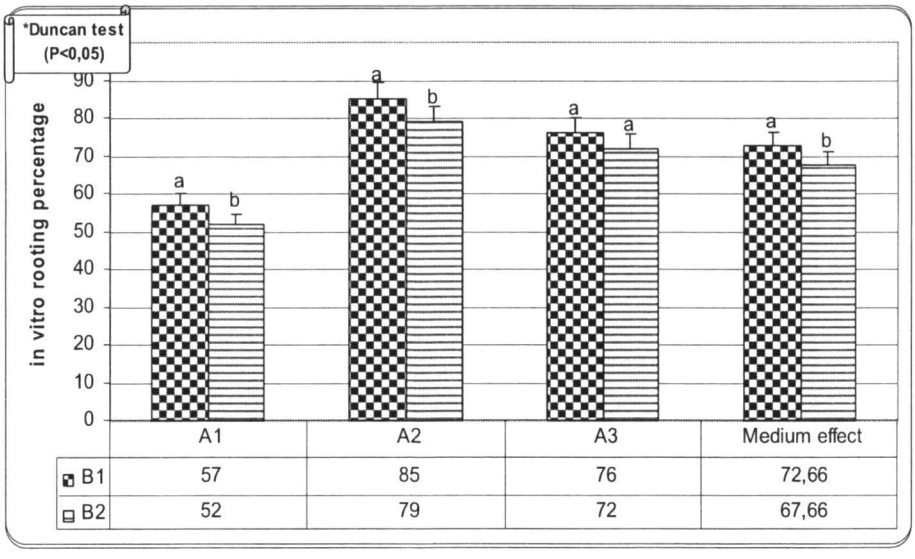


Fig. 1 Biological material for initiation and multiplication: A - meristematic tissue with 2-3 leaflets; B - plantlets obtained during initiation phase; C - shaped and distributed plantlets on multiplication nutrient medium; D - plantlets obtained in the multiplication phase



	B1	B2	Medium effect
A1	57	52	54,5
A2	85	79	82
A3	76	72	74

Fig. 2 The variation of *in vitro* rooting percentage depending on the nutrient media, for different photoperiods



	A1	A2	A3	Medium effect
B1	57	85	76	72,66
B2	52	79	72	67,66

Fig. 3 The variation of *in vitro* rooting percentage depending on the photoperiod for different nutrient media

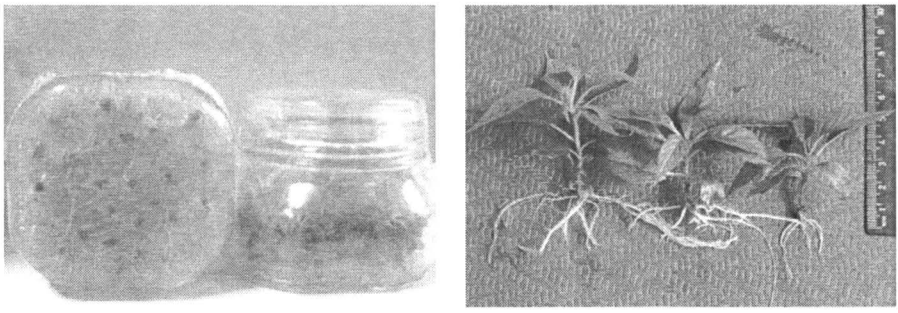


Fig. 4 *In vitro* rooted plant

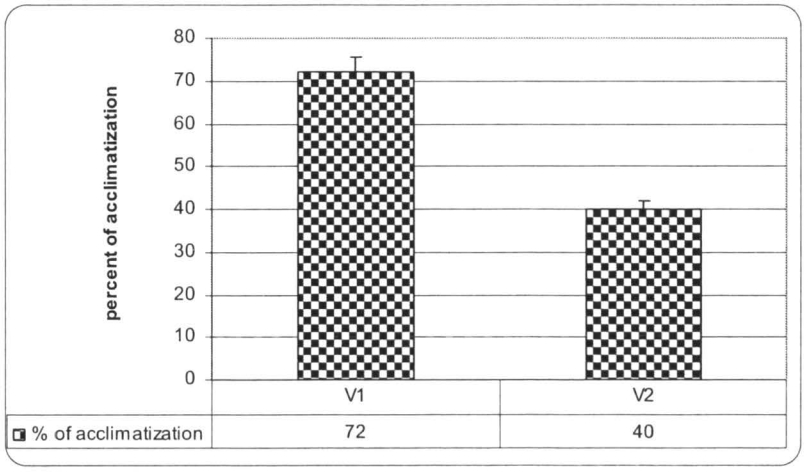


Fig. 5 The variation of adapted plants' percentage depending on the nutrient medium

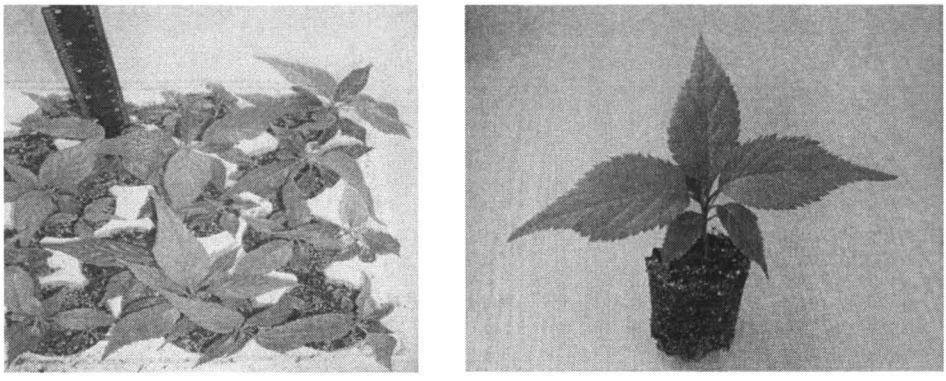


Fig. 6 Acclimatized plants

Conclusions

Studies regarding the behavior of *Prunus serrulata in vitro* culture led to the following conclusions:

1. For the rooting phase results confirm that the auxins have a substantial role in triggering and sustaining the rhizogenesis process, within certain concentrations.

2. Interpreting the interaction between the nutrient medium and photoperiodism in rooting process, the variant with the highest percentage of rooting is V.3 respectively 85%, on nutrient medium with 1 mg/l IBA and photoperiod of 14 hours.

3. The greatest acclimatization degree has occurred on nutrient mixture A.1, containing black peat and perlite 1:1.

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RESEARCHES REGARDING SOME EDAPHIC AND PHYSIOLOGICAL PROPRIETIS OF *ROSA CANINA* L. IN ECOCLIMATE CONDITIONS OF FAGARAS MOUNTAINS

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Abstract: RESEARCHES REGARDING SOME EDAPHIC AND PHYSIOLOGICAL PROPRIETIS OF *ROSA CANINA* L. IN ECOCLIMAT CONDITIONS OF FAGARAS MOUNTAINS
Brier (*Rosa canina*) is a native rose species spread in all Europe, northwestern Africa and western Asia. The hypathium are globes, sometimes ovoid, 1 - 3 cm in diameter and yellowish red or pure red when are mature. The plant is generally cultivated for its fruits. The aim of this work was to characterize the ecophysiological and edaphic parameters. We measured the leaf gas exchange, assimilatory pigments content, soil pH, hydrolytic acidity (HA), cation exchange bases sum (BC), total cation exchange capacity (CEC), cation saturation level (BS). Physiological determinations were correlated with light intensity, air temperature and humidity. The results of pH soil are part from slightly soil acid reaction category.
Key words: edaphic and physiological propriets, Fagaras Mountains.

Introduction

Rosa canina is a shrub plant which grows naturally. It grows on various land types nearby roads and forests. It is a shrub having 1-3 m high, bearing thorns with tip curved sickle-shaped bottom and strong roots developed underground. It is well known that brier grows up even in less fertile soil, fact used for entiantrosoils stabilization against earth sliding (Pârvu, 1997; Braşovean et al., 2010).

The harvesting is recommended when false fruit becomes red which means that a highest level of C vitamin is achieved. Brier fruits also contains pectin, tannins, carotenoids, flavones derivatives (Ozocan, 2002), fatty acids (palmitic, stearic, oleic, linoleic and linolenic) which were used in the cosmetic industry (Cisowski et al., 1995). They are a rich source of proteins, starch, vitamin E, sterols, and minerals and therefore are used in pharmaceutical and food industry for several specific purposes: juice, marmalade, tea, syrups, and alcoholic beverages after fermentation (Szentmihalyi, 2002).

Material and methods

Research conducted within the research project topic no. 32.120 PNCDI II which aims to identify priority in spontaneous flora *Rosa canina* valuable biotypes, their selection for breeding to produce seedlings, for establishment of a germplasm collection for ecological restoration activities of degraded lands.

The aim of this work was to characterize the ecophysiological and edaphic parameters of *Rosa canina* L. growing in Fagaras mountains ecoclimate from Romanian Carpathian. Regarding ecophysiological parameters, we measured the leaf gas exchange and assimilatory pigments content (Fig. 1). Soil analysis were representing by soil pH (Fig. 2), hydrolytic acidity (HA), cation exchange bases sum (BC), total cation exchange capacity (CEC) and cation saturation level (BS). Physiological determinations were correlated with light intensity, air temperature and humidity. CO2 concentration was recorded with the S151 CO_2 gas analyzer. Assimilatory pigments content was determinate by spectrophotometric method (in acetone 80%, using Holm's formula). The hydrolytic acidity (HA) was measured in a solution of 1 M CH_3COONa by the Kappen titration method.

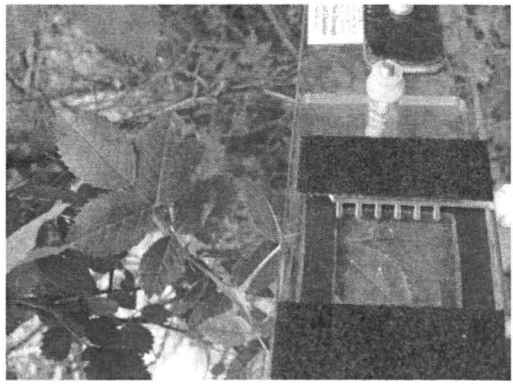

Fig. 1 Leaf chamber of CO_2 analysis package

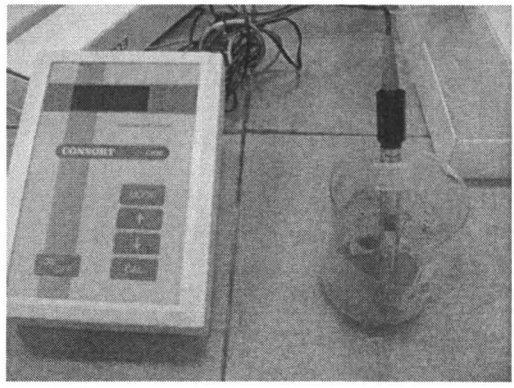

Fig. 2 pH determination

Results and discussions

pH analysis was performed by potentiometric method. soil pH value was 6.60. The results of pH soil are part from slightly soil acid reaction category.

Cation exchange bases sum (BC): Ca^{2+}, Mg^{2+}, K^{+}, Na^{+} have analyzed in Fagaras Mountains for *Rosa canina L.* had a lower value (19.21 meq 100 g^{-1} soil). Hydrolytic acidity (HA) values have registered 3.88 meq 100 g^{-1} (Fig. 3).

Total cation exchange capacity (CEC) have value of 23,09 meq 100 g^{-1} soil. Cation saturation level (BS) was calculated using the formula BS = [BC/(HA + BC)] x 100. Cation saturation level (BS) value was 83.20 meq 100 g^{-1} soil, which means that the soil for *Rosa canina* in eco climate of Făgăraş mountains from Romanian Carpathians is part from soil category with medium bases elements content.

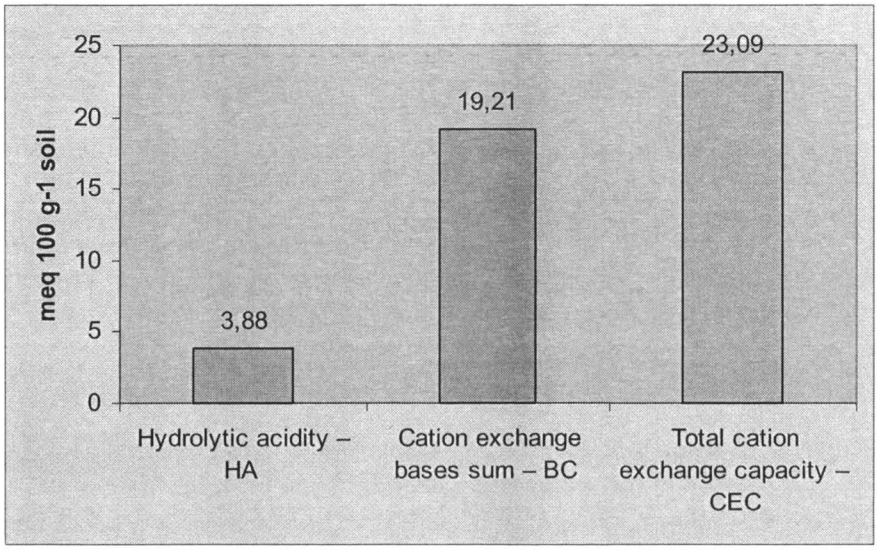

Fig. 3 Cations proprieties

Correlation between photosynthesis rate and PPFD and air temperature, and relative air humidity was studied for different level of ecological parameters, it is significant positive correlation for $p < 0.01$ level (Fig. 4). Correlation between photosynthesis rate and air relative humidity is significant negative. The results showed that the diurnal change in the photosynthetic rate was a typical bimodal curve (Fig. 4).

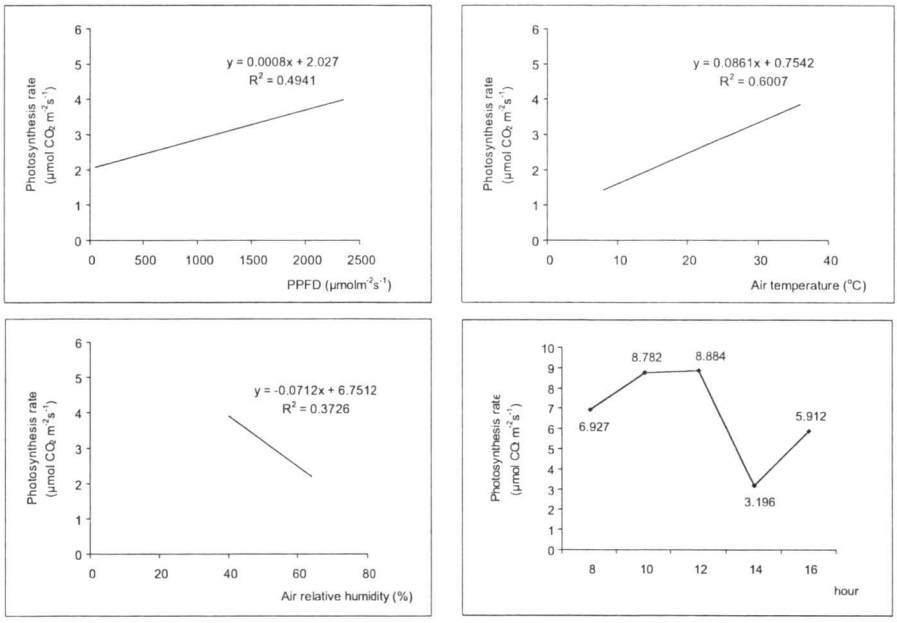

Fig. 4 Correlation between physiological parameters and PPFD, air temperature, and relative air humidity; ** correlation is significant at the 0.01 level

The analyzing of assimilatory pigments showed that the content of chlorophyll a (2.822 mg pigments/g. f.w.) is bigger than content of chlorophyll b or carotenoids pigments (Fig. 5).

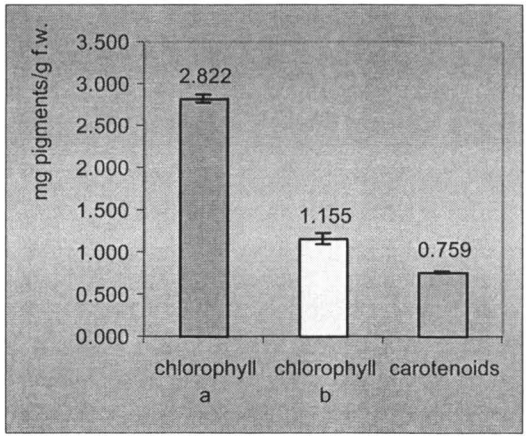

Fig. 5 Assimilatory pigments

Table 1 Photosynthesis and respiration rates for different levels of environment factors

Photosynthesis rate: 5,291 µmol $CO_2/m^2/s$ Respiration rate: 2,625 µmol $CO_2/m^2/s$ Air temperature: 24 °C Air relative humidity: 50% Light intensity: 10.000 lux
Photosynthesis rate: 9,163 µmol $CO_2/m^2/s$ Respiration rate: 3,836 µmoli $CO_2/m^2/s$ Air temperature: 25 °C Air relative humidity: 53% Light intensity: 60.000 lux
Photosynthesis rate: 6,338 µmoli$CO_2/m^2/s$ Respiration rate: 3,028 µmoli $CO_2/m^2/s$ Air temperature: 26 °C Air relative humidity: 58% Light intensity: 24.000 lux

Midday depression phenomenon of photosynthesis occurred wild rose it was jointly affected by stomatal factors and non-stomatal factors. The diurnal changes of the chlorophyll fluorescent parameters showed that photoinhibition occurred in all roses, but the wild roses were more sensible to strong light.

The reversible inactivations of PS reaction centers and the course of dissipating excess energy efficiently through non-photochemical quenching (NPQ) were the main mechanism of protecting PS reaction centres of rose leaves from damaging by strong light.

Conclusions

Ecophysiological parameters as assimilatory pigments contenting chlorophyll a, chlorophyll b and carotenoids pigments (mg/g fresh weight) were determinate by spectrophotometer method. Correlation between net photosynthetic rate (µmol CO_2 $m^{-2}s^{-1}$) and PPFD (µmol $m^{-2}s^{-1}$) or air temperature (^0C) is positive significant and for relative air humidity is negative significant. The results of pH soil are part from slightly soil acid reaction category. The results showed that the diurnal change in the photosynthetic rate was a typical bimodal curve.

The results provide important information for the propagation of species with food, pharmaceutical and cosmetic value and for elaboration of efficient strategies for achieving biodiversity conservation.

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RESTORING POPULATIONS OF *ARNICA MONTANA* BY BIOTECHNOLOGICAL METHODS

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Abstract: RESTORING POPULATIONS OF *ARNICA MONTANA* BY BIOTECHNOLOGICAL METHODS

The initiating of *Arnica montana* species has been achieved by inoculating the meristems and 2.3 primary leaves taken from vegetative tips and young shoots of buds appeared after the dormant period based on a medium MURASHIGE-SKOOG (1962) to which it added 0,005mg/l ANA; 2mg/l Benzilaminopurina; 20 mg/l NaFeEDTA; 20g/l Sucrose; 7g/l Agar. The explants multiplication of *Arnica montana.* Recorded the highest value to concentration of 0,4mg/l Benzilaminopurina.

In the phase of rooting concentration of 0.2mg/l IBA resulted in obtaining a high percentage of rooted microshoots.

The pearl stone substrate used for acclimatization resulted in obtaining of 99% rooted microcuttings.

Key words: *Arnica montana*, meristems, microshoots, MURASHIGE-SKOOG (1962) medium.

Introduction

In present, a correlation of the research - development activities with industrial and environmental policies,it can be effectively exploit a valuable sourse of raw material from nature and significantly improve resources management local/national of medicinal plants, aromatic spontaneous flora.

Material and methods

Arnica montana is an endemic species in Europa and it is prevalent in Southern Iberian Peninsula to Southern Scandinavia Peninsula.

In our country, Arnica is also found in the Carpathians, especially in Transylvania and Northern Moldavia - Suceava County, where is declared a protected species.

Arnica montana is described as herbceous and perennial plant with vegetative hibernating organs and it is known in many popular names like: Forest Chariot; Fairy Chariot, Grass Sun etc.

It is part of the Order *Asterales*, Family *Asteraceae*.

The mother plants from which the explants have been taken to initiate in vitro cultures were collected from Brusturet Keys, the plants were transferred to pots and they grown in greenhouse conditions.

The explants consisting the meristem and 2.3 primary leaves were collected from vegetative tips and axillary buds of young shoots occured after the dormant period.

The biological material was disinfected in tap water with a few drops of domestos, then was kept in alcohol (94%) for 2 minutes, after that it was used Calcium Hypochlorite (6%) for 4 minutes.

Table 1 The nutrient medium components tested in the initiation phase cultures of *Arnica Montana*

Components	V.1	V.2	V.3	V.4
Macroelements	MS1/2	MS1/2	MS1/2	MS1/2
Microelements	MS1/2	MS1/2	MS1/2	MS1/2
Vitamins	MS1/2	MS1/2	MS1/2	MS1/2
ANA (mg/l)	0,1	0,005	1,0	1,0
Benzilaminopurina (mg/l)	0,4	2,0	1,0	2,0
NaFeEDTA	20	20	20	20
Sucrose	20	20	20	20
Agar	7	7	7	7

Table 2 The experimental variants for multiplication phase of explants of *Arnica Montana*

Components	V.1	V.2	V.3	V.4	V.5
Macroelements	LF1/2	LF1/2	LF1/2	LF1/2	LF1/2
Microelements	LF1/2	LF1/2	LF1/2	LF1/2	LF1/2
Vitamins	LF1/2	LF1/2	LF1/2	LF1/2	LF1/2
AIA (mg/l)	0,2	0,2	0,2	0,2	0,2
Benzilaminopurina (mg/l)	0	0,4	0,6	0,8	1,0
NaFeEDTA (mg/l)	32	32	32	32	32
Sucrose (g/l)	40	40	40	40	40
Agar (g/l)	7	7	7	7	7

Table 3 The auxins tested for in vitro rooting of *Arnica montana* microcuttings

Variants	IBA (mg/l)	AIA (mg/l)
1.	0,2	0,2
2.	0,4	0,4
3.	0,6	0,6
4.	0,8	0,8
5.	1,0	1,0

Results and disscusions

Regardless of fotoperiod, to initiate *in vitro* cultures, the highest values of increased explants (90 - 98%), it was recorded in the V2 variant at a ratio of 0.005mg/l ANA: 2mg/l Benzilaminopurina.

The lowest values of increased explants (42 - 46%), it was obtained at a ratio of 0,4mg/l ANA: 1mg/l Benzilaminopurina in the V1 variant.

Considering the ratio ANA: Benzilaminopurina constant, fotoperiod of 16 hours recorded the best results on increasing explants (46 - 98%) unlike fotoperiod of 14 hours, where the rate of increased explants was 42 - 90%.

In what concerning the explants multiplication of *Arnica montana*, the concentration of 0.4mg/l Benzilaminopurina recorded the highest values of multiplication rate, 5 micro shoots/explant in both fotoperiods.

Increasing the concentration of Benzilaminopurina, to 1mg/l resulted in obtaining of 1.8 microshoots/explant to fotoperiod of 16 hours and 2 microshoots/explant to fotoperiod of 14 hours.

In the phase of rooting, AIA auxinic positively influenced the rooting, while increasing the concentration to 1mg/l affected the rooting. The highest value rooted microcuttings (98%) were obtained to concentrations of 2mg/l IBA.

For vitroplants acclimatization has used two typs of substrat: peat + pearl stone and simple pearl stone in make shift conditions and in automatic room.

Conclusions

In the initiation phase of *in vitro* cultures, the explants formed from meristematic tissue and 2.3 consisting of primary leaves it is inoculating on a nutritive medium formed by macroelements, microelements and vitamins MURASHIGE-SKOOG (1962) reduced to half; 0,005mg/l ANA; 2mg/l Benzilaminopurina; 20mg/l NeFeEDTA; 20g/l Sucrose; 7g/l Agar.

The nutritive medium recommended for phase of multiplication is composed of mineral salts and vitamins LEE - FOSARD (1977); 0,2mg/l AIA; 0,4mg/l Benzilaminopurina; 32mg/l NaFeEDTA; 40g/l Dextrose; 7g/l Agar.

The rooting had good results on the nutritive medium which is composed from mineral salts MURASHIGE-SKOOG (1962) reduced to half;

0,1mg/l Giberelic Acid; 38mg/l NaFeEDTA; 0,3g/l activated charcoal; 30g/l Dextrose; 7g/l Agar.

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*** http://selene.ro/articole/arnica

ENVIRONMENTAL PROTECTION USING ORGANIC TREATMENTS

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Abstract: ENVIRONMENTAL PROTECTION USING ORGANIC TREATMENTS

An efficient organic crop is based, in addition to applied technology and knowledge and use of active principles of plants. In this paper are characterized some products for environmental treatment starting from the active local plants from spontaneous flora. We want to obtain quality agricultural products without pesticide residues, but containing a balanced balance of nutrients, organic acids.

Key words: organic treatments, spontaneous flora, environmental protection.

Introduction

The organic farming, as defined in the European Union accepted, means the culture system that tends to build and maintain the productive biological systems without resorting to synthetic chemicals.

To survive, plants must cope with growing competition of about 3000 species of weeds (which can cause serious economic losses 1800), to resist the attacks of more than 50000 species of fungus (causing more than 1500 diseases), to resist the attacks of 15000 species of nematodes (which causes serious damage 1500), to resist the attacks of 800000 species of insects (of which 10 000 have devastating effects on crops).

Maintaining the health of crops, especially organic, is related to:

- use of varieties with high biological resistance against the main pathogens
- populations control pathogens by crop rotation
- appropriate use of cultural works
- use of biological control techniques
- repellent effect using natural substances.

We want to maintain plant health of crop plants by application of working methods compatible with the environment, disorientation, repelling or reducing populations of pathogenic organism's pest below economic, maintenance and / or improve sustainable soil fertility, use as much as possible, renewable resources or local area.

Material and methods

The demonstration plots we used the following materials:

- tomato and pepper seeds or certified organic planting material (seedlings)

- components of the mixtures tested on nutrient content in pesticides, heavy metals, nematodes, different stages (types) of organisms
- different types of pots
- spontaneous flora plants of local
- extracts prepared from these plants.

The research method used was randomized blocks with 3 repetitions each with 4 variants. Were used by 20 plants for each repetition and a total of 240 plants of each species. Elimination of edge effect was achieved by placing at least one plant at the beginning and end of their rows.

Having regarded to obtain organic crops seedlings planting was conducted in a greenhouse in which we have never used chemical fertilizers in the last 3 years.

Care works were carried out regular but the fertilization was done kelpak, organic fertilizer seaweed based and the phytosanitary treatments were made first with *Urtica* soak and *Equisetum* alcoholic extract and second with *Rhus typhina* infusion and soap solution. Preventive and curative treatments were made every 5-7 days until the first fruits during the ripening of the crop. It is important that successive treatments are applied with different plant extracts.

Table 1 Herbal methods of combating pathogenic organisms in vegetable species

Plant or product name, type of extraction	**Recipe**	**Application**	**Use**		**Action**
			Place	**Concentration**	
Equisetum arvense - soak - infusion - boiling	The whole plant without root: - 1kg/10 l water (green plant); - 150g/10 l water (dry plant) in addition: - 0,3 % soap; - *Urtica* soak 30 min.; - 1-2 % sodium silicate	Throughout the year Throughout the year Throughout the year Summer and spring	The plant The soil The soil The plant and soil	Diluted 5 times	Aphids, mites (red spider) to strengthen plant
Urtica dioica and ***Urtica ureas***	The whole plant without root: - about 1kg/10 l water (fresh plant) ; - 200 g/10 l water (dry plant)	Throughout the year	On the sprouting plant; The soil	Diluted 20 times Diluted 10 times	Fusariosis; Growth favor. Irrigation, bathing roots and seeds.
Soap	150 house or laundry soap, preferably paste, in 10 l water dissolve in warm water. Mix 40 g soap paste with 1 / 8 l	In case of			

	petrol (gas) in hot water, obtain a milky color, add 25 l of cold water and mix well. 100-300g soap paste, ½ l denatured alcohol, one teaspoon lime, a teaspoon salt, 10 l water; mix well.	strong infestation	The plant	Undiluted	Insecticide
Rhus typhina - alcoholic extract	Alcoholic extract of leaves	May to September	The plant		Insecticide
Dryopteris filis-mas	1kg fresh plant in 10 l water; 100 g dry plant in 10 l water, soak. 5 g high powder, ½ rainwater, extract	End of Winter Throughout the year Throughout the year	The plant and soil The trunk	Diluted 1:10 Concentrated	Aphids, snails, slugs, repellent effect in compost Against lice woolly (destruction colonies on the trunk)

Results and discussions

Preparations are insecticides for aphids, spiders and other insects, repellent for snails, slugs, and larvae of pests specific greenhouse crops. The nettle macerate has further stimulating effect on tomato plant growth and development. Use this mixture provided a healthy foliage throughout the growing season crop of tomato and pepper.

In cases where there is still some insect attacks apply additional treatment with concentrated extract of *Rhus typhina* leaves mixed with soap wetted used only on affected plants and soil around them.

Quality products are available through technology modeling biological characteristics of the variety. For example, using extracts from seaweed as foliar fertilizer stimulated the pollination of flowers, fruit development and their more uniform ripening.

Good results were obtained with the Kelpak product applied in two treatments concentration of 1% to 2% at seedling and adult plant during flowering and fruit binding.

Herbal extracts are actually nutrient solutions containing organic compounds and mineral assimilated through stomata and leaf cuticle of plant cell culture and in addition, compounds with repellent effect.

Conclusions

Reducing populations of pathogenic organisms from fungus group (such as *Pythium debarianum*, *Fusarium*, *Rhizoctonia* etc.) can be achieved by producing seedlings in pots.

Maintain populations of pathogenic organisms below the minimum pest in organic crops can only be achieved when using a complex of measures.

Biopreparations effects are not as spectacular as those of synthetic chemical substances but enough to get a healthy crop and a good commercial aspect.

Efficient organic crops are based, in addition to applied technology and the knowledge and use of active principles of plants from local spontaneous flora.

Application of friendly soil and plants in an agricultural ecosystem in general, and in a vegetable ecosystem, especially, contribute to the conservation of renewable resources within the concept of sustainable agriculture.

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STUDY REGARDING THE IDENTIFICATION OF MEDICINAL AND AROMATIC HERBS NEAR PORT-ROMANIA IRON GATES NATURAL PARK

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Abstract: STUDY REGARDING THE IDENTIFICATION OF MEDICINAL AND AROMATIC HERBS NEAR PORT-ROMANIA IRON GATES NATURAL PARK

This paper present the general considerations on the natural environment in which investigations were researched in the Iron Gates Natural Park. The area within the the Iron Gates meets a rich and interesting vegetation characterized by the abundance of species. For example, only part of the island Danube Orsova Simian and includes 1253 species, plus another 841 species in the Danube Gorge, more than half of the total number of species in Romania. The area Iron Gates includes a number of territories or the beauty of landscape, or by the acre scientific interest is representing the flora and fauna that have been put under protection in the form of reserves.

The investigated area is valuable in terms of overall wealth vegetation and the presence of a large number of valuable medicinal and aromatic species, representing a national rich.

Key words: medicinal and aromatic herbs, Iron Gates Natural Park.

The general considerations on the natural environment in which investigations were researched

Relief

Where the Danube begins to be close to the Carpathian belt, making his way to shedding weight, gaining relief appearance changes peisagistige original values. The walls rocky of protect the Danube, sometimes seething, which is struggling to escape from this wild gorge. The landscape completely different from upstream or downstream of that arouses most interest, doubled as the many objectives which increase the attractiveness. Relief, the essential component of the natural, takes different forms and is the southern part of Mehedinti the plateau, called the mind of the consumer-Alion. It presents a series of steps that descends gently from north to south. The highest scale is the south-eastern extensions Godeanu Mountains, which rises about 2000 m peaks, though cautiously guarding Cerna Valley. Along the mountain ridges undulate their Cerna Valley and Mehedinti Mountains, in which stem Timis-Cerna corridor suddenly. Apart from this corridor rises and modest attitude Almaj mountain peaks, mountains Locvei

continued west. South within he Iron Gates descends from Mehedinti Plateau to the plains and terraces along the Danube that sequence. The Mehedinti Plateau is flanked to the east of depression contact one lane, well individualized and tongue-Comanesti Halanga depression, depression basins represented by arm-wilt, Bala, Craguiesti, Sovarna, Ilovat, Halanga, Malovat and that of Severin. Depression of Severin is the biggest presenting her with a hilly terrain with average height of 50-150 m. In this depression are well developed Danube terraces that give the appearance generally suspended above the river plain at 40-45 m relative altitude.

Climate

The Iron Gates area, its geographic location, landscape fragmentation ratios and wide corridor along the Danube presence has a temperate continental climate with local nuances. Following the local factors and general influences climate, the annual number of days with overcast vary between 80-110 days and the sun shines year varies from 1500 hours to 2200 hours mountaine regions in lowland regions.

All the while the year, but especially in winter above the place invasions air masses and warm humid Mediterranean and oceanic origin. Following this phenomenon are milder winters, precipitation is in the form of sleet and snow. Predominant the winds from the west and southwest, and frosts occur infrequently. The summers are generally warm, with temperatures sometimes over 35 degrees Celsius, due to the hot tropical air invasion. In some summers in the south-eastern county of The Mehedinti place dryness and drought phenomena, continental air from the arrival of east-northeast.

The air temperature

Following the Mediterranean influences of air masses and tropical air temperature values in this part of the country are regarded as some of the largest across Romania. From Drobeta Turnu Severin, the average annual air temperature is 11.7 degrees Celsius, which decreases in value and the region of piedmont Motru the Mehedinti Plateau at 4-6 degrees Celsius. The winter is milder especially in regions with lower relief shelter located in the mountains. The average December is 1.3 degrees celsius in January and -1.0 degrees of February by 0.9 degrees celsius. The summer is generally warm and sunny and the average temperature exceeding 20 degrees Celsius. The Mehedinti Plateau region and the mountains as a result of a whole complex of factors (slope exposure, the presence of limestone rock which has a large albedo topoclimate meet very different from one place to another (topoclimat the valleys, the slopes, the cornets etc).

In this area of the country the absolute maximum and minimum temperatures were recorded according to the penetration of polar air masses and the warm, tropical.

The absolute minimum temperature recorded was - 26.6 degrees Celsius on February 22, 1929 and the absolute maximum temperature was 40.9 degrees Celsius to august 17, 1952 (both in DrobetaTurnu Severin. The aspect softer of climate in the Mehedinti County is proven and the average

number of days of winter, here is 20-25, those with frost face 85-105 80-110 days of summer and 20-40 days very hot (tropical).

Precipitations

Precipitation, as a direct result of submediterranean influences is relatively high throughout the year recorded two maximum: one in May - June and the second in November.

The largest amount of precipitation is liquid, besides winter snow often falls usual precipitation as rain and sleet.

The most precipitation is occurring in spring and late autumn. The maximum quantity annual precipitation was recorded in 1944 of 1247, 7 mm, and the minimum in 1907 of 328.5 mm in Drobeta Turnu Severin.

The snow is produced inconsistent across the area, days with snow and with snow rising from the Danube Gorge to the mountains. In the sectors recorded lower first snow in December escalating frequently in January. The mountainous region is longer extending to April 100-120 days, with snow from the 20-25 days and 50 days gorge plateau. Less abundant snow in some areas make to Baile Herculane snow depth is reduced, this oscillating in January - February average of around 10 cm.

Winds

The Iron Gates area is under the dominant influence of the movement areas west, northwest and North West to a lesser extent. The average wind speed reaches 6-7 m in mountain areas and in the gorge and below this value in Mededinti plateau. Maximum speeds reach 20 m/s, being more common in the Danube Gorge and the mountains.

The characteristics of these areas are generated by local winds present relief steps, "Cosava" the Danube Gorge (cold wind sometimes produces a temperature drop and reaches speeds of up to 20 m/s), "fohn"-ul specific slopes eastern the plateau and mountains Mehedinti mountain breeze Almaj and The Mehedinti mountains region and mountain breezes along the Danube.

Relative air humidity

Relative air humidity is an essential factor in plant and animal life. It is distributed neuniformly due to the influence of local sources of evaporation, vegetation coverage and altudinal area. The source of evaporation, which provides humidity, is the Danube and its tributaries. The average values annual air relative humidity oscillates around 70%, is higher above the Danube waters.

The maximum values recorded in winter are very large temple: 89% (Orsova - January - December), 88% (Drobeta Turnu Severin - January), 86% (Drobeta - Turnu - Severin - December), as determined by frequent advection cold air, adiabatic air cooling during nights which favors thermal inversions. In July, when the air temperature recorded most values have very low relative humidity (62-67%).

Hydrography

The water resource are represented by ground water (groundwater and depth) and superficial (rivers and lakes). They constitute the part of

geographical landscape with important implications in the tourism activity through changes spectacular landscape and the opportunity to develop a resort (Baile Herculane).

The waters Romanian Danube in the gorge of the river is fed by a network that has its origin in the mountains Locvei, Almaj, Cerna and The Mehedinti. Among the Orsova and Drobeta-Turnu-Severin, the Danube flows into the biggest river of bodies across the sector, this confluence Cerna river basin with the large (1380 square kilometers) and longest (82 km square). The Cerna has one of the most asymmetric basins in the country in that it collects on its right bank the largest tributaries (Mehadica, Belareca) which drains about 95% of the entire basin. Downstream from Danube Orsova now receives several tributaries and smaller in area and length as Vodita and Jidostita Bahna. Apart from running water in the port area of rolling landscape and water meadows are parts of some natural and anthropogenic origin lakes. The natural lakes are few, limited in scope and related exclusively limestone formations of the the Mehedinti Plateau.

The karst lakes appear Zaton and Ponoare existing small drainage upstream and downstream of each of a stream: Great Valley Ghiorghiesti, respectively). Barrage the lakes built on the Danube and The Cerna is particularly important both in economic and tourism (The Iron Gates Lake, Lake Iovan).

The springs are home to Bath Herculane vadoasa and artezian. Constanța flow regime, except the spring Hercules I, mineralization of 3-6 g/liter and temperature of 40-60 degrees Celsius have made here is develops Baile Herculane.

Soils

As a consequence of the combined and simultaneous action of climate, terrain and vegetation, soils of this region presents a wide range. With the exception of depression, they are generally shorter, high skeleton content and soils with deeper red than corresponding, the same type's genetige, and other regions. In addition, they are largely affected by erosion especially on the southern slopes of the valleys. M. Spirescu and N. Muica in the region identified a range of soils automorphy from reddish-brown soil until brown acid soils. The soils are generally reddish brown podzolic, except those on the terraces slopes. The most representative are those on the terrace Drobeta Turnu Severin, who have a strong textural differentiation and reddish color in the horizon iluvial net.

The soils brown podzolic and brown, developed Miocene conglomerates and crystalline schists, also have poor textural differentiation. The soils podzolic argiloiluvial appear only at the confluence of the Danube valley with the valley Jidostita. They are generally pseudogleizate. The soils brown acid are common in crystalline schists of the the Mehedinti the plateau the plateau, especially on the northern slopes are forests of beech and hornbeam.

Apart from mentioned soils are frequently poorly developed soils also cover both the alluvial depressions November (alluvial soils and meadow

brown soil and alluvial terrace) and on steep slopes (soil skeleton, regosoils, ranker soils). The massive limestone M. Popovat and M. Spirescu in 1957 identified cornet soils (terra rosa), strongly eroded.

Vegetation

The area within the the Iron Gates meets a rich and interesting vegetation characterized by the abundance of species. For example, only part of the island Danube Orsova Simian and includes 1253 species, plus another 841 species in the Danube Gorge, more than half of the total number of species in Romania. In addition, the mountain is a veritable botanical garden Domogled being considered the place with the richest flora in Europe.

The vegetation of this area comprises over 30% Asian and European euro elements, the general fund of the vegetation is dominated by elements submediterneene however, and east balkan mediterneene whose period activ vegetation is placed in the first half, when making remarkable scenery. The plants specified block of Mediterranean, tulip of boilers, the Dalmatian gladiola, yellow iris, pasqueflower large turkish cherry, wild walnut, fig, saffron ivy, bindweed spanish, laurel, lilac, etc. The beginning of may nearly all the slopes and the the plateau the Mehedinti Mountains are covered by large areas of hornbeam trees compact, expensive, bat that turns into true lilac brane (Ponoarele, the Cerna-peak and Nadanova).

A special interest in the the Iron Gates presents forests, characterized by great diversity, contributing to the creation of aesthetic images of great value throughout their growing period. For the Iron Gates are characteristic of the forests but thermophilic elements which contain besides the species mentioned and loving species such as mosdreanul ed caldera, three-lobed maple, hazel Turkish black pine of Banat. In housed valleys and depressions and slopes increase with Balkan beech southern and southwestern exposure increases pubescent oak. Shade of the valley slopes were installed beech forests mixed with hornbeam and beech Caucasus. In the vicinity Monastery Vodita meet Turkish hazel woods mixed with evergreen oak.

The area has an important role in the surrounding forests Bala and Herculane Baile, influencing them to the local climatic conditions by reducing wind speed, air filtering pollutants, sunlight intensity and mitigating temperature extremes, thus participating in creating a favorable business and leisure resorts. In the northern area of the Iron Gates in the Mountains Godeanu, the Mehedinti and Cerna, there are coniferous forests and mountain vegetation in the gap grass, very rich and varied in species and color.

The area Iron Gates includes a number of territories or the beauty of landscape, or by the acre scientific interest is representing the flora and fauna that have been put under protection in the form of reserves, some foreskin to be included as national parks (Domogled-Cerna Valley).

The plants medicinal and aromatic identified territory of The Iron Gates

The researches following conducted between 2009 and 2011, the said territory has identified the following herbs and medicinal: *Huperzia selago* (L.) Bernh. ex Schrank et Mart. (*Lycopodium selago* L.), *Equisetum arvense* L., *Dryopteris filix-mas* (L.) Schott (*Neophrodium filix-mas* (L.) Strempel, *Ephedra distachya* L., *Helleborus odorus* Waldst. et Kit, *Chelidonium majus* L., *Fumaria officinalis* L., *Saponaria officinalis* L., *Humulus lupulus* L., *Urtica dioica* L., *Parietaria officinalis* L., *Parietaria erecta* Mert. et Koch, *Juglans regia* L., *Rosa canina* L., *Agrimonia eupatoria* L., *Geum urbanum* L., *Fragaria vesca* L., *Crataegus monogyna* Jacq, *Crataegus pentagyna* Waldst. et Kit, *Cytisus scoparius* (L.) Link. (*Sarothamnus scoparius* (L.) Wimm., *Sarothamnus vulgaris* Wimm., *Spartium scoparium* L.), *Melilotus officinalis* (L.) Pallas, *Euphorbia amygdaloides* L., *Euphorbia cyparissias* L., *Conium maculatum* L., *Hypericum perforatum* L., *Viola arvensis* Murray, *Viola odorata* L., *Viola tricolor* L., *Alliaria petiolata* (Bieb.) Cavara et Grande (*Alliaria officinalis* Andrz.), *Capsella bursa-pastoris* (L.), *Salix alba* L., *Salix fragilis* L., *Salix purpurea* L., *Tilia cordata* Mill., *Tilia platyphyllos* Scop, *Tilia tomentosa* Moench (*Tilia argentea* DC.), *Althaea officinalis* L., *Cornus mas* L., *Vinca minor* L., *Vincetoxicum hirundinaria* Medicus (*Cynanchum vincetoxicum* (L.) Pers.), *Galium odoratum* (L.) Scop. (*Asperula odorata* L.), *Galium odoratum* (L.) Scop. (*Asperula odorata* L.), *Sambucus ebulus* L., *Sambucus nigra* L., *Viburnum opulus* L., *Valeriana officinalis* L., *Convolvulus arvensis* L., *Atropa belladonna* L., *Datura stramonium* L., *Pulmonaria officinalis* L. (*Pulmonaria officinalis* L. ssp. *maculosa* (Hayne) Gams), *Symphytum officinale* L., *Anchusa officinalis* L., *Gratiola officinalis* L., *Verbascum nigrum* L., *Verbascum phlomoides* L., *Verbascum thapsus* L., *Digitalis ferruginea* L., *Digitalis grandiflora* Miller (*Digitalis ambigua* Murr., *Digitalis ochroleuca* Jacq.), *Digitalis lanata* Ehrh., *Veronica officinalis* L., *Verbena officinalis* L., *Leonurus cardiaca* L. (*Cardiaca vulgaris* Moench), *Achillea millefolium* L., *Chamomilla recutita* (L.) Rauschert (*Matricaria chamomilla* L. pro parte, *Leucanthemum vulgare* Lam. (*Chrysanthemum leucanthemum* L.), *Artemisia absinthium* L., *Tussilago farfara* L., *Carlina acaulis* L., *Centaurea cyanus* L., *Cichorium intybus* L., *Taraxacum officinale* agg. Weber, *Asparagus officinalis* L., *Colchicum autumnale* L., *Elymus repens* (L.) Gould (*Agropyron repens* (L.) Beauv.), *Acorus calamus* L. (*Acorus odoratus* Lam., *Acorus vulgaris* Simk.).

The investigated area is valuable in terms of overall wealth vegetation and the presence of a large number of valuable medicinal and aromatic species, representing a national rich.

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THE AGE-BASED STRUCTURE FOR UROPODINA POPULATIONS (ACARINA: ANACTINOTRICHIDA: UROPODINA) WITH PARTHENOGENETIC REPRODUCTION

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Abstract: THE AGE-BASED STRUCTURE FOR UROPODINA POPULATIONS (ACARINA: ANACTINOTRICHIDA: UROPODINA) WITH PARTHENOGENETIC REPRODUCTION

The present paper puts forward the structure upon age criterion and the succession of generations for the populations of certain Uropodina species with parthenogenetic reproduction (*Urodiaspis tecta, Trachytes aegrota* and *Trachytes tesquorum*). The research has been conducted on a 2 years period (2003-2004), in 3 forest ecosystems (Făget, Budeasa and Mărăcineni), using a graphical method for the illustration of the generations' succession. In the researched populations, a generation takes from 6 to 13 months, with 2 complete generations in the 2 research years.

Key words: Uropodina mites, parthenogenetic species, the structure of the populations upon age, succession of generations.

Introduction

There is relatively little research on the ecology of Uropodina populations, and most of them have targeted the establishment of a numerical dynamic for certain populations (density dynamic), not so much the demography (establishing a structure on age, duration for stages of development, distribution of the development stages in population). Researcher Marina Huţu studies the variation of the populations according to seasons for 13 Uropodina species in a mixed deciduous forest in N Moldavia (Huţu, 1978), and reaches the conclusion that, in the respective conditions, the Uropodina have had up to 4 generations per year. Bloszyk and col. (Bloszyk, 2006) study the demographics of *Cilliba rafalskii* species in a mixed deciduous forest litter, near Pniewy, and concludes that it has 1 year life cycle.

Studies of more length on the Uropodina demographics are conducted by Francoise Athias-Binche, who identifies development duration from larva to adult of 8 to 11 months for *Olodiscus minimus, Neodiscopoma catalonica, Urodinychus carinatus* and *Trachytes lamda* species from beech forest in Massane, thus having 2 complete generations in 2 years of research (Athias-Binche 1985, 1989).

Interesting demographic data are obtained by the author on the population of *Allodinychus flagelliger* species, which she studies for 6 years,

with samples took from the trunk of a decomposing beech (Athias-Binche, 1978). In this case the mean development duration from larva to adult was of 12 months; with a maximum of 22 months because deutonymphs are foretics (present a passive movement, attaching to bugs, and leave the tree in spring time to return during autumn, thus the much extended length of the life cycle).

Useful information on the length of the life cycle of Uropodina mites have been provided by the growing individuals in lab conditions (Athias-Binche & Haberssat, 1988; Constantinescu et al., 2007; Huţu, 1978). It has been observed that in lab conditions, Uropodina reach maturity much quicker (3-4 months), as compared to individuals from the populations studied outdoors, due to favourable conditions of humidity and temperature.

The purpose of the present research has been of establishing the age-based structure and the generations' succession for 3 species of litter Uropodina (*Trachytes tesquorum, Urodiaspis tecta* and *Trachytes aegrota),* which have been observed on a 2 years period, in 3 forest ecosystems near Piteşti (Făget hornbeam-beech forest, Budeasa hornbeam-oak forest, and Mărăcineni hornbeam forest).

Material and methods

For the present research, 720 samples of litter (of 100 cm^2 surface) have been collected monthly, on a 2 years period (2003-2004), and a total of 5265 Uropodina individuals were identified (1426 individuals from *Urodiaspis tecta* species, 1772 from *Trachytes aegrota* and 2067 from *Trachytes tesquorum*).

Sample extraction has been made after Tullgren-Berlese method, modified by Balogh that is based on the extreme sensitivity of edaphic fauna to dryness and light. It leaves the sample as soon as it notices a lowering of humidity, by migrating to the basis of the sample, from where the animals fall in plastic collecting with alcohol.

After the extraction from the sample of the fauna material, the content of the collecting tube has been displayed on filter paper and, upon binocular magnifier, the Uropodina species have been separated from the rest of the soil fauna. All the Uropodina individuals have been kept in lactic acid for clarifying, afterwards determined up to the species. A data sheet has been made for each sample, containing the place from which the sample was collected, the date of collection, biotope, number of females and pre-adults (larvae, deutoymphs, and protonymphs) for each species. For the pregnant females, the number of eggs found in the endogynium has been marked.

In order to identify the succession of the generations and the number of generations on the 2 years of research, a very important indicator was the number of eggs of the females. The data obtained through lab growing of Uropodina species show that the females can lay between 30 and 60 eggs in their entire life, and the microscope examination usually reveals 2 up to maximum 4 eggs at the same time in the endogynium. They are laid one by one at 24 hours distance, predominantly in certain periods determined both

by the genetic constitution of the species, and the congruence of a complex of favourable environment conditions.

Because of laying the eggs gradually, the identification of the life duration of each development stage is difficult; nevertheless, one can estimate the duration of a generation and the succession of generations. The period when a peak in the number of females was observed, as well as a large number of eggs in endogynium, coincides with population maximum in the respective generation. This maximum has been followed by the decline of the number of females, for after laying eggs and fulfilling the role of species perpetuation, they live 2 more months at most. From the eggs laid by one generation, especially in the maximum of population period, the next generation is formed. In other words, the population peak of one generation and an increased number of eggs mark the beginning of the next generation, and in one, two months at most after this peak, the adults of the initial population are mostly gone. One can observe that the two generations partially overlap.

In order to establish a structure based on age, succession and duration of the generations of the studied Uropodina populations, I have used a graphic method. For *Trachytes tesquorum*, *Urodiaspis tecta* and *Trachytes aegrota* species that multiply asexually through thelytok parthenogenesis, the lack of males and the presence of a large number of eggs in the females have simplified the interpretation of the graphics and identification of the succession of the development stages.

An inconvenience in establishing the succession of the generations and the number of generations per year was the reduced number of larvae from the samples. The explanation is on one hand, that they are very fragile and little and most of them destroyed during extraction. And on the other hand that they represent the development stage of the most reduced duration and, as a consequence, the probability of capturing them is very low compared with the other stages.

Results and discussions

The aged-based structure and the succession of the generations for the populations of *Urodiaspis tecta* species. As the graphics below demonstrate, *Urodiaspis tecta* species develops best in the second year of study. In Făget (Fig.1) a first important generation of females appears in February - April 2003, when one can also observe a large number of deutonymphs, successively exuviating and becoming adults up until April. The females of this first generation lay eggs in February - April, afterwards larvae appear, (a small number appears in samples in July) the protonymphs starting July, and deutonymphs from July to November. Deutonymphs exuviate and transform into the females of the second generation, appearing in December 2003 - February 2004. In this last period, a very important number of eggs are to be observed in the females, from which the 3rd generation of the population appears. The eggs are laid by the females until February, protonymphs appear step by step in November 2003 - February

2004 interval, they exuviate, and starting with March one could observe the deutonymphs. Deutonymphs gradually transform into females, in April-July interval, when the females of the 3rd generations appear. They lay a large number of eggs, from which the 4th generations of protonymphs appear (determined in samples in July), then deutonymphs in September - November. Deutonymphs exuviate in their turn, and the females of the 4th generation appear in October - December, and start laying eggs preparing the next generation.

In Budeasa hornbeam-oak forest (Fig. 2) a big proportion of pre-adults (larvae, protonymphs and deutonymphs) appear in February 2003 and exuviate gradually until May, transforming into the first generation of females of the year, with a maximum in April, from which the protonymphs of the 2nd generation will appear in June-September, deutonymphs in July-November, and the 2nd generation of females in July - October. The females of the 2nd generation lay eggs in October - December, from which the larvae of the 3rd generation appear in January - February 2004, protonymphs in January - March, deutonymphs in May - June, and through their exuviations the 3rd generation females appear in May - August. The 3rd generation of females lays eggs in May - June, a small number of larvae appear in June samples, from which protonymphs will appear in August - October, then deutonymphs from September - December will gradually exuviate and the 4th generation females will appear starting October. In this month a large number of eggs can be observed in the females' endogynium, from which a new generation of larvae will appear (they are observed on the graphic of December).

In Mărăcineni hornbeam forest (Fig. 3) a first generation of females appears in March - May 2003, in May 2nd generation eggs are identified in the females, from which larvae soon appear (the same month), then protonymphs until the end of July, deutonymphs and the females of the 2nd generation in September 2003 - February 2004. The females of the 2nd generation lay eggs gradually until February, protonymphs appear until April and deutonymphs in February - May. They exuviate and the 3rd generation of females appears in May - August. A peak of pregnant females in observed in May (a large number of eggs), in June - July the larvae leave the eggs, in July and August protonymphs appear, deutonymphs are afterwards observed in samples until December. From these deutonymphs the 4th generation of females appears, with a maximum in November - December. These females lay eggs in November - December, and the larvae of a new generation appear.

One can observe that in the case of this species, the length of a complete development cycle is in between 6 and 8 months, and longer in autumn-winter; during the 2 years of studies, only 2 complete generations were identified. Also, the maximums of the populations do not coincide with a new generation emerges in the population. A new generation coming to place is clearly marked, besides the population peak, by the presence of a

large number of eggs in the females' endogynium and, in the next stage, by the presence of larvae in samples.

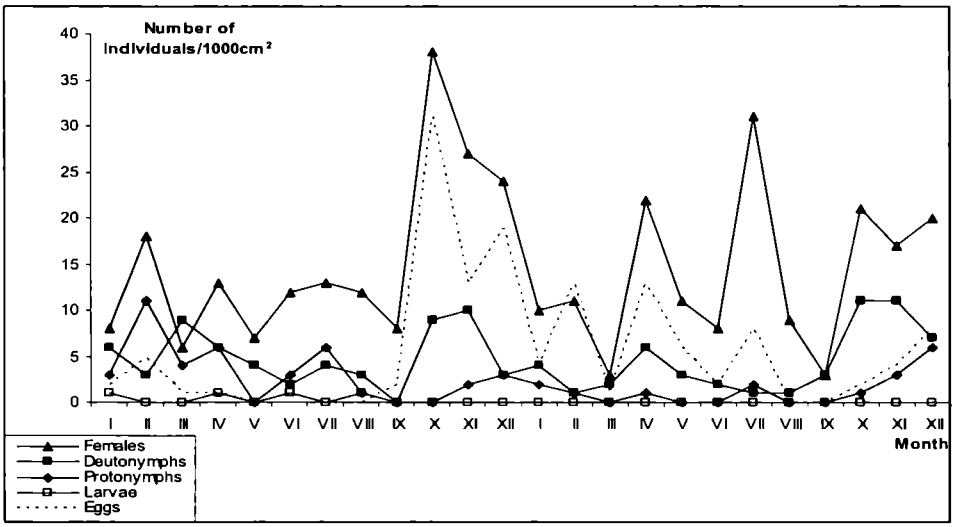

Fig. 1 Phenology of the *Urodiaspis tecta* population in the hornbeam-beech forest from Făget

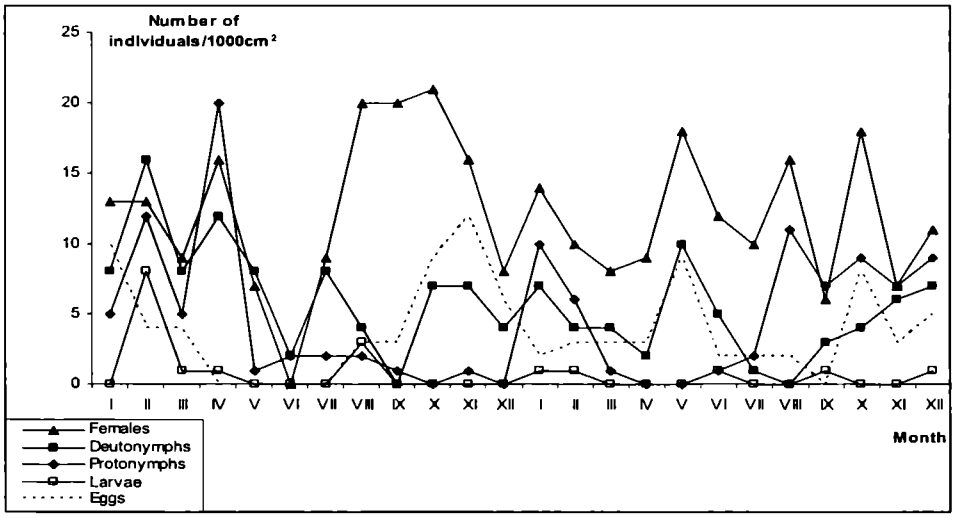

Fig. 2 Phenology of the *Urodiaspis tecta* population in the hornbeam-oak forest from Budeasa

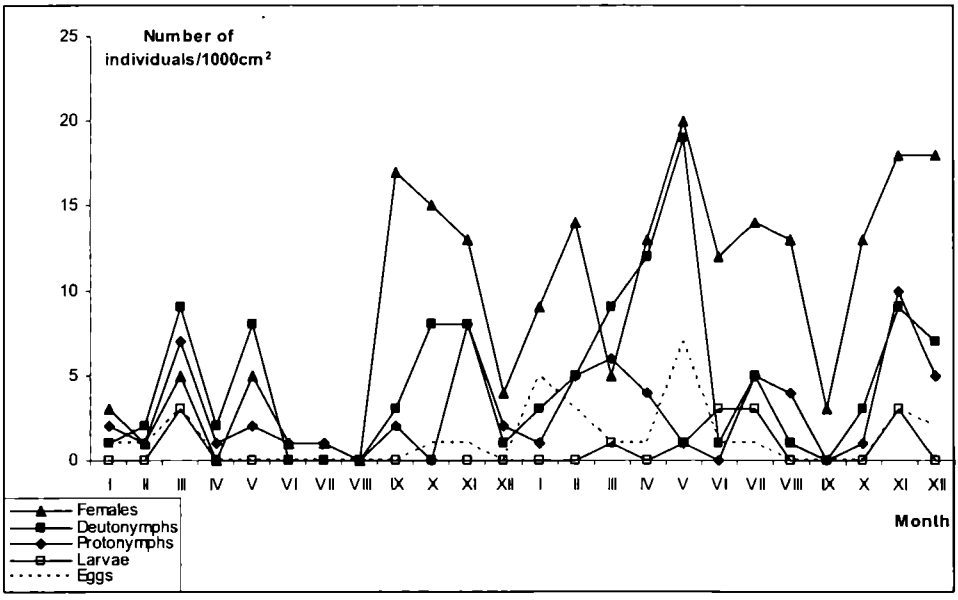

Fig. 3 Phenology of the *Urodiaspis tecta* population in the hornbeam forest from Mărăcineni

The aged-based structure and the succession of generations for the populations of *Trachytes aegrota* species. This species is better developed in Făget and Budeasa, while in Maracineni one could observe a decline in number, especially in 2004.

In hornbeam-beech forest (Fig. 4) a 1st female generation appears in February - April 2003, and lay eggs in a prolonged interval of several months (February - June), protonymphs start appearing in June - July, deutonymphs in April - September, and in October - December, a 2nd generation females appears. The females have a large number of eggs in the endogynium, and they are laid in November 2003 - April 2004. Protonymphs of the 3rd generation are observed in July, and deutonymphs in July - August. The 3rd generation females appear starting August, but the maximum of this generation of females is in December, when a large number of eggs are also laid, marking the next generation emerges.

In hornbeam - oak forest (Fig.5) the 1st generation of females appears during February - April 2003 period, but a significant proportion of protonymphs and deutonymphs from this generation still appear which will later exuviate. The 1st generation females lay eggs especially in February - March; protonymphs appear in June - September, deutonymphs in August - November, and the 2nd generation females in the same period. The 2nd generation females appear in the sample for a long time, until May 2004, and the eggs are laid gradually throughout this entire period; larvae appear in samples in July, protonymphs especially in July - August and most of deutonymphs in August - November. Deutonymphs exuviate and become

the 3rd generation females, especially in October - December, while in December a large number of eggs appears, marking the beginning of a new generation.

In hornbeam forest population (Fig. 6) a first generation of females appears in February - April, but here too a large number of protonymphs and deutonymphs are not yet exuviated and this will happen later, prolonging the 1st generation of females up to July. The 1st generation females lay a large number of eggs in February - April, from which 2nd generation of protonymphs appear in July and deutonymphs in July - October. Through their exuviations, the 2nd generation of females appears, with a maximum in October. Continuing, the 2nd generation females lay eggs in December 2003 - March 2004, but the population suffers a very important decline and the larvae, protonymphs and deutonymphs mostly disappear, those that resist reach maturity in July, providing the 3rd generation females, afterwards the population maintains a surviving limit number until the end of 2004.

One can observe that in the case of this species 2 complete generations appear in the 2 years of research, and the length of these generations varies very much, from 8 - 9 months in the first year of study, to 13 months in the second.

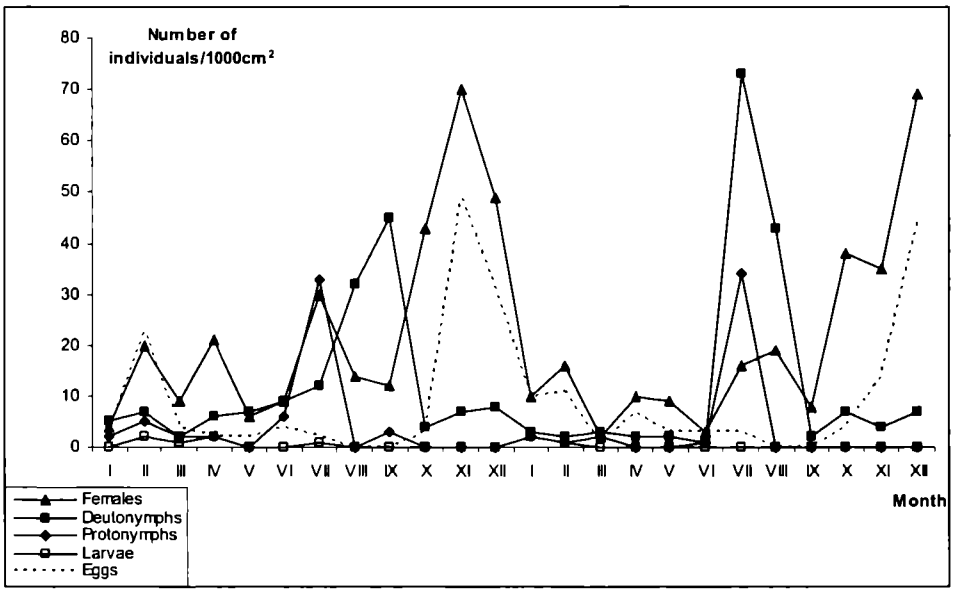

Fig. 4 Phenology of the *Trachytes aegrota* population in the hornbeam-beech forest from Făget

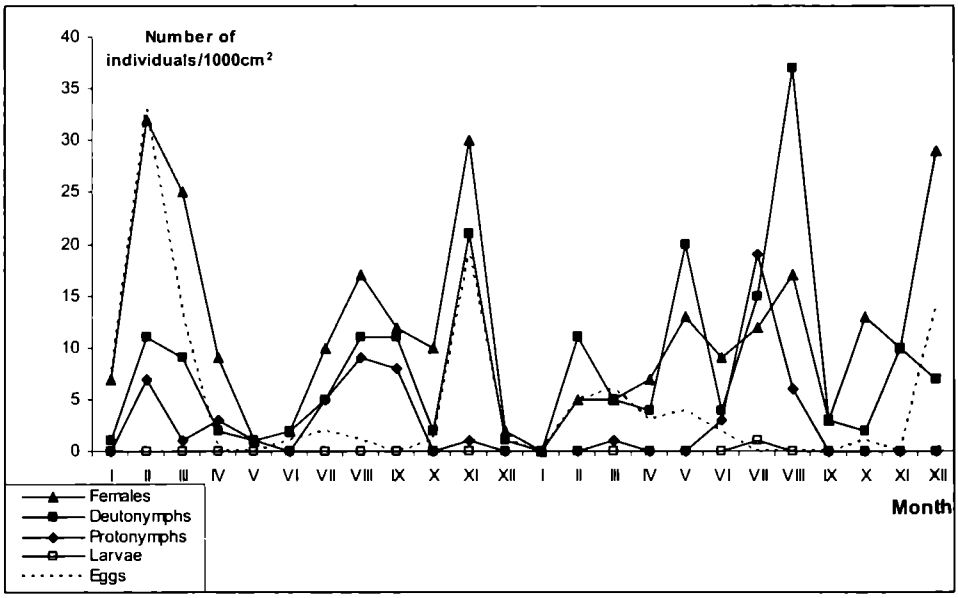

Fig. 5 Phenology of the *Trachytes aegrota* population in the hornbeam-oak forest from Budeasa

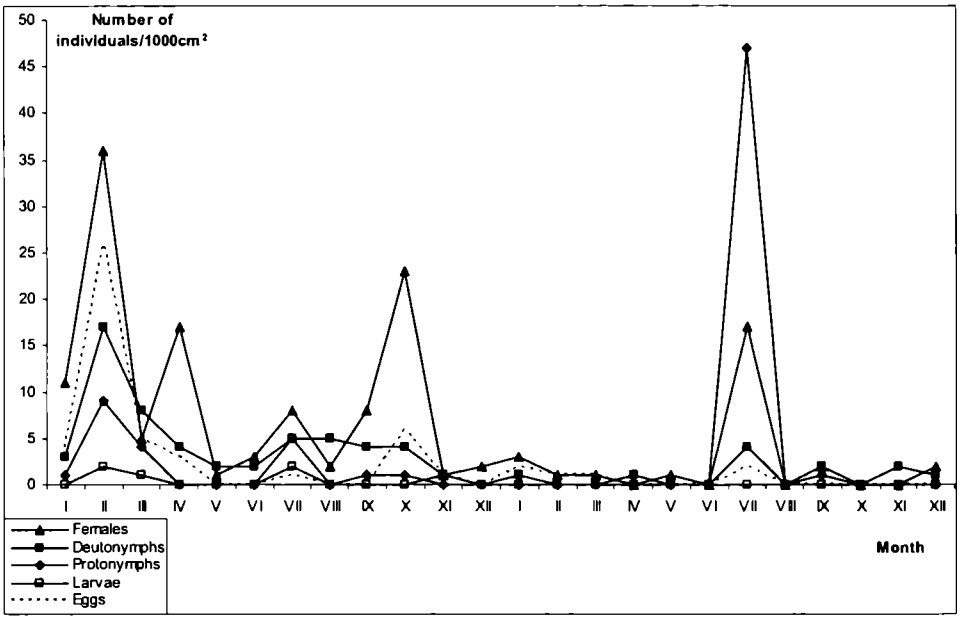

Fig. 6 Phenology of the *Trachytes aegrota* population in the hornbeam forest from Mărăcineni

The aged-based structure and the succession of generations for the populations of *Trachytes tesquorum* species. *Trachytes tesquorum* species is well developed in Mărăcineni and Budeasa, more in the 2nd year of study. In Făget, the number of identified individuals was very small (31),

thus a relevant graphical representation and a data analysis were impossible.

In Mărăcineni (Fig.7), a 1st female generation appears in January-April 2003, with large number of eggs in the females' endogynium, marking the beginning of the 2nd generation. A small number of larvae appear in July, protonymphs in September-October, and deutonymphs from September 2003 to January 2004 gradually transform into 2nd generation females. These females lay eggs from November to April, and 3rd generation protonymphs emerge in July, while the deutonymphs July - November, and a 3rd generation females in October - December. One can observe how the 3rd generation females lay eggs in November, preparing the next generation.

In hornbeam-oak forest (Fig.8), 1st females generation appears in February-April, when a large number of eggs are determined under the microscope, especially in February and March. From these eggs, the 2nd generation protonymphs appear in March-July, deutonymphs starting August 2003 up until February 2004. These deutonymphs gradually exuviate in the prolonged interval, forming the 2nd females generation, in October 2003 - April 2004. The 2nd females generation gradually lays eggs all this time, and in June-August the 3rd protonymphs generation appears, in July-September deutonymphs, and starting October and up until the end of 2004 the 3rd females generation. They lay eggs starting November.

One can observe that this species has 2 complete generations in the 2 years of study, and the length of a generation is of approximately 10 months in 2003 and 11 months in 2004 for both populations.

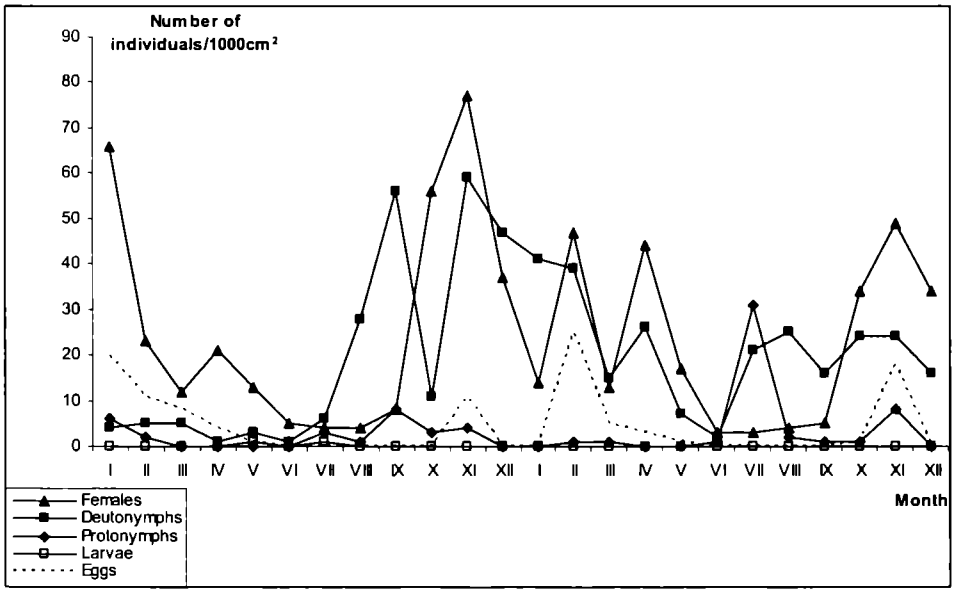

Fig. 7 Phenology of the *Trachytes tesquorum* population in the hornbeam forest from Mărăcineni

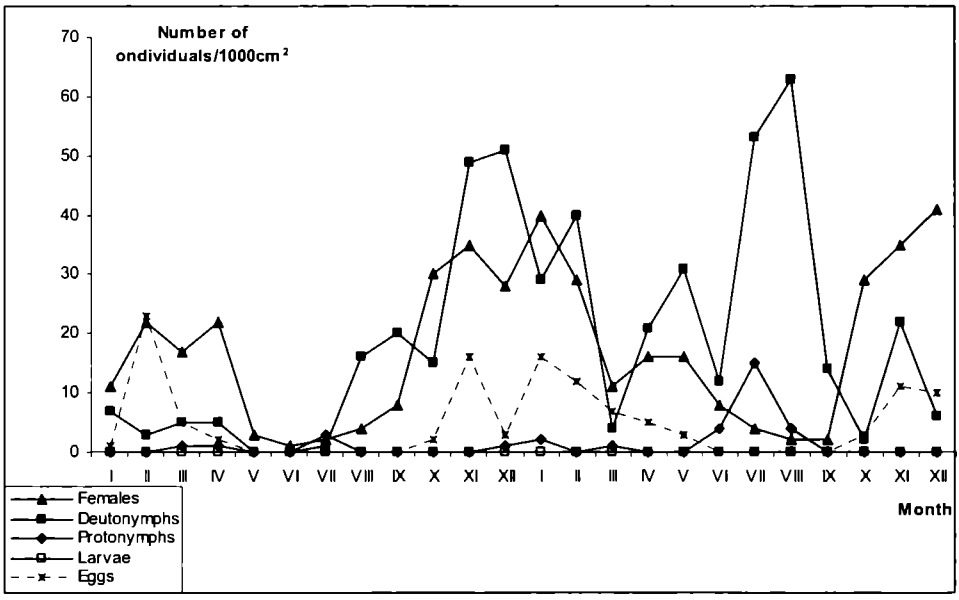

Fig. 8 Phenology of the *Trachytes tesquorum* population in the hornbeam-oak forest from Budeasa

Conclusions

One can observe that in all the 8 populations researched there are 2 complete generations in the 2 years of study, and their length varies between 6 and 13 months.

The populations of *Urodiaspis tecta* species from Făget, Budeasa and Mărăcineni evolves similarly, the length of a complete development cycle is between 7 and 10 months, shorter in the 1st year of study. A 1st generation appears in the population in January - March 2003 and reaches maturity in October - November 2003; a 2nd appears in October-November 2003 and reaches maturity in April-May 2004.

In the case of *Trachytes aegrota* species, the populations from Făget and Mărăcineni have a very similar evolution - a 1st generation of 9 months appears in February 2003 and reaches maturity in November 2003, the 2nd takes 13 months and appears in November 2003, reaching maturity in December 2004. In Mărăcineni the evolution of the population resembles the former in the 1st year of study, but in the 2nd a very strong decrease in number is registered, few individuals could reach maturity in a shorter time period (9 months).

Trachytes tesquorum species only appears in Budeasa and Mărăcineni ecosystems. The 2 populations evolve similarly, with a 1st generation in January-February 2003, reaching maturity in November 2003 (9-10 months), the 2nd generation from November 2003 reaches maturity in November 2004 (12 months).

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DATA ABOUT THE DYNAMICS OF THE EPIGEIC SPIDER COMMUNITIES FROM THE MIDDLE BASIN OF THE ARGEŞ RIVER

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Abstract: DATA ABOUT THE DYNAMICS OF THE EPIGEIC SPIDER COMMUNITIES FROM THE MIDDLE BASIN OF THE ARGEŞ RIVER

The paper presents results on the dynamics of populations of epigeic spiders from three ecosystems in the middle basin of the Argeş River. Collections made for three years have enabled tracing curves that describe the dynamics of the males, females and immature individuals, but and overall dynamics of populations of spiders from the area studied.

Key words: spiders, dynamics, basin of the Argeş River.

Introduction

In literature there are few data on the population's dynamics of spiders. Addressing this issue is difficult because it requires systematic studies made over a period of time at least one year. In our country were made only two studies (Burlacu, 1973; Urák, 2008), which addresses among other things and to populations dynamics of spiders from areas studied (the Brăneşti forest, near Bucharest and the upper basin of Olt River). For this reason we considered it appropriate to present in this work the data obtained on the dynamics of populations of spiders of the middle basin of river Argeş, an unstudied area in terms the spiders fauna.

For knowledge the dynamic of the spiders population has been used the method of ecological stationary. To this end has been taken in studied three resorts located in the middle basin of the river, near Piteşti city (Fig. 1). The types of ecosystems in that have been established the three stations occupy large areas in the middle basin of the river Argeş, being representative of the studied area.

The first resort investigated was bounded in a forest of oak, known as Trivale forest, and located at a distance of about one kilometer north-west by Piteşti city. Sample surface was set on a plateau at an altitude of about 370 m. In the stationary area, the trees layer is dominated by *Quercus robur* L. copies aged between 85 and 100 years. Association identified in the plateau area, where was located the inpatient, is *Querco robori-Carpinetum* BORZA 1937.

The second resort was fixed in an area with xero-mesophilic bushes that populate Lecşoare hill, near the city Ştefăneşti, to about four kilometers

east of the city of Pitesti. Area where samples were collected included the top of the Lecşoare hill and its plateau area, at an altitude of about 340 m on the slope and 360 m on the plateau. The bushes, with a height of 1 to 2.5 m, are consisting of *Prunus spinosa* L. and *Crataegus monogyna* JACQ. The vegetal association is *Pruno spinosae - Crataegetum monogynae* (SOÓ 1927) PASS. 1968.

The third station was located in a beech forest, to 11 kilometers north of the city of Pitesti, on Teascului Valley, near the village Miceşti. The stationary was fixed on an irregular slope with north-east exhibition, an altitude contained between 330 and 420 m. In the sampling area the tree layer is prevailed by the beech (*Fagus sylvatica* L.), and disseminated the hornbeam (*Carpinus betulus* L.) (the vegetal association is *Carpino - Fagetum sylvaticae* PAUCĂ 1941).

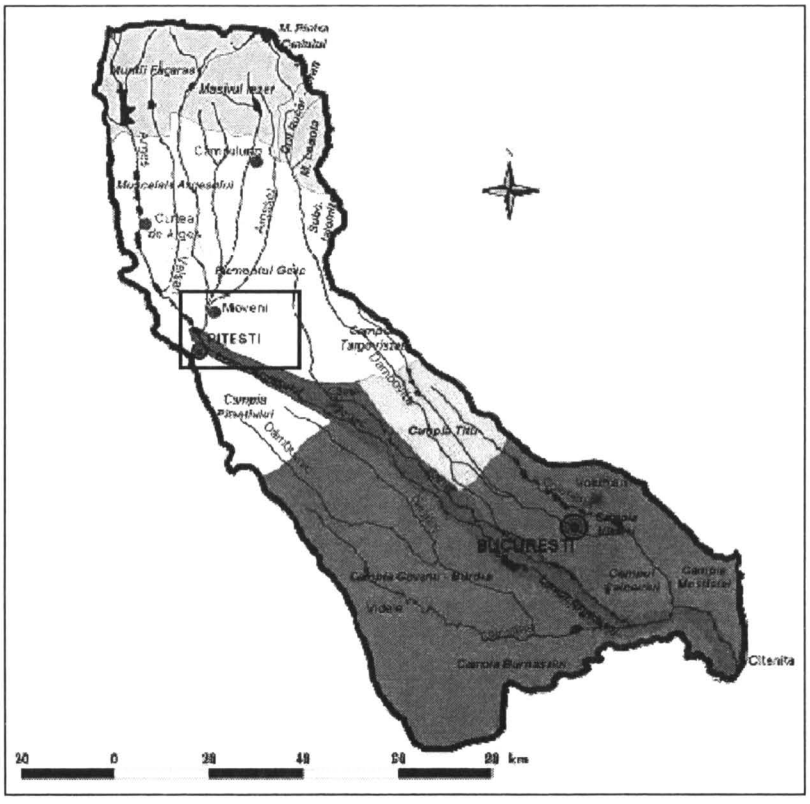

Fig. 1 Investigated area of the middle basin of the Argeş River

Materials and methods

The study was conducted during March 2003 - November 2005. Gathering material was bimonthly for nine months each year, during March - November. The time interval between two collections was 15 days, raising the samples being made at the beginning of each month and at its middle, the program rigorously. Never delay due to bad weather conditions were

more than 24 hours. I used pitfall traps (Barber traps) to collect arachnids. Have been used plastic cups with a capacity of 500 cm^3, with opening diameter of 9 cm, height 12 cm and area of 63.58 cm^2 opening. Each trap was made by 150 cm^3 of 5% solution, water with formaldehyde (formalin), approximately one third of the volume of a vessel. 27 traps were installed in groups of nine traps, in each ecosystem. Distance between traps was 10 m, sufficient to avoid interference between them (Digweed et al., 1995). Between the three groups, each with nine traps, the distance was 50 meters which allowed a good coverage of the investigated area.

Results and discussions

During March 2003 - December 2005 was collected, from the three ecosystems: Trivale, Ştefăneşti and Miceşti, an arachnological rich material, both in terms qualitatively and quantitatively. For the three years of study catches totaled 41420 copies, of which 35502 copies were determined until species level and the remaining 5918 specimens were identified until genus or family, because it is impossible to establish exactly the species for examples immature or damaged. In terms of systematically the collected arachnological material was represented by the 32 families, 123 genera and 223 species.

Comparing the curves that describe the numerical dynamics of the spiders communities of three stationary investigated, we found that there are differences between the three ecosystems, caused by specific environmental conditions of each ecosystem. Particular shapes of the curves that describe the numerical dynamics of the communities of spiders of the three the stationary was determined by the rates which takes place the phenomena of growth or decrease of the number of individuals (Fig. 2).

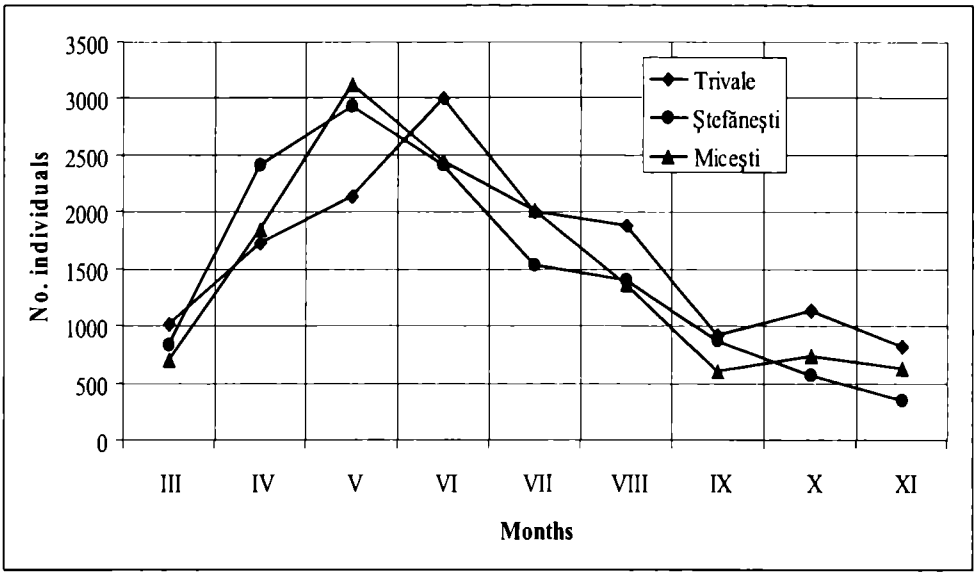

Fig. 2 Numerical dynamics of the spider's community for the three ecosystems investigated, for the period 2003 - 2005 (cumulative values on three years)

For the forest Trivale, we observed a rapid increase in the number of copies in April, after which growth declined slightly in May, followed in June by a new numerical increase of the growth rate.

We found that this phenomenon was caused by specific environmental conditions of this stationary, respectively the soil structure and topography of the area where was located this stationary, in conjunction with the temperatures from this period. The spring, during the rainfall, thanks to relief which does not allow water runoff, of the soil structure which has in the upper horizon a layer waterproof which allows only small extent the deep infiltration of water and the relatively low temperatures which led to a slow evaporation of water, which stagnated at ground level, negatively affected the activity of epigeic organisms and thus rates of catch. Once with increasing temperature, evaporation rate increased, and therefore, the duration of the phenomenon previously reported decreases, which leading to increase of the numerical rate growth in June. Chronology of events mentioned above is valid for 2003 and 2004, when the dynamics of the arachnocenosis of this stationary was given mainly by species of the family Lycosidae: *Pardosa alacris* (C. L. KOCH), *Pardosa lugubris* (WALCKENAER) and *Trochosa terricola* THORELL. For year 2005 two periods were observed in that numerical growth rate decreased: in April and June, when rainfall was higher compared to previous years and meteorological norm (averages values on 50 years). Thanks to changing environmental conditions, the numerical dynamic in 2005 was due in particular species belonging to the family Linyphiidae: *Diplostyla concolor* (WIDER) and *Centromerus sylvaticus* (BLACKWALL)

After the numeric peak of June, the numerical decline of the spider's community was abruptly, being characterized by an attenuation of this phenomenon in August, thanks to the maximum touched of the new generation of immature individuals, followed by a minimum in September, probably generated by high values of temperature and low rainfall in August, for the years 2003 and 2004, and the very high temperatures and abundant rainfall, for the year 2005. There was a slight numerical increase in October, amid the increasing number of individuals of the new generation followed by a new decline in November, when the invertebrate species reduce their activity due to decrease temperature.

For the stationary from Ştefăneşti the curve that describing the general dynamics of spider's community showed a rapid increase in the number of copies by April, what coincides with the numerical growth of the species *Alopecosa pulverulenta* (CLERCK), after which the growth rate drops in May. This numerical growth attenuation in May was stronger for 2003, probably due to the higher temperatures correlated with low relative humidity of this period of 2003, compared to similar periods in 2004 and 2005. The numerical decline of the spider's community from this ecosystem was relatively similar to that observed for forest Trivale, being probably generated by the same phenomena. Differences between the two ecosystems

(Ştefăneşti and Trivale) were represented to lack the maximum of autumn and the numerical lower values for the ecosystem from Ştefăneşti.

For the ecosystem from Miceşti, the curve describing the numerical dynamics overall of the community of spiders from this stationary, practically, coincides with the dynamics of *Pardosa alacris* (C. L. KOCH) species, being characterized by rapid growth, linear, to the number of individuals caught, from March to May, then the spiders community entered in decline, until September, a decline more slowly and relatively uniformly, compared with the above ecosystems (Trivale and Ştefăneşti), decline characterized by small variations from month to month. This was followed, as in the case of forest ecosystem Trivale, a slight numerical increase in October, and a new decrease of the number of copies captured in November.

Comparative analysis of the curves that describe the numerical dynamics of the spider's communities, from the three ecosystems investigated, shows that the numerical peak for the stationary from Trivale forest was reached a month later than for the stationary from Ştefăneşti and Miceşti.

The explanation for this situation can be offered by the relationship that exists between the phenology of spider's species and the local environmental conditions. It is known that for a particular temperature range raising the temperature a few degrees may hasten the maturation of the immature specimens and their early mating (FOELIX, 1996). In the case of ecosystem from Ştefăneşti, monthly temperature averages were higher than those recorded at the meteorological station in Piteşti and in the other two ecosystems analyzed throughout the study period. For this reason we can say that, of thermal point of view, in this stationary, conditions become favorable for development the spider's fauna with about a month earlier than in the forest Trivale. Following the dynamics of the dominant species we found that of the six dominant species, three species: *Alopecosa pulverulenta* (CLERCK) (the species with the largest number of individuals captured in each year), *Trochosa terricola* THORELL and *Alopecosa cuneata* (CLERCK), reached the numerical peak in April. Locating of the numerical peak in the month May and not in April was determined that a larger number of species had the maximum effective in the month May and not in April; even if, separate, they had a lower number of individuals than the three dominant species from the month April, however, taken together, their share was higher, which resulted to the localization of the numerical peak in the month May. These considerations show that the optimal time for most species of spider from this stationary is during April-May. It seems that the most species "avoids" the period June to September when temperatures, in open areas at ground level, exceeded sometimes the 42^0C at hour 13^{00} and relative humidity dropped below 50%. Given that about 70% of the surface of this ecosystem is represented of open areas with herbaceous vegetation we believe that the phenomena described above were largely responsible for locating the maximum number in the month May.

In the case of the ecosystem represented to the beech forest from Miceşti, the whole dynamics of the spider's community was heavily influenced by the dynamics of two species, the *Pardosa alacris* (C. L. KOCH) and *Pardosa lugubris* (WALCKENAER), of them, the dominant role, had the first species whose the maximum number was reached in May. For this reason we can say that the maximum number from the month May of this spider's community was determined of the peak number of the species *Pardosa alacris* (C. L. KOCH), especially the male of the species.

In case of the ecosystem represented of the forest Trivale, spring, the temperature growth is more slowly than in the open environment and for this reason the lower threshold thermal (zero temperature of development), for dominant species, is reached later compared with the ecosystem from Ştefăneşti, which may explain, at least partially, the temporal difference between the numerical peaks of the spider's community from the this two ecosystems. If we relate to the stationary from Miceşti, the lag of the numerical peak was probably due to the fact that it is generated by flocks of several species, some of which have the top number in June.

Another finding resulting from the comparative analysis of curves that describe monthly variation of the dynamics of spider's communities of the three stationary shows that if of Ştefăneşti resorts, the peak of autumn is not visible; it is probably masked by migration to individuals for wintering in the areas with shrubs or in the forest with which adjoins this stationary. Therefore, compact shrub vegetation zones and nearby forest have an important role in terms of presence and dynamics some the spider's species from this stationary; in their absence, perhaps, some spiders species would not be present in this stationary, species which may be considered "forest species".

If we consider the dynamics of males, females and immature individuals the data presented above show that the monthly numerical variation was different for adults and juveniles and for two sexes. Cumulating the data for the three ecosystems of the middle basin of the river Argeş, we tried to obtain a general pattern of variation that to approximate the numerical dynamic of males, females and immature individuals in the study area (Fig. 3).

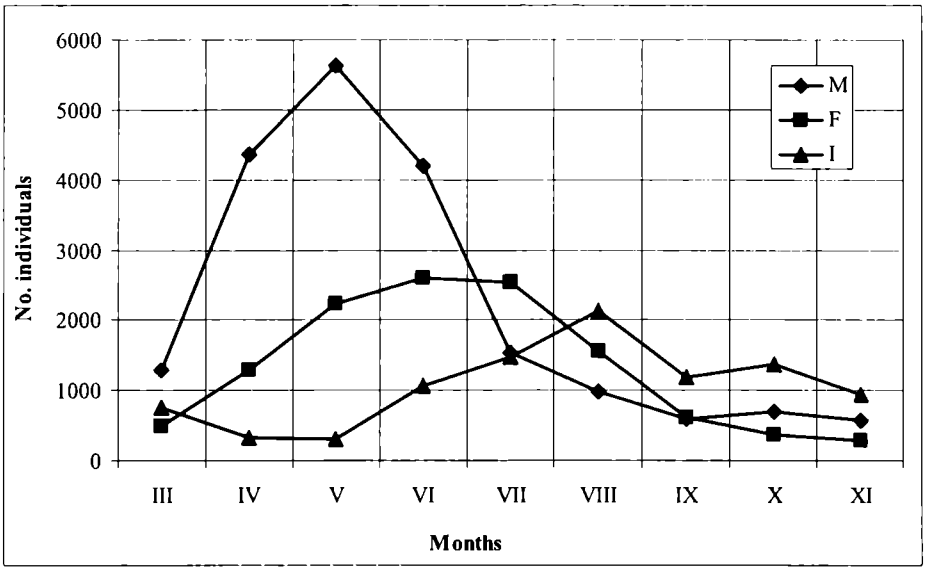

Fig. 3 Numerical dynamics of the males, females and immature individuals of the middle basin of the Argeş River

For males was observed a rapid increase in the number of individuals from March until April, after which numerical growth rate decreased slightly, the maximum being reached in May. After this peak, the number of males decreases sharply until July, when the numerical decrease was mitigated by the maturation the males belonging to species that reaching the maximum number during this period (species of the family Gnaphosidae). The number of individuals belonging these species being relatively small, they could only partially offset this decline, determined by the regress the number of males belonging to dominant species (most species of the family Lycosidae), who had the peak numbers in April - May. This decrease in the number of males continued slowly until September, when, thanks to maturation of the individuals of the new generation, their numbers gradually increased until October, but the level reached this month was much lower than in May. Followed in November a very slight decrease compared to the previous month of the number of males captured.

The dynamics of female was characterized by a less steep evolution than that of males. Their number increased slowly from March until June, when was peaked, much lower than that of males, in May. After numerical peak of June, the number of females begins to decline, very slowly in July, after which the numerical decrease was something faster until September. In October and November, the numerical decline of females continue, but with a rate slower, due to the emergence the individuals of new generation.

Different dynamics of the two sexes was determined to characteristics of their biological cycle and by different behavior of male and female, both influenced by environmental conditions. Males that are smaller, they need a smaller number of molts to reach maturity and, therefore, reach

sexual maturity faster than females, who mature more slowly. After mating males die, their number decreases rapidly, while females live longer, they build cocoons, deposited eggs and too many species have care of juvenile. Females are much less active compared to males, rarely fall into traps and therefore the number of specimens captured was lower, which partly explains the much higher number of males captured.

In the case of immature specimens, their number decreased as from March until month May, phenomenon caused by the maturation in this period of the specimens that have wintering in the juvenile stage, thereby increasing the number of the adults. The number of immature specimens began to increase in June due to the gradual emergence of juveniles of the new generation, phenomenon that has kept an upward trend until August, when it was peaked. Followed a decrease in the number of immature specimens in September and then increased slightly in October and a new decline in November. Like if of males, these variations recorded in the autumn months had reduced amplitude.

The data presented previous on the dynamics of adults: males and females and of immature individuals allowed us to locate in time some important aspects of the dynamics report between the two sexes and of the report between of adult and immature. Regarding the report between the two sexes we found that spring it was favorable the males, their dominance was maximum in May, after which, due to contradictory trends of the numerical dynamics of the two sexes, the number of males decreased rapidly while number of females increased slowly; the report between the two sexes is balanced in July and then this reverses. In the period July-September we witnessed a dominance of the females, but less net compared with that of the males from spring. In September, the ratio between the sexes was reversed again, amid the growth number by males and declining of female's number, report which remains until month July, next year.

Regarding the relationship between adults and immature, we noticed that spring, generally, the number of immature was less than that of adults (less than males but higher than that of females), and decreases until month May. Since June, due to the emergence of a new generation, the number of immature increases, exceeding the number of males in July and in August on that of females, a situation which remains unchanged until November.

Based on these data we can say that spring and the first month of summer were generally dominated by males, July was dominated by females, and since August began dominance of the immature. We must consider that the data presented are general, there were variations from year to year and from a stationary to another but in general the deviations are not greater than a month.

Individuals of spiders populations wintering in various stages of development, depending on the species and according to local environmental conditions. Adults that appear the spring resulting from the maturation of juveniles that appeared summer and that wintering in the advanced stages of development, as under adults or as adults. It is known

that there are many species of spiders that submitted the eggs in series, building a second or even third cocoon. The high number of juveniles from October is determined by the secondary cocoons from which will out individuals who will wintering as juveniles, in the early stages, copies that mature in the following spring, supporting increasing number of adults.

By aggregating the data presented above for the three ecosystems analyzed, we tried to describe the general dynamics of the spiders community from the middle basin of the river Argeş (Fig. 4).

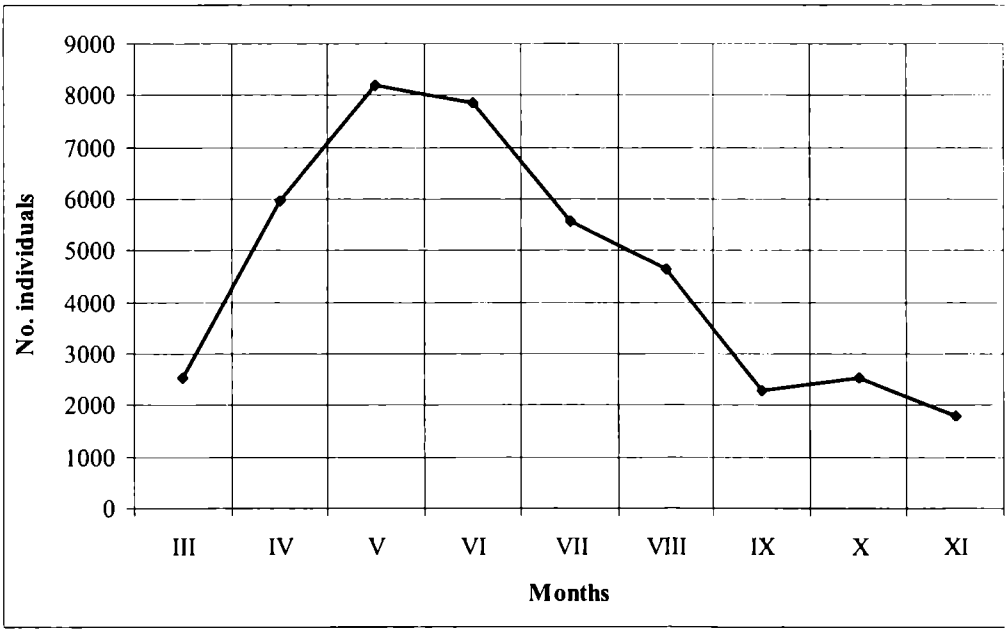

Fig. 4 Numerical dynamics of spiders of the middle basin of the river Argeş (cumulative values on three years)

It can be seen (fig. 4) that communities of spiders from middle basin of the river Argeş presents two numerical peaks, the main one, spring located, in month May, and another in autumn, located in October. First maximum, the spring, was characterized by much higher values compared with the autumn and coincides with the breeding period for most species of the spiders from the temperate zone of Europe, when both sexes have a high activity. Analyzing the share of each month in terms of the number of specimens captured, reported at the total number of specimens collected in the three years, in the three ecosystems, we found that their number increased rapidly from 6.15% in March to 14.44% in April. Followed again a less steep increase, in May, when was reached the top number, 19.77%, then in June, the share of captured specimens decreased slightly to 19%. The numerical decline was accentuated in July, when share of captured individuals decreased to 13.41%, then, in August, was observed a slower numerical decline thanks to of the peak number reached of juvenile, the share of individuals collected in this month was 11.24%. September was

characterized by a sudden drop in the number of specimens collected, fact reflected in the share of this month which was only 5.54%. A slight increase was observed in October, when the share of individuals collected increased to 6.12%, then fell again in November to 4.34%.

From the data presented above resulting that there was very little difference between May and June regarding in the number of individuals collected, what makes us think that, depending on environmental conditions, maximum number can be located in either of two months. For this reason, we consider it more correct to say that associations of spiders of the river basin of Argeş reach maximum numbers in period May-June.

This finding is confirmed by data from the literature (Tretzel, 1952), showing that in temperate regions of Europe most species it reproduces in May-June, and larvae hatch in summer, from July to August. The autumn, juveniles leave the cocoon and disperse, causing the second maximum observed in October, with much lower value than that of May-June. Comparing our data with those obtained by other researchers in Romania (Niculescu-Burlacu, 1973 and Urák, 2008), we found that there is a slight gap. For spider's communities from the south of country, the peak of spring is located in April - May while on the mountain zones it is reached in July, indicating the role of climatic factors in shaping the numerical dynamics of the spiders.

Conclusions

The annual numerical dynamics of spider's populations of the three resorts was characterized by clear differentiation of two aspects, one spring and one by autumn, marked each by a numerical peak, the autumn is much lower compared to the spring and well individualized for forest ecosystems. Between they is interposed summer period, characterized by a low numerical level, marked by a general downward trend. Numerical growth periods, pre summer and post summer, which culminates with two numerical peaks, represent intervals to maximum activity of spiders populations of the three ecosystems.

Annual dynamic of the two sexes and the immature specimens showed that, in the communities of spiders, the spring was dominated by males, the summer was dominated by females and autumn by the juveniles, situation applies to all ecosystems studied and for all years of study.

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CONSIDERATIONS ABOUT SOME GENUS FROM GALERUCINAE SUBFAMILY (COLEOPTERA, CHRYSOMELIDAE) IN ROMANIA

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Abstract: CONSIDERATIONS ABOUT SOME GENUS FROM GALERUCINAE SUBFAMILY (COLEOPTERA, CHRYSOMELIDAE) IN ROMANIA
In this paper are presented the taxonomical, biological and ecological considerations of the species of some genera of Galerucinae subfamily in Romania. These data are based on personal analysis of specialized literature and own researches.
Key words: Galerucinae, Chrysomelidae, Romania, taxonomical and ecological data.

Introduction

From the ecologic point of view, the species belonging genus presented in this paper are mesophylls eating whit leafs of plants belonging to different botanical families.

Notes concerning these species at material level were published in different works together with other species of leaf - beetels or beetles, sometimes even with other orders of insects. Syntheses concerning these genera at national level were never realized up to the present moment.

Material and methods

The species are published in alphabetical order and in brackets there are the author` s name and the year when the species were mentioned. The indentifications of species, systematictics, nomenclature, general distribution of leaf - beetles in the holartic region and the plants are based on certain papers (Ciocârlan, 2000; Kaszab, 1962; Warchalowski, 2003).

Results and discussions

Genus *Euluperus* WEISE, 1886

Euluperus cyaneus (JOANNIS, 1866)

General distribution: south - western part of Balkan Peninsula, Bulgaria, Romania.

Distribution in Romania: Scărița - Belioara (Crişan, Teodor, 1996), Bucovina (Fleck, 1904).

Biological and ecological data: host plants are unknown. Very rare species, founded in the mountain zone.

Euluperus major (WEISE, 1886)
General distribution: Carpathian basin, Bulgaria, Turkey.
Distribution in Romania: Braşov, Bucegi (Petri, 1912).
Biological and ecological data: similar situation to that of preceding species.

Euluperus xanthopus (DUFTSCHMID, 1825)
General distribution: Central Europe, Bulgaria, Basin of Danube, Ukraine, Republic of Moldova till in Caucasus.
Distribution in Romania: Şura Mare, Sibiu, Turnu Roşu (Bielz, 1887; Petri, 1912).
Biological and ecological data: mountain species, rare, host plant is unknown.

Genus *Phyllobrotica* CHEVROLAT, 1837

Phyllobrotica adusta (CREUTZER, 1799)
General distribution: Europe.
Distribution in Romania: Scărița - Belioara (Crişan & Teodor, 1996), Greci (Roşca, 1976), Hagieni (Negru & Roşca, 1967), Baziaş (Ieniştea, 1974), Bucureşti, Comana, Babadag (Fleck, 1904), Tismana (Marcu, 1929), Novaci, Sohodol Valley (Bobârnac, 1974), Haţeg, Sibiu, Şura Mare, Turnu Roşu, Marpod, Reghin, Sighişoara, Braşov (Petri, 1912), Fânațele Clujului (Nistor et al., 2000), Craiova, Bucovăț (Ilie, 2002), Olimp, Mangalia (Serafim & Maican, 2004).
Biological and ecological data: host plants are *Stachys* (LINNAEUS 1784). Xerophylic - mesophylic species, common, founded from fields till the mountain zone.

Phyllobrotica elegans (KRAATZ, 1866)
General distribution: around the Black Sea (Asia Minor, European Turkey, Bulgaria, Romania, Moldavia, south Ukraine) and in Caucasian countries.
Distribution in Romania: according to Warchalowski (2003), his presence in Romania is possible.
Biological and ecological data: host plant is unknown. Xerophylic species.

Phyllobrotica quadrimaculata (LINNAEUS, 1758)
General distribution: Europe, excepting Iberian Peninsula.
Distribution in Romania: Harghita (Rozner, 1997), Dunavăț (Crişan, 1995), Caraorman (Ieniştea, 1974), Sibiu, Reghin (Bielz, 1887), Poiana Braşov (PETRI, 1926), Bocicoiu Mare (Maican & Serafim, 2001).
Biological and ecological data: host plant are *Scutellaria galericulata* (LINNAEUS 1784). Hygrophilic species, relatively common in swampy places, on the edges of waters.

Genus *Xanthogaleruca* LABOISSIERE, 1934

Xanthogaleruca luteola (MÜLLER, 1766)
General distribution: Europe, Central Asia
Distribution in Romania: Arcalia (Crişan & Bonea, 1995), Comarova (Negru & Roşca, 1967), Bucovina (Fleck, 1904), Cozmeni (Marcu, 1928), Filiaşi (Ilie, 2002), Cărbuneşti, Cheile Sohodol (Ilie & Chimişliu, 2000), Braşov,

Sighişoara, Reghin (Bielz, 1887), Haţeg, Gherla (Petri, 1912), Manăstirea Cocoş (Montandon, 1906), Mangalia and environs (Negru, 1957), Craiova, Filiaşi (Matei & Bobârnac, 1978), the Confluence of Târnava river (Crişan & DRUGUŞ, 2001).
Biological and ecological data: host plant is the elm - *Ulmus* (LINNAEUS 1784). Mesophilic species, founded till the beech tree stage.

Genus *Luperus* GEOFFROY, 1762

Luperus caucasicus WEISE ssp. *mixtus* (WEISE, 1879)
General distribution: Caucasus, Carpathians (after Kaszab, 1962).
Distribution in Romania: Retezat, Sibiu, Şura Mare, Braşov (Kaszab, 1962).
Biological and ecological data: host plant is unknown. Mountain species.

Luperus flavipes (LINNAEUS, 1767)
General distribution: Europe, Central Asia
Distribution in Romania: Scărița - Belioara (Crişan & Teodor, 1996), Harghita (Rozner, 1997), Poiana Stampei (Dănilă, 1970), Predeal, Azuga, Bucovina (Fleck , 1904), Vârvoru de Jos, Stârmina forest (Ilie, 2002), Şura Mare, Poiana Braşov, Făgăraş, Reghin (Bielz, 1887), Poiana Braşov, Borsec, Pasul Surduc (Petri, 1912).
Biological and ecological data: host plants are *Alnus* (MILLER 1802), *Betula* (LINNAEUS 1794), *Salix* (LINNAEUS 1794). Mesohigrophilic species, relatively common, founded from the oak stage till the subalpine stage.

Luperus longicornis (FABRICIUS, 1781)
General distribution: Europe, Siberia.
Distribution in Romania: Scărița - Belioara (Crişan & Teodor, 1996), Baziaş (Ieniştea, 1974), Prahova (Fleck, 1904), Sighişoara, Racoş, Braşov (Petri, 1912), Bucureşti (Jaquet, 1900) - ab. betulinus Joannis.
Biological and ecological data: host plants are similar to preceding species. Relatively rare species, more frequent in the mountain zone. Mesohigrophilic species.

Luperus luperus (SULZER, 1776)
General distribution: westeren, central, southern Europe, excepting Iberian Peninsula.
Distribution in Romania: Scărița - Belioara (Crişan & Teodor, 1996), Harghita (Rozner, 1997), Praid, Miercurea Ciuc, Perla Harghitei, Bodoc Mountains (Szel et al., 1995), Filaret (Fleck, 1904), Băişorii Mountain (Crişan, 1997), the upper Arieş river basin (Crişan & Teodor, 2002), Turnu Roşu, Mureş (Petri, 1912), Racoş, Borsec (Petri, 1926).
Biological and ecological data: host plants are *Ulmus* (LINNAEUS 1784), *Salix* (LINNAEUS 1794), *Alnus* (MILLER 1802), *Agrotis alba* (LINNAEUS 1794). Relatively common species, founded till the mountain zone.

Luperus viridipennis (GERMAR, 1824)
General distibution: Alps, Carpathians, Balkans, south Ural and central Asia.
Distribution in Romania: Codrul Slătioara (Cârdei et al., 1965), Harghita (Rozner, 1997), Borşa, Cârţişoara - Făgăraş mountains (Szel et al., 1995), Prahova, Azuga (Fleck, 1904), Cozmeni (Marcu, 1928), Someşul Cald zone

(Crişan et al., 1999), Tismana (Marcu, 1929), Parâng mountains, Braşov, Şerbota (Petri, 1912), Borsec (Petri, 1926), Transilvania (Teodoreanu, 1988), Mehedinţi mountains (Ilie, 2002), the upper Arieş river basin (Crişan & Teodor, 2002).

Biological and ecological data: common species, founded till the subalpine zone. Host plants are *Alnus* (MILLER 1802). Mesohigrophilic species.

Luperus xanthopoda (SCHRANK, 1781)

General distribution: central and southern Europe, Central Asia.

Distribution in Romania: Harghita (Rozner, 1997), Praid, Valea Râului, Târnava Mică (Szel et al., 1995), Frumoasa (Dănilă, 1970), Floreasca – Bucureşti (Ochs, 1922), Tismana (Marcu, 1929), Şura Mare, Poiana Braşov, Mediaş, Reghin, Geaca, Zau de Câmpie, Sighişoara, Sibiu, Sovata (PETRI, 1912), Craiova (Ilie, 2002), the upper Arieş river basin (Crişan & Teodor, 2002), Deva (Petri, 1926), Banat, Braşov, Cernei mountains (Warchalowski, 1993).

Biological and ecological data: common species, mesophilic species, host plants are *Ulmus* (LINNAEUS 1784), *Corylus avelana* (LINNAEUS 1794), *Crataegus* (LINNAEUS 1794), *Populus nigra* (LINNAEUS 1794).

Luperus cyanipennis (KUSTER, 1848)

General distribution: Ex - Yugoslavia, southern Ukraine, Transylvania.

Distribution in Romania: Braşov, Cluj (Petri, 1912). According to Warchalowski (2003), his presence at national level is impossible, needing reconfirmations.

Biological and ecological data: host plants are *Salix* (LINNAEUS1784) and *Acer campestre* (LINNAEUS1784).

One species must be excluded in the Romanian fauna: *Luperus nigripes* (KIESENWETTER, 1861). This species is distributet in the Alps mountains. Recorded from Turnu Roşu (Petri, 1926) and Predeal (Kaszab, 1962), the above records must be based on misidentification.

Conclusions

At national level, the genus presented belonging to the Galeruciane subfamily includes 13 species and one chromatic variety, one species is uncertain and one must be excluded in the Romanian fauna.

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OULEMA GOZIS, 1886 (COLEOPTERA, CHRYSOMELIDAE) IN ROMANIA

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Abstract: OULEMA GOZIS, 1886 (COLEOPTERA, CHRYSOMELIDAE) IN ROMANIA
Oulema genus is represented in Romania by 6 species. In this paper there are presented general and national distribution, also some biological and ecological notes of these species.
Key words: *Oulema*, Chrysomelidae, Romania.

Introduction

Oulema genus belongs to the Criocerinae subfamily, including species who live on the different herbs, some of them being cultivated. Generally, these species present a big ecological plasticity seeing the disemination on the vertical, founding on the lawns from the plains to mountains.

Material and methods

The paper includes localisation of the species, which resulted from both personal analyse and specialized literature or the consultation of the collections of certain museums. The identification of species, systematics, nomenclature, general distribution of leaf-beetles in the holarctic region are based on certain papers (Kaszab, 1962; Warchalowski, 2003). The species are published in alphabetical order and in brackets there are the authors name and the year when the species were mentioned.

Results and discusssions

The checklist of the *Oulema* genus in Romanian fauna is as follows:

Genus *Oulema* GOZIS, 1886.

Oulema erichsonii (SUFFRIAN, 1841)

General distribution: Europe

Distribution in Romania: Harghita (Rozner, 1997); Ţeţina - Bucovina (Marcu, 1928); Baia de Aramă (Bobârnac, 1974); Bobâlna, Dăbâca (Nistor et al., 2000); the Arieş upper basin (Crişan & Teodor, 2002).

Biological and ecological dates: more rare species, found in the high hills and the mountains, in the humid places.

Oulema gallaeciana (HEYDEN, 1870)

General distribution: western, northern and central part of Europe, western Siberia and in northern part of Central Asia.
Distribution in Romania: Cheile Turzii (Crişan, 1992); Cheile Turului (Crişan & Teodor, 1996); Piatra Cloşani (Marcu, 1928); Harghita (Rozner, 1997); Harghita Mts., Reci (Szel, 1995); Azuga (Omu Peak), Bucovina, Bucureşti (Fleck, 1904); Braşov, Petroşani, Pui, Zărneşti, Haţeg (Petri, 1912); Vultureni, Dăbâca (Crişan, 2000); Fânaţele Clujului (Nistor, 2000); Moisei, Izvoru lui Dragoş, Rona de Sus, Strâmtura, Berşota river (Maican & Serafim, 2004); Vâlcele (Nistor, 2000); the Arieş upper basin (Crişan & Teodor, 2002); the valey of Frumuşeana river, clearings Smereni, Poienile de sub munte, Săliştea (Maican & Serafim, 2004); the Arieş lower basin (Crişan & Teodor, 2005).
Biological and ecological dates: frequent species, lives on *Cirsium* (SCOPOLI, 1762) and *Triticum aestivum* (LINNAEUS, 1748).

Oulema melanopus (LINNAEUS, 1758)

General distribution: Palearctic species
Distribution in Romania, biological and ecological dates: found from the beaches of the sea to the mountains, very frequent species. The hosts plants are different graminaceae, this species are pest for agriculture.

Oulema rufocyanea (SUFFRIAN, 1847)

General distribution: south-western Europe
Distribution in Romania: Harghita (Rozner, 1997).
Biological and ecological dates: very rare species. The host plants are different graminaceae.

Oulema septentrionis (WEISE, 1880)

General distribution: central and northern Europe.
Distribution in Romania: Borşa, Rodnei Mts., Perşani Mts., Baraolt Mts., Bodoc Mts., Reci, Nemira Mts. (Szel, 1995); Haţeg (Petri, 1912).
Biological and ecological dates: rare species, found in the mountains on *Nasturtium officinale* (Robert Brown, 1836).

Oulema tristis (HERBST, 1786)

General distribution: southern and cental Europe, Siberia and Japan.
Distribution in Romania: Cheile Turului (Crişan & Teodor, 1996); Comana (Fleck, 1904); Caraorman (Crişan, 1993); Sibiu, Săcele (Bielz, 1887); Măcin-Tulcea-Niculiţel area (Roşca, 1977); Banat (Banatului Museum, Timişoara).
Biological and ecological dates: more rare species, the host plants are *Achillea* (LINNAEUS, 1745), *Echinochloa crus-galli* (BEAUVAIS, 1796), *Setaria italica* (BEAUVAIS, 1796).

From an ecological preferences point of view, the majority of species are mesophill-mesohygrophill. Referring to the distribution of those species on the vertical, it has been found the preference for the altitudes, over 300 m.

Conclusions

In Romania, *Oulema* genus includes 6 species distributed in different biotopes, on different host plants.

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SYNTHETIC DATA REGARDING KNOWLEDGE OF PARASITOIDES OF FAMILY CERAMBYCIDAE (INSECTA: COLEOPTERA: CHRYSOMELOIDEA) II

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Abstract: SYNTHETIC DATA REGARDING KNOWLEDGE OF PARASITOIDES OF FAMILY CERAMBYCIDAE (INSECTA: COLEOPTERA: CHRYSOMELOIDEA) II

This paper presents a survey of data on the parasite fauna on long-horned beetles taken from papers published in 1961 (Panin & Săvulescu, 1961). There were identified 38 species of parasites belonging to the order Hymenoptera, family Ichneumonidae, which parasitize on 32 species of host beetles.

Key words: Ichneumonidae, Cerambycidae, parasites.

Introduction

Ichneumonidae include a relatively large number of parasitic species in Romania. Adults feed on the nectar of flowers, but their larvae parasitize especially caterpillars and pupae of Lepidoptera, Coleoptera, Tenthredinidae etc. The adults may be pests of agricultural and silvicultural plants. But the larvae can be effectively used for biological control of insect pests of economically important plants (Constantinescu, 1959).

The first step in our investigation of parasites found in beetles is a synthesis of existing literary data taken mainly from the papers published in 1961 (Panin & Săvulescu, 1961).

Material and methods

The taxonomy and nomenclature of the identified species is in accordance with Fauna Europaea database. The species of parasites are presented in the alphabetical order and within them, in alphabetical order on subfamilies and tribes, in tabular form, which include host of beetles. Species of beetle-hosts (Coleoptera: Cerambycidae) and the subfamilies are also arranged alphabetically.

Results and discussions

After processing the data, there were identified 38 species of parasitic Ichneumonida (Table 1) and 32 hosts species of longhomened beetles Cerambycidae (Table 2). On the left of the table there are listed the species of parasites and on the right - the species of beetles (Table 1).

Table 1 Parasites of some species of Cerambycidae

No.	Taxa (subfamilies, tribes, species) BRACONIDAE	Species of Cerambycidae
Subfamily Blacinae		
1	*Atanycolus initiator* NEES.	*Tetropium fuscum* FABRICIUS 1787
2	*Blacus errans* NEES	*Exocentrus adspersus* MULSANT 1846
3	*Bracon discoideus* WESM. .	*Sarpeda populnea* LINNÉ 1758
4	*Bracon truncorum* GOUR.	*Phyrrhidium sanguineum* LINNÉ 1758
5	*Coeloides abdominalis* ZETT. \	*Acanthocinus aedilis* LINNÉ 1758
6	*Eubadison flavipes* HOL.	*Exocentrus punctipennis* MULSANT 1856
7	*I. extricator* NEES.	*Exocentrus punctipennis* MULSANT 1856
8	*Iphiaulax flavator* F.	*Callidium violaceum* LINNÉ 1758
		Phymatodes testaceus LINNÉ 1758
		Monochamus sutor LINNÉ 1758
		Pogonocherus (Pityphilus) fasciculatus DEGEER 1775
9	*I. impostor* SCOP.	*Plagionotus arcuatus* LINNÉ 1758
		Monochamus sutor LINNÉ 1758
		Acanthocinus aedilis LINNÉ 1758
		Liopus nebulosus LINNÉ 1758
10	*Pseudovipio desertor* F.	*Plagionotus arcuatus* LINNÉ 1758
11	*Vipio nominator* F.	*Acanthocinus griseus* FABRICIUS 1792
Subfamily Brachistinae		
12	*Calyptus (Eubazus) ruficoxis* WSM.	*Callidium aeneum* DEGEER 1775
Subfamily Cheloninae		
13	*Ascogaster rufipes* LATREILLE	*Sarpeda populnea* LINNÉ 1758
Subfamily Cenocoeliinae		
14	*Cenocoelius agricolator* L.	*Pogonocherus (Pityphilus) fasciculatus* DEGEER 1775
Subfamily Doryctinae		
15	*Spathius exarator* F.	*Phymatodes testaceus* LINNÉ 1758
		Clytus tropicus PANZER 1795
16	*Doryctes gallicus* REICH.	*Phyrrhidium sanguineum* LINNÉ 1758
		Plagionotus arcuatus LINNÉ 1758
17	*D. igneus* RATZB.	*Pogonocherus (Pityphilus) fasciculatus* DEGEER 1775
18	*D. imperator* RATZB.	*Pogonocherus (Pityphilus) fasciculatus* DEGEER 1775
		Acanthocinus aedilis LINNÉ 1758
19	*D. leucogaster* NEES.	*Hylotrupes bajulus* LINNÉ *1758*
		Phymatodes testaceus LINNÉ 1758
		Plagionotus arcuatus LINNÉ 1758
		Rhagium bifasciatum FABRICIUS 1775
		Rhagium inquisitor LINNÉ 1758
		Tetropium castaneum LINNE 1758
20	*D. leucogaster* var. *márothiensis* SZÉPL.	*Xylotrecus rusticus* LINNÉ 1758
21	*D. mutillator* THUMB.	*Exocentrus stierlini* GANGLBAUER 1883
		Phymatodes testaceus LINNÉ 1758
		Tetropium castaneum LINNÉ 1758
		Tetropium fuscum FABRICIUS 1787
22	*D. pomarius* REINH.	*Pogonocherus (Pityphilus) fasciculatus* DEGEER 1775
		Acanthocinus aedilis LINNÉ 1758
		Liopus nebulosus LINNÉ 1758
23	*D. striatellus* NEES.	*Callidium violaceum* LINNÉ 1758
		Monochamus sutor LINNÉ 1758
24	*D. undulatus* RATZB.	*Pogonocherus hispidus* LINNÉ 1758
		Pogonocherus (Pityphilus) fasciculatus DEGEER 1775
25	*Doryctes* sp.	*Gracilia minuta* FABRICIUS 1781
Subfamily Euphorinae		
26	*Meteorus tabidus* WSM.	*Sarpeda scalaris* LINNÉ 1758

		Liopus nebulosus LINNÉ 1758
Subfamily Helconinae		
27	*Helcon rusparator* NEES.	*Callidium violaceum* LINNE 1758
		Strangalia quadrifasciata LINNÉ 1758
28	*H. annulicornis* NEES.	*Clytus arietis* LINNÉ 1758
		Mesosa (Aphelocnemia) nebulosa FABRICIUS 1781
29	*H. tardator* NEES.	*Callidium aeneum* DEGEER 1775
		Callidium violaceum LINNÉ 1758
		Phymatodes testaceus LINNÉ 1758
30	*H. aequator* NEES.	*Tetropium castaneum* LINNÉ 1758
31	*H. dentator* F.	*Tetropium castaneum* LINNÉ 1758
		Tetropium fuscum FABRICIUS 1787
		Cerambix scopoli FUESSLY 1775
		Callidium violaceum LINNÉ 1758
		Callidium aeneum DEGEER 1775
		Plagionotus arcuatus LINNÉ 1758
32	*H. carrinator* NEES.	*Callidium violaceum* LINNÉ 1758
		Phymatodes testaceus LINNÉ 1758
33	*H. rusparator* NEES.	*Leptura quadrifasciata* LINNÉ 1758
		Acanthocinus aedilis LINNÉ 1758
Subfamily Histeromerinae		
34	*Histeromerus mystacinus* WESM.	*Strangalia aurulenta* FABRICIUS 1792
35	*Ipobracon melanurus* THOMSON	*Rhamnusium bicolor* SCHRANK 1781
36	*I. nigrator* ZETT.	*Plagionotus arcuatus* LINNÉ 1758
		Rhagium inquisitor LINNÉ 1758
		Spondylis buprestoides LINNÉ 1758
37	*I. obscuripennis* THOMS	*Phyrrhidium sanguineum* LINNÉ 1758
Subfamily Opiinae		
38	*Opius caudatus* WSM.	*Pogonocherus hispidus* LINNÉ 1758

The 38 species of parasitic Ichneumonids belong to 9 subfamilies: Blacinae (11 species), Brachistinae (1 species), Cheloninae (1 species), Cenocoeliinae (1 species), Doryctrinae (11 species), Euphorinae (1 species), Helconinae (7 species), Histeromerinae (4 species) and Opiinae (1 species) (Fig. 1).

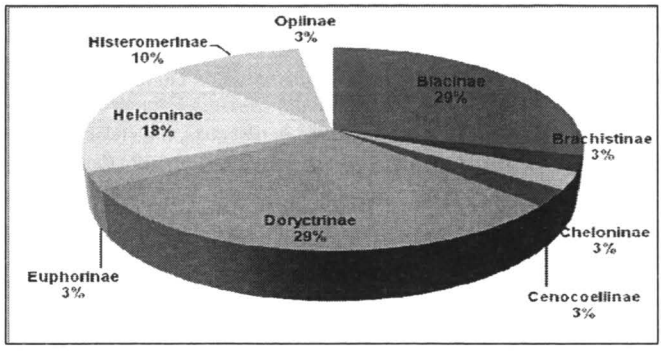

Fig. 1 Comparative percentages of species of the family Ichneumonidae

We analyzed the data to be useful material and in terms of diversity of hosts. We found 33 species of beetles belonging to the family Cerambycidae. Each of them is hosts of several species of parasites (Table 2).

Table 2 Cerambycid host species for Ichneumonidae

No.	Species of beetles	Subfamilies of beetles
1	*Callidium aeneum* DEGEER 1775	Cerambycinae
2	*Callidium violaceum* LINNÉ 1758	
3	*Cerambix scopoli* FUESSLY 1775	
4	*Clytus arietis* LINNÉ 1758	
5	*Clytus tropicus* PANZER 1795	
6	*Gracilia minuta* FABRICIUS 1781	
7	*Hylotrupes bajulus* LINNÉ *1758*	
8	*Phymatodes testaceus* LINNÉ 1758	
9	*Phyrrhidium sanguineum* LINNÉ 1758	
10	*Plagionotus arcuatus* LINNÉ 1758	
11	*Xylotrecus rusticus* LINNÉ 1758	
12	*Acanthocinus aedilis* LINNÉ 1758	Lamiinae
13	*Acanthocinus griseus* FABRICIUS 1792	
14	*Exocentrus adspersus* MULSANT 1846	
15	*Exocentrus punctipennis* MULSANT 1856	
16	*Exocentrus stierlini* GANGLBAUEr 1883	
17	*Leiopus nebulosus* LINNÉ 1758	
18	*Mesosa (Aphelocnemia) nebulosa* FABRICIUS 1781	
19	*Monochamus sutor* LINNÉ 1758	
20	*Pogonocherus (Pityphilus) fasciculatus* DEGEER 1775	
21	*Pogonocherus hispidus* LINNÉ 1758	
22	*Sarpeda populnea* LINNÉ 1758	
23	*Sarpeda scalaris* LINNÉ 1758	
24	*Leptura quadrifasciata* LINNÉ 1758	Lepturinae
25	*Rhagium bifasciatum* FABRICIUS 1775	
26	*Rhagium inquisitor* LINNÉ 1758	
27	*Rhamnusium bicolor* SCHRANK 1781	
28	*Strangalia aurulenta* FABRICIUS 1792	
29	*Strangalia quadrifasciata* LINNÉ 1758	
30	*Tetropium castaneum* LINNE 1758	Spondylidinae
31	*Tetropium fuscum* FABRICIUS 1787	
32	*Spondylis buprestoides* LINNÉ 1758	

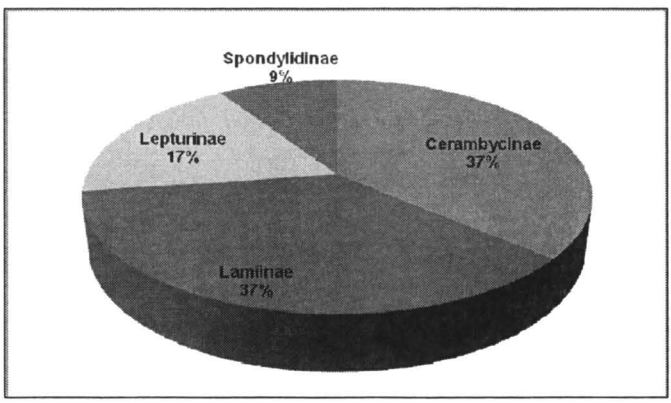

Fig. 2 Distribution of subfamilies within the family of Cerambycidae

Most host beetle belong the subfamily Cerambycinae (12 species) and Lamiinae (12 species), and other hosts belong to the following at two subfamilies: Lepturinae (6 species) and Spondylidinae (3 species) (Fig. 2).

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RESEARCH ABOUT CÂMPULUNG CITY ORNITHOFAUNA (ARGEŞ COUNTY, ROMANIA)

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Abstract: **RESEARCH ABOUT CÂMPULUNG CITY ORNITHOFAUNA (ARGEŞ COUNTY, ROMANIA).**
During February 2010 - January 2011, in the built-up areas of the Câmpulung city from the Sub-mountainous area of the hydrographical basin of the Râul Doamnei River, through monthly observations, 30 species of birds were identified. They belong to 5 orders. The most of the species were residents or summer visitors. 21 of them were breeding species; *Passer domesticus* had the biggest density (3.66 pairs/ha). Regarding the constancy, *Streptopelia decaocto*, *Pica pica*, *Corvus monedula*, *Turdus merula*, *Parus major* and *Passer domesticus* were euconstant species and, regarding the dominance and the Dzuba index of ecological significance, *Streptopelia decaocto*, *Corvus monedula* and *Passer domesticus* were eudominant species. The Passeriformes order was always overdominant.
Key words: ornithofauna, built-up areas, Câmpulung.

Introduction

The avifauna of the cities from our country were well studied in recent decades (Şova & Rang, 1968; Ion & Valenciuc, 1982; Papadopol & Petrescu, 1990; Ion & Gache, 1996; Butnaru, 2006; Butnaru et al., 2007; Gache, 2007; Bălescu, 2005a; Bălescu, 2005b; Bălescu, 2006; Bălescu, 2007; Bălescu, 2008; etc.) but the ornithofauna of the cities from the Râul Doamnei hydrographical basin was not studied until now.

Materials and methods

The Câmpulung city is located between 570 and 640 m elevation on the Râul Târgului valley, in the depression with same name from the submontan region of the Iezer-Păpuşa Massif (Fig. 1). Râul Târgului is tributary to the Râul Doamnei River that flows in the Argeş River. The city, with 12 km^2 surface, is surrounded by mixture forests (*Fagus sylvatica* and *Picea abies*), fruit trees orchards (*Malus pumila*) and pastures. The vegetation of the city differs depending on the zone, the place of the spontaneous vegetation and the gardens with fruit trees from the outskirts being occupied more and more, toward the centre, by the ornamental vegetation: *Picea abies*, *Pinus sylvestris*, *Tilia* sp., *Thuja* sp., *Aesculus hippocastanum*, *Betula* sp., *Salix* sp.

The observations were performed between February 2010 and January 2011, in the centre of the city. Monthly, a field monitoring in the built-up areas was effectuated, generally between 8:00 and 10:00. The transect method was used. 1 km was covered on the Negru Vodă Street, found at about 200 m distance of the Râul Târgului River bed (Fig. 1), from the Negru Vodă Monastery to the City Hall.

A binocular 10*50 and a Hamlin guide (Bruun et all., 1999) were used.

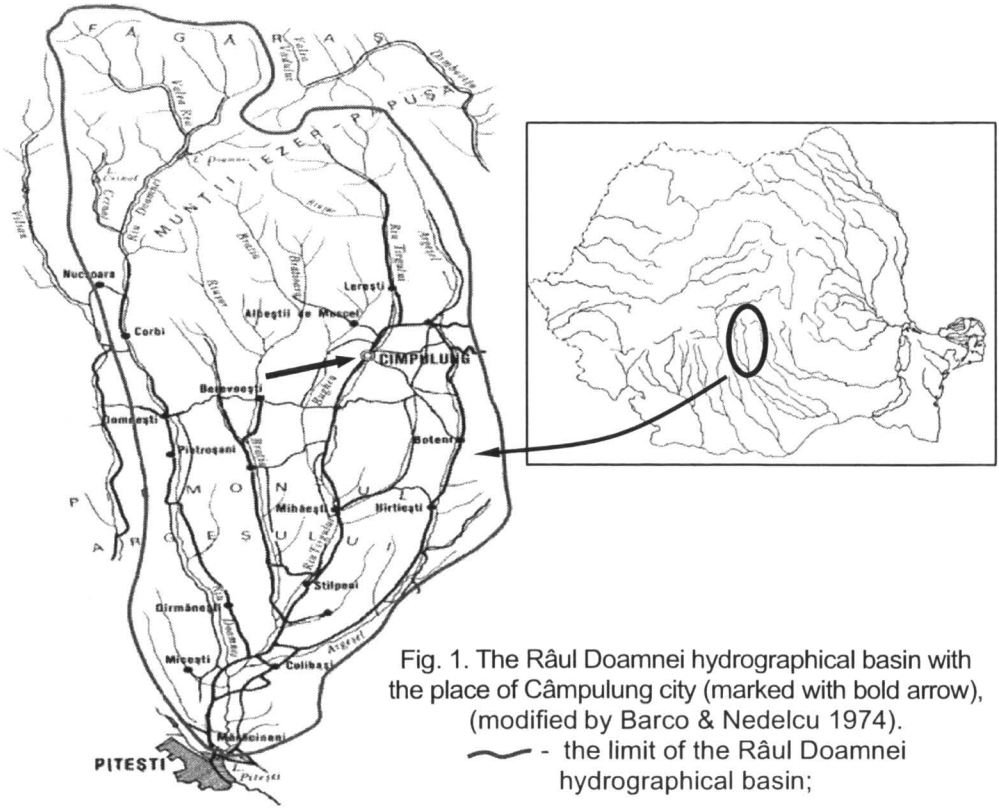

Fig. 1. The Râul Doamnei hydrographical basin with the place of Câmpulung city (marked with bold arrow), (modified by Barco & Nedelcu 1974).
~ - the limit of the Râul Doamnei hydrographical basin;

Results and discussions

During February 2010 - January 2011, 30 species of birds (7.85% of all species of birds recorded in Romania, by Munteanu 1998) were identified into the built-up area of the Câmpulung city. They belong to 5 orders and 13 families (Table 1).

Table 1 The distribution on taxonomic units of the avifauna observed in Câmpulung city during February 2010 - January 2011, comparatively with the situation at the national level

Taxonomic unity	Romania	Câmpulung city	Percents (%)
Number of orders	19	5	26.32
Number of families	64	13	20.31
Number of species	382	30	7.85

10 species (33.33%) were resident species (R), 2 species (6.67%) were partial migrant species (PM), 5 species (16.67%) were winter visitors (WV), 10 species (33.33%) were summer visitors (SV), 1 species (3.33%) was species of passage (P) and 2 species (6.67%) were accidental species (Ac), (Table 2, Fig. 2). A species can belong to many phenological categories, but only their main category was took into consideration. The resident species and the summer visitors had the biggest percentage (together 66.66% of all identified species). The winter visitors had half of the percentage of the summer visitors.

Table 2 The monthly occurrence of the bird species identified within the built-up areas of Câmpulung city, during February 2010 – January 2011, and their phenology

No.	Species	Month												Phenology in the area	Observations
		January	February	March	April	May	June	July	August	September	October	November	December		
1.	*Buteo buteo*		■											Ac	1 i., on 20 February
2.	*Streptopelia decaocto*	■	■	■	■	■	■	■	■	■	■	■	■	R	
3.	*Apus apus*				■	■	■	■						SV	
4.	*Dendrocopos major*								■				■	R	
5.	*Delichon urbica*				■	■	■	■	■					SV	
6.	*Sturnus vulgaris*		■		■	■	■							SV	3 i., on 20 May
7.	*Garrulus glandarius*									■				Ac	2 i., on 19 September
8.	*Pica pica*	■	■	■	■	■		■	■	■	■	■	■	R	
9.	*Corvus monedula*	■	■	■	■	■	■	■	■	■	■	■	■	R	
10.	*Corvus frugilegus*	■									■			WV	Max. 3 i., on 23 October
11.	*Corvus corone cornix*			■	■	■			■		■		■	R	
12.	*Corvus corax*				■									R	1 i., on 22 April

13.	*Sylvia curruca*				■	■	■							SV	Max. 2 i., on 20 May
14.	*Phylloscopus collybita*								■	■				P	
15.	*Regulus regulus*		■						■					WV	Max. 2 i., on 24 August
16.	*Phoenicurus ochruros*					■	■	■	■	■				SV	Each 1 i.
17.	*Turdus merula*	■	■	■	■	■	■	■		■	■	■	■	PM	
18.	*Turdus pilaris*					■	■	■						SV	Max. 8 i., on 20 May
19.	*Parus palustris*					■				■			■	R	
20.	*Parus caeruleus*											■	■	WV	
21.	*Parus ater*	■	■	■			■				■	■		R	Max. 11 i., on 23 October
22.	*Parus major*	■	■		■	■		■	■	■	■	■	■	R	Max. 10 i., on 23 October and 14 November
23.	*Sitta europaea*				■	■			■					SV	Max. 5 e., on 20 May
24.	*Passer domesticus*	■	■	■	■	■	■	■	■	■	■	■	■	R	
25.	*Fringilla coelebs*	■		■	■		■			■	■	■	■	PM	
26.	*Coccothraustes coccothraustes*	■		■	■						■	■		WV	
27.	*Serinus serinus*				■			■						SV	
28.	*Carduelis chloris*					■	■	■	■	■	■	■		SV	
29.	*Carduelis spinus*											■	■	WV	Max. 4 i., on 21 December
30.	*Carduelis carduelis*							■	■					SV	

Legend:

■ - occurrence, R - resident species, PM - partial migrant species, WV - winter visitor, SV - summer visitor, P - passage species, Ac - accidental species, i - individual(s).

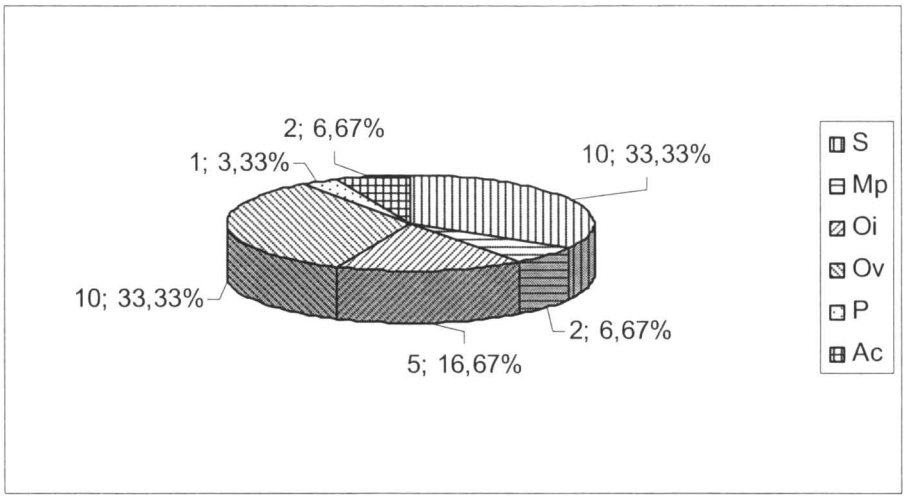

Fig. 2 The distribution of the birds' species observed during February 2010 - January 2011 in the Câmpulung city, according to their phenology (R - resident species, PM - partial migrant species, WV - winter visitor, SV - summer visitor, P - passage species, Ac - accidental species)

The total number of observed birds' species presented a minimum in March (9 species). The maximum was in the spring migration (in April and May - 16 species). In August, at the beginning of the autumn passage, was also a lesser maximum (14 species). All number of species from the hiemal season varied between 10 and 12. Instead, the number of individuals of all observed species registered a maximum in June and July (253, respectively 245 individuals), it being the effect of the juveniles of *Apus apus*, *Corvus monedula* and *Passer domesticus* that abandoned the nests. The minimum of the individuals was noted in March (101 individuals), at the beginning of the spring, when the trophic resources were at the minimum level. Generally, fewer than 150 specimens were numbered in winter, the January being the exception, when *Corvus monedula* attained the biggest number of individuals (50), (Table 2 and Table 3).

Table 3 The monthly and general repartition of the species and observed individuals number

Month	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Period**
Number of species	10	10	9	16	16	13	13	14	12	12	12	12	30
Number of individuals	180	146	101	165	185	253	245	164	159	150	135	124	2007

Streptopelia decaocto (species observed each month) had a maximum number of individuals in May (39 individuals) and in August (37 individuals), that corresponded to the appearance of the fledged young. The minimum was from October to December (the absolute minimum in December – 9 individuals). *Apus apus* was observed from April to June (86 individuals), when, because of the bad weather, the birds gathered from the neighbourhoods in search of food, behaviour mentioned in the scientific literature (Rietschel et all. 1964). The juveniles abandoned their nest in July (66 individuals being observed). *Corvus monedula* was observed each month, the maximum of individuals being in June (55 individuals), when the fledged young appeared. A maximum of 50 individuals was registered in January, because of the birds in transit. The smallest number of individuals was in March and December (21 individuals). The monthly number of individuals of *Passer domesticus* varied irregularly, it reflecting both the real dynamics of the population and the habits of the species to gather in places with abundant food from the city or from the vicinity or to rest in hidden places: garrets, building ornaments, dense heads of trees and bushes etc. The biggest number of individuals was registered in July (105 individuals) and the minimum in May (49 individuals) (Fig. 3).

According to the methodology of the Atlas of the Romanian Breeding Birds (Munteanu et al., 2002), 21 breeding species were identified (Table 4), 6 of them being characteristically for the human settlements (*Streptopelia decaocto*, *Apus apus*, *Delichon urbica*, *Corvus monedula*, *Turdus merula* and *Passer domesticus*) (Radu, 1984). The low number of species that breed into the hollows (*Dendrocopos major*, *Sturnus vulgaris*, *Parus ater*, *Parus major* and *Sitta europaea*) and their small density show the importance of the lack of old trees in ecosystem.

Passer domesticus had the biggest density (3.66 pairs/ha). It was followed by *Streptopelia decaocto* (1.25 pairs/ha) and *Corvus monedula* (1.125 pairs/ha). *Apus apus* and *Delichon urbica* had each 0.60 pairs/ha and *Turdus merula* a density of 0.10 pairs/ha. The others species had densities bellow 0.1 pairs/ha.

The all density of the breeding species was 8.01 pairs/ha. *Streptopelia decaocto*, *Apus apus*, *Delichon urbica*, *Corvus monedula*, *Turdus merula* and *Passer domesticus* had together a density of 7.34 pairs/ha, that means 91.63% of the density of all breeding species.

12 species (57.14%) were certainly breeding and (CB) and 9 (42.85%) probably breeding (PB) (Table 4).

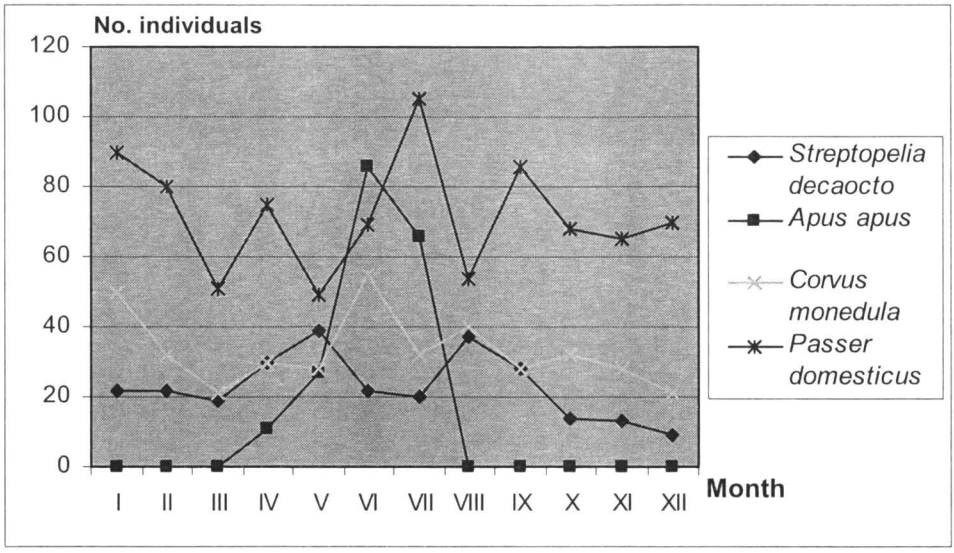

Fig. 3 The monthly variation of the individuals' number for some species of birds

Table 4 The densities of the breeding birds species observed in Câmpulung city

No.	Species	Density (pairs/ha)	Breeding
1	*Streptopelia decaocto*	1.250	CB
2	*Apus apus*	0.600	CB
3	*Dendrocopos major*	0.017	PB
4	*Delichon urbica*	0.600	CB
5	*Sturnus vulgaris*	0.083	PB
6	*Pica pica*	0.027	CB
7	*Corvus monedula*	1.125	CB
8	*Corvus corone cornix*	0.012	CB
9	*Sylvia curruca*	0.050	PB
10	*Phoenicurus ochruros*	0.075	PB
11	*Turdus merula*	0.100	CB
12	*Turdus pilaris*	0.058	CB
13	*Parus palustris*	0.025	PB
14	*Parus ater*	0.010	PB
15	*Parus major*	0.080	CB
16	*Sitta europaea*	0.038	CB
17	*Passer domesticus*	3.666	CB
18	*Fringilla coelebs*	0.063	PB
19	*Serinus serinus*	0.040	PB
20	*Carduelis chloris*	0.057	CB
21	*Carduelis carduelis*	0.033	PB

Legend: CB - certainly breeding species, PB - probable breeding species

Regarding the ecological indexes (Table 5), depending on the constancy, 6 species (20%, *Streptopelia decaocto*, *Pica pica*, *Corvus monedula*, *Turdus merula*, *Parus major* and *Passer domesticus*) were euconstant species (C4), 2 species (6.67%, *Fringilla coelebs* and *Carduelis chloris*) were constant species (C3), 7 species (23.33%, *Apus apus*, *Delichon urbica*, *Sturnus vulgaris*, *Corvus corone cornix*, *Phoenicurus ochruros*, *Parus ater* and *Coccothraustes coccothraustes*) were accessory species (C2) and 15 species (50%, *Dendrocopos major*, *Garrulus glandarius*, *Sylvia curruca*, *Parus palustris*, *Serinus serinus*, etc.) were accidental species (C1).

Concerning the dominance, 3 species (10%, *Streptopelia decaocto*, *Corvus monedula* and *Passer domesticus*) were eudominant species (D5), 1 species (3.33%, *Apus apus*) was dominant species (D4), 1 species (3.33%, *Parus major*) was subdominant species (D3), 2 species (6.67%, *Delichon urbica* and *Pica pica*) were recedent species (D2) and 23 de species (76.67%, *Buteo buteo*, *Sturnus vulgaris*, *Corvus corax*, *Regulus regulus*, *Parus caeruleus*, etc.) were subrecedent species (D1).

Depending on the Dzuba index of ecological signification, 3 species (10%, *Streptopelia decaocto*, *Corvus monedula* and *Passer domesticus*) were eudominant species (W5), no specie was dominant species (W4), 3 species (10%, *Apus apus*, *Pica pica* and *Parus major*) were subdominant species (W3), 9 species (30%, *Delichon urbica*, *Corvus corone cornix*, *Phoenicurus ochruros*, *Turdus pilaris*, etc.) were recedent species (W2) and 15 species (50%, *Corvus frugilegus*, *Phylloscopus collybita*, *Sitta europaea*, *Carduelis spinus*, *Carduelis carduelis*, etc.) were subrecedent species (W1).

Table 5 The ecological indexes of the avifauna

No.	Species	Constancy	Category of constancy	Dominance	Category of dominance	Dzuba index of ecological signification	Category of Dzuba index of ecological signification
1	*Buteo buteo*	8.33	C1	0.05	D1	04	W1
2	*Streptopelia decaocto*	100	C4	13.70	D5	13.702	W5
3	*Apus apus*	33.33	C2	9.47	D4	3.156	W3
4	*Dendrocopos major*	16.67	C1	0.10	D1	0.017	W1
5	*Delichon urbica*	41.67	C2	1.99	D2	0.830	W2
6	*Sturnus vulgaris*	33.33	C2	0.30	D1	0.100	W1
7	*Garrulus glandarius*	8.33	C1	0.10	D1	08	W1
8	*Pica pica*	91.67	C4	1.44	D2	1.325	W3
9	*Corvus monedula*	100	C4	19.78	D5	19.781	W5
10	*Corvus frugilegus*	16.67	C1	0.20	D1	0.033	W1

11	*Corvus corone cornix*	50	C2	0.45	D1	0.224	W2
12	*Corvus corax*	8.33	C1	0.05	D1	04	W1
13	*Sylvia curruca*	25	C1	0.20	D1	0.050	W1
14	*Phylloscopus collybita*	16.67	C1	0.40	D1	0.066	W1
15	*Regulus regulus*	16.67	C1	0.15	D1	0.025	W1
16	*Phoenicurus ochruros*	41.67	C2	0.25	D1	0.104	W2
17	*Turdus merula*	91.67	C4	0.95	D1	0.868	W2
18	*Turdus pilaris*	25	C1	0.55	D1	0.137	W2
19	*Parus palustris*	25	C1	0.15	D1	0.037	W1
20	*Parus caeruleus*	16.67	C1	0.20	D1	0.033	W1
21	*Parus ater*	50	C2	1.05	D1	0.523	W2
22	*Parus major*	83.33	C4	2.39	D3	1.993	W3
23	*Sitta europaea*	25	C1	0.35	D1	0.087	W1
24	*Passer domesticus*	100	C4	42.95	D5	42.950	W5
25	*Fringilla coelebs*	66.67	C3	0.70	D1	0.465	W2
26	*Coccothraustes coccothraustes*	41.67	C2	0.40	D1	0.166	W2
27	*Serinus serinus*	16.67	C1	0.10	D1	0.017	W1
28	*Carduelis chloris*	58.33	C3	1	D1	0.581	W2
29	*Carduelis spinus*	16.67	C1	0.35	D1	0.058	W1
30	*Carduelis carduelis*	16.67	C1	0.25	D1	0.042	W1

Legend: C1 - accidental species, C2 - accessory species, C3 - constant species, C4 - euconstant species; D1 - subrecedent species, D2 - recedent species, D3 - subdominant species, D4 - dominant species, D5 - eudominant species; W1 - subrecedent species, W2 - recedent species, W3 - subdominant species, W4 - dominant species, W5 - eudominant species.

Because of the small green areas with old trees, the ecological diversity was quite modest (1.85, respectively 3.96). The evenness was also small (0.54, respectively 0.13), it showing a pronounced disequilibrium between the number of individuals of each species (Table 6). The differences between values consist in the fact that the Shannon-Wiener index takes in account both the number of species and the number of individuals of each species and the Simpson index takes in account the number of individuals of each species in relationship with the number of individuals of all observed species.

Table 6 The ecological diversity and the evenness of the avifauna observed in Câmpulung city

Index	**Shanon Wiener index**	**Hsmax**	**Shanon Wiener evenness**	**Simpson index (1/λ)**	**S**	**Simpson evenness**
Value	1.85	3.40	0.54	3.96	30.44	0.13

I calculated the index of relation for all birds orders (Kelemen & Szombath, 1975; Gache, 2002). The value of the static axis (As) is 20, and the value of the axis of dominancy (Ad) is 40.

The Passeriformes order was each ecological season overdominant, the biggest value of its index of relation (IR) being in the hiemal season (88.38%) and the smallest in the vernal season (60.27%). The Apodiformes order, in the vernal and aestival, and the Columbiformes order, in the serotinal, were in the dominance zone, in the others seasons they being complementary. Falconiformes and Piciformes were always complementary (Table 7, Fig. 4).

Table 7. The values of the index of relation of the bird orders identified in Câmpulung city, during February 2010 – January 2011

Order	Prevernal	Vernal	Aestival	Serotinal	Autumnal	Hiemal	Period
Falconiformes	0	0	0	0	0	0.17	0.05
Columbiformes	18.42	13.93	8.16	22.56	13.59	11.28	13.70
Apodiformes	4.14	25.80	26.94	0	0	0	9.47
Piciformes	0	0	0	0.61	0	0.17	0.10
Passeriformes	77.44	60.27	64.90	76.83	86.41	88.38	76.68

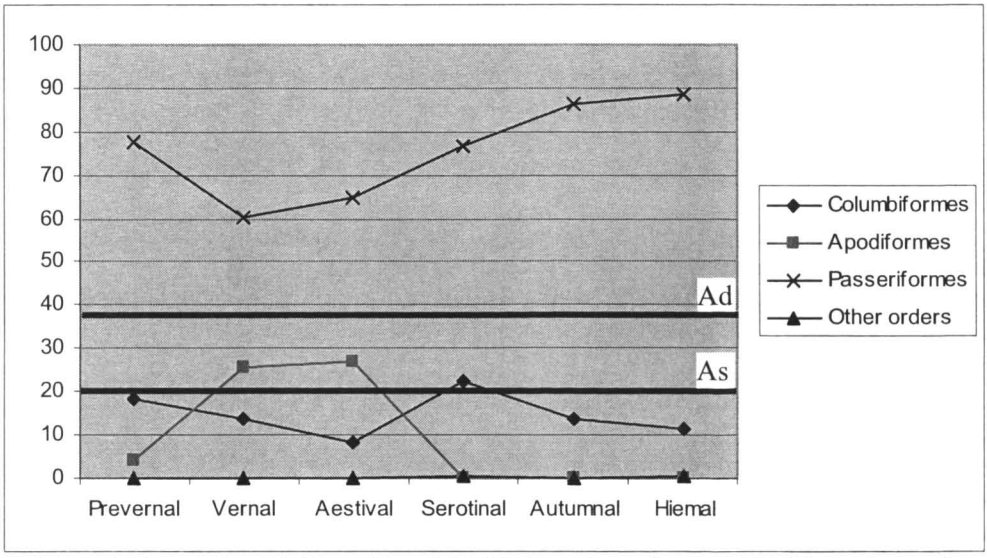

Figure 4 The seasonal dynamics of the birds orders observed in Câmpulung city during February 2010 - January 2011

Regarding the global participation of the orders to the birds' population observed in Câmpulung city, the Passeriformes order was the only overdominant order, with a value of 76.68%. The other orders (Falconiformes, Columbiformes, Apodiformes and Piciformes) were complementary (Table 7, Fig. 5).

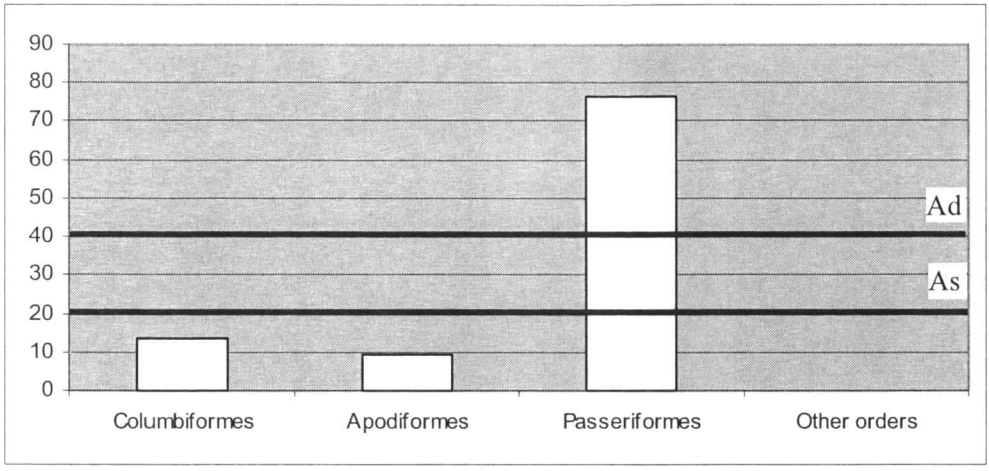

Figure 5 The global participation of the orders to the birds' population registered during February 2010 – January 2011 in Câmpulung city

Conclusions

- During February 2010 - January 2011, 30 birds species (7.85% of all species of birds recorded in Romania, included in 5 orders and 13 families) were identified in each month at a single field monitoring;
- 10 species (33.33%) were resident, 2 (6.67%) were partial migrant, 5 (16.67%) were winter visitors, 10 (33.33%) were summer visitors, 1 (3.33%) were passage visitor and 2 (6.67%) were accidental species;
- In March was the minimum number of recorded species (9) and in April and May was the maximum number of recorded species (16 species);
- The biggest number of individuals was registered in June and July (253, respectively 245 individuals); minimum was registered in March (101 individuals);
- The maximum of the individuals number was in May (for *Streptopelia decaocto*), in June (for *Apus apus* and *Corvus monedula*), and in July (for *Passer domesticus*);
- 21 breeding species were identified, 12 certainly breeding and 9 probable breeding;
- *Passer domesticus* had the biggest density (3.66 pairs/ha);
- The density of all breeding species was 8.01 pairs/ha;
- The accidental species and the subrecedent species were the most numerous;
- *Streptopelia decaocto*, *Pica pica*, *Corvus monedula*, *Turdus merula*, *Parus major* and *Passer domesticus*) were the euconstant species and *Streptopelia decaocto*, *Corvus monedula* and *Passer domesticus* were the eudominant species;
- The ecological diversity and the evenness were low;
- The Passeriformes was the only order overdominant.

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RESEARCH ABOUT MIOVENI CITY ORNITHOFAUNA (ARGEŞ COUNTY, ROMANIA)

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Abstract: **RESEARCH ABOUT MIOVENI CITY ORNITHOFAUNA (ARGEŞ COUNTY, ROMANIA)**
During 2009, in the built-up areas of the Mioveni city 40 species of birds were identified. They belong to 8 orders and 20 families. The most of the species were residents, summer visitors or passage migrants. Only 12 were breeding species; *Passer domesticus* had the biggest density (6 pairs/ha). Regarding the constancy, *Streptopelia decaocto* and *Passer domesticus* were euconstant species, regarding the dominance, *Streptopelia decaocto*, *Delichon urbica* and *Passer domesticus* were eudominant species and, regarding the Dzuba index of ecological significance, *Streptopelia decaocto* and *Passer domesticus* were eudominant species. The Passeriformes order was always overdominant.
Key words: ornithofauna, built-up areas, Mioveni.

Introduction

During the last decades, the avifauna of the cities from our country were well studied (Şova & Rang, 1968; Ion & Valenciuc, 1982; Papadopol & Petrescu, 1990; Ion & Gache, 1996; Butnaru, 2006; Butnaru et all, 2007; Gache, 2007; Bălescu, 2005a; Bălescu, 2005b; Bălescu, 2006; Bălescu, 2007; Bălescu, 2008; etc.), the researches being focused mainly on their green areas. Excepting the avifauna of the Câmpulung city, the ornithofauna of the cities from the Râul Doamnei hydrographical basin was not studied until now. I fixed in this paper only on the avifauna from the built-up areas because one of the other habitats will be the subject of the other studies. The biological and ecological characteristics were considered. Because Mioveni is a typical city of the hilly area, its avifauna it is probably to be similar to the one of other cities from the adjacent region with same features.

Materials and methods

The Mioveni city is placed at circa 325 m elevation in the meadow of the Doamnei River, near to the confluence of the Argeşel River with the Târgului River (Fig. 1). Mioveni, Clucereasa, Colibaşi, Făgetu and Racoviţa are its components, its territorial-administrative surface being 5097 ha (595 ha - built-up areas). It is surrounded by agricultural lands and fruit tree orchards. The Dacia Motorcar Plant and a vast deciduous forest composed

by diverse species of *Quercus*, *Fagus*, *Carpinus*, *Acer*, *Ulmus* etc. are toward South-East.

The city itself, without suburbs, measures approx. 75 ha. Most buildings are blocks with 4 floors built after 1980. Its vegetation (usually ornamental plants of the genera: *Buxus*, *Ligustrum*, *Juniperus*, *Populus*, *Prunus*, *Picea*, *Pinus*, etc.) is rarely. It covers only small islands between buildings or borders the alleys. The most of the trees have less than 20 years old. In the center of the city there are no gardens; they begin to appear toward the periphery.

The observations were performed in 2009, generally between 8:00 and 10:00, only in the built-up areas from the centre of the city. One sample was done each month. I used the transect method. The track was 1 km long, on the principal road of the locality (Fig. 1). The species were visually and auditory identified (by Bruun et all, 1999). A binocular 10x50 was employed.

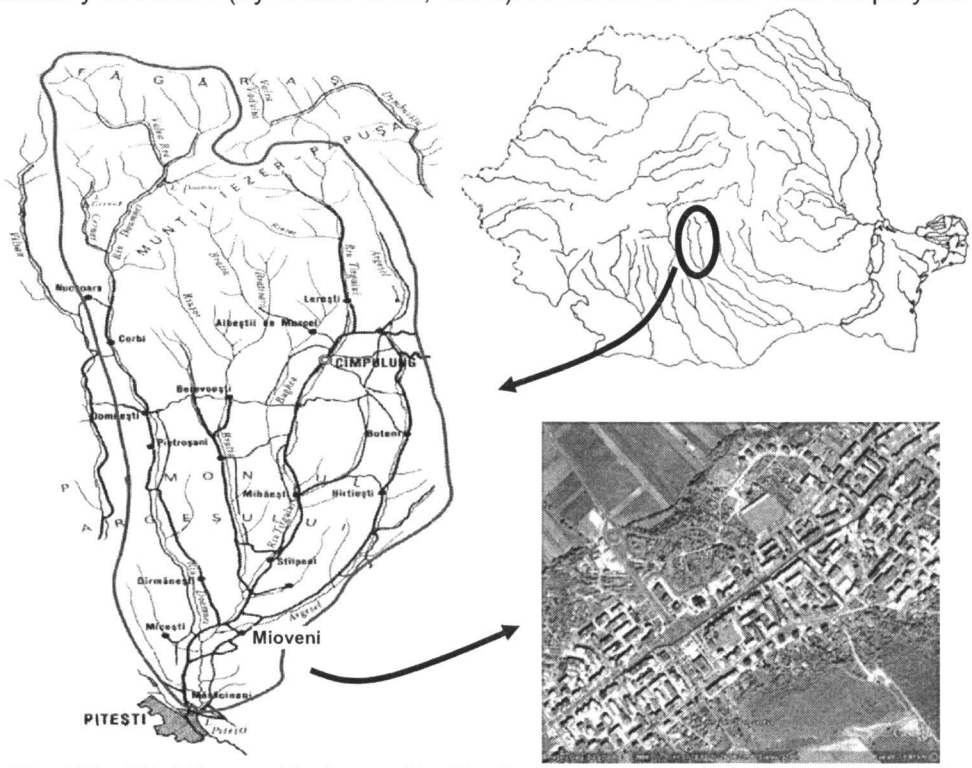

Fig. 1 The Râul Doamnei hydrographical basin with the place of Mioveni city (in Google Earth format), (modified by Barco & Nedelcu, 1974)

The limit of the Doamnei River hydrographical basin

Results and discussions

During 2009, 40 species of birds (10.47% of all species of birds recorded in Romania, by Munteanu, 1998) were identified into the built-up area of the Mioveni city. They belong to 8 orders and 20 families (Table 1 and Table 2).

Table 1 The distribution on taxonomic units of the avifauna observed in Mioveni city during 2009, comparatively with the situation at the national level

Taxonomic unity	Romania	Mioveni city	Percents (%)
Number of orders	19	8	42.11
Number of families	64	20	31.25
Number of species	382	40	10.47

Compared with the avifauna of the other cities, it is noticeable that their qualitative and quantitative components differ mainly depending on the anthropogenic pressure; the green areas on reduced surfaces, the absence of the old trees with hollows, the restricted access in the attics, chimneys and other spaces of breeding and refuge, the limited trophic supply determine a low number of species. Also, the lists of birds take into account the time of study, the size of the studied area, the kind of habitats, the place and altitudinal level of the cities, etc.

So, the ornithofauna of Bucharest (town from the plain zone, with about 300 km^2 surface) and of its surroundings numbered (between 1951 and 1989) 161 species. More or less extended open areas, with low vegetation, small parks and gardens with trees and bushes, alleys and green areas with fruit trees or flowers, green areas along rivers, parks with natural or artificial lakes, extended and diversified parks, lakes, rivers and narrow beaches, reed beds, areas with buildings of various kinds etc. have been considered (Papadopol & Petrescu, 1990).

The avifauna identified in Bacău city and into its vicinity, during 1962-1965, numbered 110 species (Şova & Rang, 1968): railway stations and industrial areas - 22 species, old districts - 35 species, areas with old and isolated buildings - 10 species, suburbs with gardens and very few trees - 1 species, settlements for sports and stadia - 2 species, new districts in construction - 4 species, lawns and small rounds with small vegetation from markets - 8 species, rivers and other wetlands - 14 species, typical suburbs, with houses set in gardens - 27 de species, residential, new, modern and rich in green areas districts - 9 species, new parks with young plantations - 56 species, cemeteries and small parks - 35 species, large parks with old trees - 75 species and lands around the reservoirs - 29 species.

In the parks of the same city Bacău from the hilly area, between 1989 and 1994, 108 species of birds were counted: 76 species in the Freedom Park, 107 species in the Gherăeşti Park, and 91 species in the Hemeius Park (Ion & Gache, 1996).

In the main green areas of the Iaşi city from the plain zone, in February 2004 - October 2005, 89 species were recorded (Butnaru, 2006) while, in the range 2003 - 2006, in the Exhibition Park were identified 36 species of birds and in the Copou Garden, 31 species (Butnaru et all., 2007). Also in Iaşi, a larger study was done during 1992 - 2006, when, in the city largest green spaces were counted 108 species of birds: Botanical Garden -

107 species, Exhibition Park - 60 species, Copou Garden - 44 species, "Maiorescu" Park - 30 species (Gache, 2007).

The oldest long-term studies about the birds of Iaşi were made during 1963 - 1981; in the Botanical Garden, the birds list included 87 species (Ion & Valenciuc, 1982).

A series of works (Bălescu, 2005 - 2008) were developed on the bird fauna of Craiova, a city located in the plain. Thus, the Romanescu Park, the Botanical Garden, the Craiovița Lake and Park, the Lunca Jiului Park, the various districts (e.g. Mofleni with the ponds from the suburbs - Şerca pond, Mofleni pond), the green areas etc. counted in the prevernal season (2002 - 2005) 94 species, in the vernal season (2002 - 2005), 69 species, in the aestival season (2003 - 2006), 69 species, in the serotinal season (2004 - 2006), 75 species, in the autumnal season (2005 - 2007), 84 species, and in the hiemal season (2000 - 2005), 54 species.

Finally, in the built-up areas of the Câmpulung city from the submontane part of the Doamnei River hidrographic basin (570-640 m elevation), during February 2010 - January 2011, 30 species of birds were identified. 23 are commonly to both cities (Câmpulung and Mioveni): *Streptopelia decaocto*, *Apus apus*, *Dendrocopos major*, *Delichon urbica*, *Sturnus vulgaris*, *Garrulus glandarius*, *Pica pica*, *Corvus monedula*, *Corvus frugilegus*, *Corvus corone cornix*, *Corvus corax*, *Phylloscopus collybita*, *Regulus regulus*, *Phoenicurus ochruros*, *Turdus merula*, *Parus caeruleus*, *Parus major*, *Passer domesticus*, *Fringilla coelebs*, *Coccothraustes coccothraustes*, *Carduelis chloris*, *Carduelis spinus*, and *Carduelis carduelis* (Mestecăneanu, 2011).

13 species (32.50% of all species identified in Mioveni city) were considered resident species (R), 1 species (2.50%) was considered partial migrant species (PM), 6 species (15.00%) were considered winter visitors (WV), 9 species (22.50%) were considered summer visitors (SV), 9 species (22.50%) were considered species of passage (P) and 2 species (5.00%) were considered accidental species (Ac), (Table 2, Fig. 2). Among the species considered accidental was *Larus michahellis*, species that breeds in the Piteşti city (placed downstream at 15 km). It can breed here in a few years, because the species is in expansion within the country; also, the administrative territory of the city is crossed by the Doamnei, Târgului and Argeşel Rivers. A species can belong to many phenological categories, but only their main category was took into consideration. The status of some species regarding the phenological categories where they were affiliated is relative, because after a longer period of study, they can move to other categories. It is significant the important percentage of the resident species (some very rare in frequency), of the summer visitors (some only come in search of food), and of the passage species (because the city is situated at the confluence of Târgului and Argeşel Rivers, the last in the continuation of the Rucăr-Bran Corridor). Compared with situation from the Câmpulung city, the percentages evidently differ regarding only the resident species and summer visitors, where here these were lower, and the passage migrants, where here these were higher, reflecting the

geographical position and the seasonal trophic resources of the two cities (Mestecăneanu, 2011).

The total number of observed species of birds presented two minimums of 6 species, one in July (constituted almost in totality by the breeding species, plus *Falco subbuteo* that came here in search of food) and other in December (constituted by resident species, plus *Turdus merula* - winter visitor). The maximum was in September (21 species), it being generated largely by the passage species and summer visitors. Regarding the number of individuals of the observed species, the minimum was registered in January (134 individuals) and October (135 individuals). The maximums of the individuals were recorded in February (267 individuals, because of *Passer domesticus*, *Turdus viscivorus* and *Streptopelia decaocto*), July (256 individuals, because of *Passer domesticus* and *Delichon urbica*) and November (241 individuals, because of *Passer domesticus* and *Anser anser*). Excepting *Anser anser*, the other passage species contributed modestly to the growing of the individuals' number of the birds from the passage period (Table 2 and Table 3).

Table 2 The monthly occurrence of the bird species identified within the built-up areas of Mioveni city, during 2009, and their phenology

No.	Species	Month												Phenology in the area	Observations
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
1	*Ardea cinerea*				■									P	4 i., on 5 April, in flight toward North
2	*Anser anser*											■		P	67 i., on 11 November, in flight toward West-South-West
3	*Accipiter nisus*	■			■							■		R	
4	*Falco subbuteo*						■	■	■					SV	
5	*Falco tinnunculus*	■				■						■		PM	Max. 2 i., on 17 May
6	*Larus michahellis*				■									Ac	5 i., on 5 April, in flight and placed on House of Culture of the Unions
7	*Streptopelia decaocto*	■	■	■	■	■	■	■	■	■	■	■	■	R	
8	*Apus apus*				■		■	■	■	■				SV	Max. 8 i., on 1 August
9	*Dendrocopos major*									■				R	1 i., on 13 September

10	*Galerida cristata*								■					Ac	1 i., on 1 August
11	*Hirundo rustica*						■			■				SV	
12	*Delichon urbica*				■	■	■	■	■	■				SV	
13	*Anthus trivialis*									■				P	3 i., on 13 September
14	*Motacilla alba*				■		■			■	■			SV	Max. 4 i., on 13 September
15	*Sturnus vulgaris*			■	■	■	■	■		■	■			SV	Max. 8 i., on 5 July
16	*Garrulus glandarius*						■							R	1 i., on 13 June
17	*Pica pica*	■	■	■		■	■			■				R	
18	*Corvus monedula*		■	■	■	■	■			■		■	■	R	
19	*Corvus frugilegus*	■								■				R	
20	*Corvus corone cornix*									■				R	3 i., on 13 September
21	*Corvus corax*			■						■				R	3 i., on 13 September
22	*Prunella modularis*										■			P	1 i., on 11 October
23	*Sylvia atricapilla*						■							SV	1 i., on 13 June
24	*Phylloscopus collybita*									■	■			P	
25	*Regulus regulus*		■											WV	1 i., on 7 February
26	*Phoenicurus ochruros*									■	■			P	
27	*Turdus merula*												■	WV	3 i., on 19 December
28	*Turdus philomelos*										■			P	1 i., on 11 October
29	*Turdus viscivorus*		■											WV	70 i., on 7 February
30	*Parus caeruleus*									■		■		WV	
31	*Parus major*	■	■	■	■		■			■	■	■	■	R	
32	*Passer domesticus*	■	■	■	■	■	■	■	■	■	■	■	■	R	
33	*Passer montanus*											■		WV	2 i., on 8 November
34	*Fringilla coelebs*										■			P	1 i., on 11 October
35	*Coccothraustes coccothraustes*						■			■	■			R	
36	*Carduelis chloris*			■	■	■	■		■					SV	
37	*Carduelis spinus*										■			WV	1 i., on 11 October
38	*Carduelis carduelis*				■					■			■	R	
39	*Carduelis cannabina*				■									SV	3 i., on 5 April
40	*Emberiza citrinella*									■	■			P	

Legend:

■ - occurrence; I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII – the months of the year; R

– resident species, PM – partial migrant species, WV – winter visitor, SV – summer visitor, P – passage species, Ac – accidental species; i – individual(s).

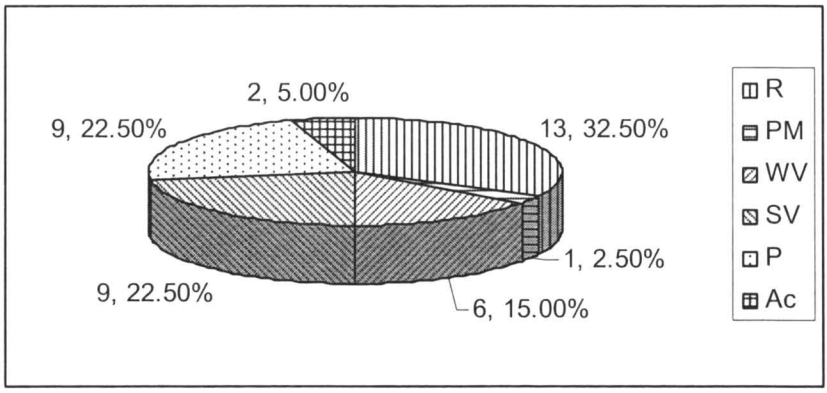

Fig. 2 The distribution of the birds' species observed during 2009 in the Mioveni city, according to their phenology (R - resident species, PM - partial migrant species, WV - winter visitor, SV - summer visitor, P - passage species, Ac - accidental species)

Table 3 The monthly and general repartition of the species and observed individuals number

Month	January	February	March	April	May	June	July	August	September	October	November	December	Period
Number of species	7	7	8	14	8	15	6	7	21	13	9	6	40
Number of individuals	134	267	176	193	204	175	256	198	197	135	214	164	2313

In Câmpulung city, the maximum number of species was registered in April and May and the minimum in March and the maximum number of individuals was registered in June and the minimum in March (Mestecăneanu, 2011). The differences of dynamics between the avifauna of the cities from the submontane and hilly areas from the Doamnei River hydrographical basin are result of the local conditions of food, breeding, passage and wintering.

In terms of monthly variation of the individuals number of the three synanthropic species with the highest dominance, *Streptopelia decaocto*, resident species, registered each time, presented two principal maximums - one in March (36 individuals) and other in September and October (31, respectively 30 individuals). The main minimum was in December (4 individuals) but paradoxically a period of minimum was also in June - July (10, respectively 12 individuals), when the fledging of the juveniles should be

reflected in the increased of their number. The explanation is that the species is concentrated permanently near the trophic resources, inside the city or outside it; also, the juveniles disperse after gaining independence to other places rich in food. The abundance of birds in spring and autumn seems to indicate some migration, at least locally. *Delichon urbica* was observed from April to September, its maximum number of individuals being recorded in July and August (110, respectively 115 individuals), because of the fledged juveniles. The autumn migration from September was not surprised in the observations. In the case of *Passer domesticus*, also resident species and presented merely in observations, the minimum was in August (55 individuals) and the maximum in February and December (172, respectively 150 individuals). Same tendency to group in places rich in food, observed at *Streptopelia decaocto*, was again obvious. In winter the birds come in the city from the neighborhoods and in summer they leave on fields for insects or seeds (Fig. 3).

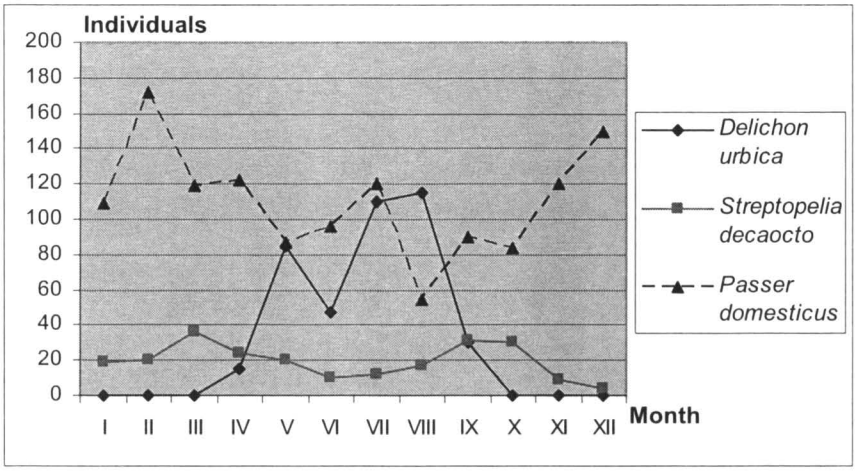

Fig. 3 The monthly variation of the individuals' number for some species of birds.

In the built-up areas from the Câmpulung city, the number of individuals of *Streptopelia decaocto* showed also two maximums, but closer (in May and August) and the number of individuals of *Passer domesticus* varied quite similarly with that from this case (r = 0.32, positive, acceptable and insignifiant correlation), (Colton, 1974; Stan, 1993; Mestecăneanu, 2011).

According to the methodology of the Atlas of the Romanian Breeding Birds (Munteanu et all, 2002), only 12 breeding species were registered during 2009 year (Table 4). 6 of them are characteristically for the human settlements (*Streptopelia decaocto*, *Apus apus*, *Hirundo rustica*, *Delichon urbica*, *Corvus monedula* and *Passer domesticus*), the others being sylvan species or peculiar to the anthropogenic landscape (Radu, 1984; Munteanu, 2000). Considering the reduced number of old and hollow trees, only two species (*Parus major* and *Sturnus vulgaris*) bred in hollows. Some - *Apus apus*,

Motacilla alba (probably), *Corvus monedula* and *Passer domesticus* - bred preponderantly in diverse favourable spaces from builds (walls, chimneys, house tops, etc.). *Passer domesticus* bred often in old nests of *Delichon urbica*, too. Also, *Hirundo rustica* and *Delichon urbica* bred on buildings. *Streptopelia decaocto*, *Pica pica*, *Sylvia atricapilla* and *Carduelis chloris* bred in canopy. Occasionally, in the city can breed other species observed at outskirts: *Dendrocopos major*, *Garrulus glandarius*, *Phylloscopus collybita*, *Turdus merula*, *Turdus philomelos*, *Parus caeruleus*, *Passer montanus*, *Coccothraustes coccothraustes*, *Carduelis carduelis*, etc.

Passer domesticus had the biggest density (6 pairs/ha). It was followed by *Delichon urbica* (5 pairs/ha) and *Streptopelia decaocto* (1 pair/ha). The others species have had each densities bellow 0.2 pairs/ha.

The all density of the breeding species was 13.25 pairs/ha. This very high density was given in percentage of over 92% by the three most abundant species: *Streptopelia decaocto*, *Delichon urbica* and *Passer domesticus*.

9 species (75%) were certainly breeding (CB) and 3 (25%) probably breeding (PB) (Table 4).

In built-up areas of Câmpulung city, 21 breeding species were identified, only 9 of them being noted also at Mioveni (*Streptopelia decaocto*, *Apus apus*, *Delichon urbica*, *Sturnus vulgaris*, *Pica pica*, *Corvus monedula*, *Parus major*, *Passer domesticus* and *Carduelis chloris*) (Mestecăneanu, 2011). *Passer domesticus* had the biggest density in both cases, but almost twice higher in Mioveni than in Câmpulung, in direct correlation with the trophic supplies and the places of nesting. Principally according to the places of nesting, *Delichon urbica* had at Câmpulung a very low density compared with one from the Mioveni city and *Streptopelia decaocto* had a comparable density in both cases. Per total, the density of all species from the built-up areas of Câmpulung was lower that one calculated for the built-up areas of Mioveni, the main responsible species for this fact being *Delichon urbica* and *Passer domesticus*.

Regarding the ecological indexes (Table 5), depending on the constancy, 2 species (5.00%, *Streptopelia decaocto* and *Passer domesticus*) were euconstant species (C4), 3 species (7.50%, *Sturnus vulgaris*, *Corvus monedula* and *Parus major*) were constant species (C3), 5 species (12.50%, *Apus apus*, *Delichon urbica*, *Motacilla alba*, *Pica pica* and *Carduelis chloris*) were accessory species (C2) and 30 species (75.00%, *Accipiter nisus*, *Larus michahellis*, *Dendrocopos major*, *Garrulus glandarius*, *Prunella modularis*, etc.) were accidental species (C1).

Table 4 The densities of the breeding birds species observed in Mioveni city

No.	Species	Density (pairs/ha)	Breeding
1	*Streptopelia decaocto*	1	CB
2	*Apus apus*	0.20	CB

3	*Hirundo rustica*	0.10	PB
4	*Delichon urbica*	5	CB
5	*Motacilla alba*	0.10	PB
6	*Sturnus vulgaris*	0.10	CB
7	*Pica pica*	0.05	CB
8	*Corvus monedula*	0.20	CB
9	*Sylvia atricapilla*	0.10	PB
10	*Parus major*	0.10	CB
11	*Passer domesticus*	6	CB
12	*Carduelis chloris*	0.10	CB

Legend: CB – certainly breeding species, PB – probable breeding species.

By dominance, 3 species (7.50%, *Streptopelia decaocto*, *Delichon urbica* and *Passer domesticus*) were eudominant species (D5), no species was dominant species (D4), 2 species (5.00%, *Anser anser* and *Turdus viscivorus*) were subdominant species (D3), 3 species (7.50%, *Apus apus*, *Sturnus vulgaris* and *Parus major*) were recedent species (D2) and 32 species (80.00%, *Ardea cinerea*, *Galerida cristata*, *Motacilla alba*, *Corvus monedula*, *Emberiza citrinella*, etc.) were subrecedent species (D1).

Concerning the Dzuba index of ecological signification, 2 species (5.00%, *Streptopelia decaocto* and *Passer domesticus*) were eudominant species (W5), 1 species (2.50%, *Delichon urbica*) was dominant species (W4), 1 species (2.50%, *Parus major*) was subdominant species (W3), 9 species (22.50%, *Apus apus*, *Sturnus vulgaris*, *Pica pica*, *Carduelis carduelis*, etc.) were recedent species (W2) and 27 species (67.50%, *Falco subbuteo*, *Dendrocopos major*, *Hirundo rustica*, *Phylloscopus collybita*, *Turdus philomelos*, *Carduelis cannabina*, etc.) were subrecedent species (W1).

The ecological diversity was poor (1.56, respectively 2.70), reflecting the accentuated anthropogenic influence. The evenness was also small (0.42, respectively 0.07), it showing a pronounced disequilibrium between the number of individuals of the eudominant species and the number of individuals of the other species (Table 6). The differences between values consist in the fact that the Shannon-Wiener index takes in account both the number of species and the number of individuals of each species and the Simpson index takes in account the number of individuals of each species in relationship with the number of individuals of all observed species.

Table 5 The ecological indexes of the avifauna

No.	Species	Constancy	Category of constancy	Dominance	Category of dominance	Dzuba index of ecological signification	Category of Dzuba index of ecological signification
1	*Ardea cinerea*	8.33	C1	0.17	D1	0.014	W1
2	*Anser anser*	8.33	C1	2.90	D3	0.241	W2
3	*Accipiter nisus*	25.00	C1	0.13	D1	0.032	W1
4	*Falco subbuteo*	25.00	C1	0.13	D1	0.032	W1
5	*Falco tinnunculus*	25.00	C1	0.17	D1	0.043	W1
6	*Larus argentatus*	8.33	C1	0.22	D1	0.018	W1
7	*Streptopelia decaocto*	100.00	C4	10.03	D5	10.030	W5
8	*Apus apus*	41.67	C2	1.17	D2	0.486	W2
9	*Dendrocopos major*	8.33	C1	0.04	D1	0.004	W1
10	*Galerida cristata*	8.33	C1	0.04	D1	0.004	W1
11	*Hirundo rustica*	16.67	C1	0.09	D1	0.014	W1
12	*Delichon urbica*	50.00	C2	17.38	D5	8.690	W4
13	*Anthus trivialis*	8.33	C1	0.13	D1	0.011	W1
14	*Motacilla alba*	33.33	C2	0.39	D1	0.130	W2
15	*Sturnus vulgaris*	58.33	C3	1.47	D2	0.857	W2
16	*Garrulus glandarius*	8.33	C1	0.04	D1	0.004	W1
17	*Pica pica*	50.00	C2	0.30	D1	0.151	W2
18	*Corvus monedula*	66.67	C3	0.91	D1	0.605	W2
19	*Corvus frugilegus*	16.67	C1	0.26	D1	0.043	W1
20	*Corvus corone cornix*	8.33	C1	0.13	D1	0.011	W1
21	*Corvus corax*	16.67	C1	0.17	D1	0.029	W1
22	*Prunella modularis*	8.33	C1	0.04	D1	0.004	W1
23	*Sylvia atricapilla*	8.33	C1	0.04	D1	0.004	W1
24	*Phylloscopus collybita*	16.67	C1	0.09	D1	0.014	W1
25	*Regulus regulus*	8.33	C1	0.04	D1	0.004	W1
26	*Phoenicurus ochruros*	16.67	C1	0.09	D1	0.014	W1
27	*Turdus merula*	8.33	C1	0.13	D1	0.011	W1
28	*Turdus philomelos*	8.33	C1	0.04	D1	0.004	W1
29	*Turdus viscivorus*	8.33	C1	3.03	D3	0.252	W2
30	*Parus caeruleus*	16.67	C1	0.22	D1	0.036	W1
31	*Parus major*	75.00	C3	1.34	D2	1.005	W3
32	*Passer domesticus*	100.00	C4	57.24	D5	57.242	W5
33	*Passer montanus*	8.33	C1	0.09	D1	0.007	W1
34	*Fringilla coelebs*	8.33	C1	0.04	D1	0.004	W1

35	*Coccothraustes coccothraustes*	25.00	C1	0.22	D1	0.054	W1
36	*Carduelis chloris*	41.67	C2	0.30	D1	0.126	W2
37	*Carduelis spinus*	8.33	C1	0.04	D1	0.004	W1
38	*Carduelis carduelis*	25.00	C1	0.43	D1	0.108	W2
39	*Carduelis cannabina*	8.33	C1	0.13	D1	0.011	W1
40	*Emberiza citrinella*	16.67	C1	0.17	D1	0.029	W1

Legend: C1 - accidental species, C2 - accessory species, C3 - constant species, C4 - euconstant species; D1 - subrecedent species, D2 - recedent species, D3 - subdominant species, D4 - dominant species, D5 - eudominant species; W1 - subrecedent species, W2 - recedent species, W3 - subdominant species, W4 - dominant species, W5 - eudominant species

Table 6 The ecological diversity and the evenness of the avifauna observed in Mioveni city

Index	**Shanon Wiener index**	**Hsmax**	**Shanon Wiener evenness**	**Simpson index (1/λ)**	**S**	**Simpson evenness**
Value	1.56	3.69	0.42	2.70	40.68	0.07

The index of relation was calculated for all birds' orders (Kelemen & Szombath, 1975; Gache, 2002). The value of the static axis (As) is 12.5, and the value of the axis of dominancy (Ad) is 25. They were used to determine the importance of the orders of birds that took part to the constitution of the avicenosis from the dominance point of view.

The Passeriformes order was each ecological season overdominant, the biggest value of its index of relation (IR) being in the aestival season (92.97%) and the smallest in the autumnal season (77.78%). The Columbiformes order was dominant in the prevernal and aestival seasons, in the rest of the seasons it being complementary. The other orders (Ciconiiformes, Anseriformes, Falconiformes, Charadriiformes, Apodiformes and Piciformes) were always complementary (Table 7, Fig. 4).

Regarding the global participation of the orders to the birds' population observed in Mioveni city, the Passeriformes order was the only overdominant order, with a value of 85.04%. Columbiformes and the other orders (Ciconiiformes, Anseriformes, Falconiformes, Charadriiformes, Apodiformes and Piciformes) were complementary (Table 7, Fig. 5).

Table 7 The values of the index of relation of the birds' orders identified in Mioveni city, during 2009

Order	**Prevernal**	**Vernal**	**Aestival**	**Serotinal**	**Autumnal**	**Hiemal**	**Period**
Ciconiiformes	1.08	0	0	0	0	0	0.17
Anseriformes	0	0	0	0	0	8.60	2.90
Falconiformes	0.27	0.79	0.39	0.25	0	0.51	0.43
Charadriiformes	1.36	0	0	0	0	0	0.22
Columbiformes	16.26	7.92	4.69	12.15	22.22	6.68	10.03

Apodiformes	0.81	1.85	1.95	3.04	0	0	1.17
Piciformes	0	0	0	0.25	0	0	0.04
Passeriformes	80.22	89.45	92.97	84.30	77.78	84.21	85.04

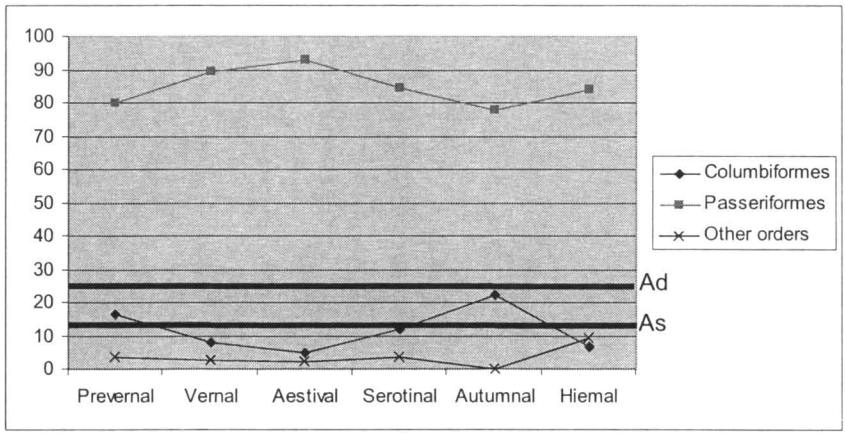

Fig. 4 The seasonal dynamics of the birds orders observed in Mioveni city during 2009

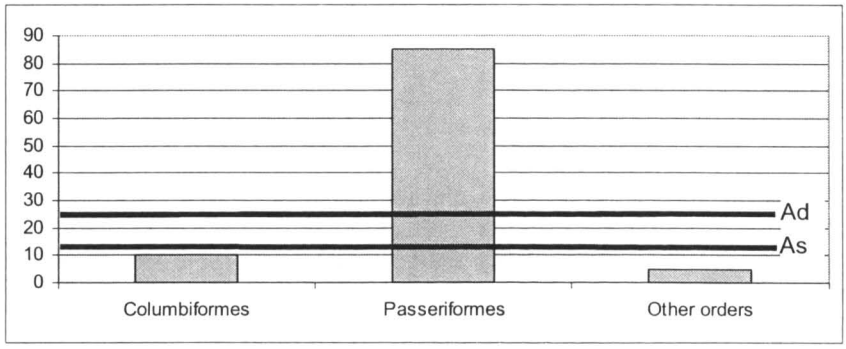

Fig. 5 The global participation of the orders to the birds' population registered during 2009 in Mioveni city.

In Câmpulung city, regarding the constancy, *Streptopelia decaocto*, *Pica pica*, *Corvus monedula*, *Turdus merula*, *Parus major* and *Passer domesticus* were the euconstant species, regarding the dominance *Streptopelia decaocto*, *Corvus monedula* and *Passer domesticus* were eudominant species and regarding the Dzuba index of ecological signification, the same *Streptopelia decaocto*, *Corvus monedula* and *Passer domesticus* were eudominant species. The values of the ecological diversity and of the evenness were slightly higher than those obtained in this case (the ecological diversity - 1.85, respectively 3.96, and the evenness - 0.54, respectively 0.13). Also, the Passeriformes order was always overdominant (Mestecăneanu,

2011). These mean that exist a pronounced analogy between the two avicoenoses, despite of the difference of elevation between the two cities, Mioveni and Câmpulung.

Conclusions

- During 2009, 40 birds species included in 8 orders and 20 families (10.47% of all species of birds recorded in Romania) were identified in Mioveni city;
- 13 species (32.50%) were considered resident species, 1 species (2.50%) was considered partial migrant species, 6 species (15.00%) were considered winter visitors, 9 species (22.50%) were considered summer visitors, 9 species (22.50%) were considered species of passage and 2 species (5.00%) were considered accidental species;
- In July and December was the minimum number of recorded species (6) and in September was the maximum number of recorded species (21 species);
- the biggest number of individuals was registered in February (267 individuals), July (256 individuals) and November (241 individuals); the minimum was registered in January (101 individuals) and October (135 individuals);
- the maximum of the individuals number was in March (for *Streptopelia decaocto*), in August (for *Delichon urbica*) and in February (for *Passer domesticus*);
- 12 breeding species were registered, 9 certainly breeding and 3 probable breeding;
- *Passer domesticus* had the biggest density (6 pairs/ha);
- The density of all breeding species was 13.25 pairs/ha;
- The accidental species and the subrecedent species were the most numerous;
- *Streptopelia decaocto* and *Passer domesticus* were the euconstant species and *Streptopelia decaocto*, *Delichon urbica* and *Passer domesticus* were the eudominant species;
- The ecological diversity and the evenness were low;
- The Passeriformes was the only order overdominant;
- Qualitative and quantitative components of the cities avifauna differ mainly depending on the anthropogenic pressure;
- Between the avicoenoses of the built-up areas of the two cities from the Doamnei River hydrographical basin, Mioveni and Câmpulung, there is a pronounced analogy, despite of the difference of elevation between them.

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ASPECTS CONCERNING THE AVIFAUNA IN GRUIA-GÎRLA MARE NATURAL PROTECTED AREA

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Abstract: ASPECTS CONCERNING THE AVIFAUNA IN GRUIA-GÎRLA MARE NATURAL PROTECTED AREA
Gruia - Gârla Mare protected area was declared trough the Government Decision 1284/2007, regarding the designation of the ornithological special protection areas, being part of the Natura 2000 Network, with a surface covering 2756.2 hectares and overlapping on the administrative territory of 4 units: Gruia, Gârla Mare, Pristol, Vrata.
Key words: Gruia - Gârla Mare protected area, avifauna, Mehedinţi.

Introduction

Gruia - Gârla Mare protected area was declared trough the Government Decision 1284/2007, regarding the designation of the ornithological special protection areas, being part of the Natura2000 Network. As an ornithological special protection area, the main objective is the conservation, maintaining, and where it is needed, giving back a favourable condition to the birds 'species and their natural habitats, especially to the ones that are included on the 3th and 4th Annexes of 57/2007 Law.

Gruia-Gârla Mare protected area is situated in Mehedinti County, continental biogeographic region, on the administrative territory of the following localities: Gârla Mare (10%), Gruia (6%), Pristol (less than 1%), and Vrata (37%), having 2756, 2 hectares surface, with the following geocoordinates: 44°10'42"N and 22°48'22".

Gruia - Gârla Mare protected area is overlapping with Gârla Mare - Salcia wetland, declared by Mehedinti County Council in 2000. It is very important for a lot of protected birds, under the Birds Directive, but also for species that are protected trough Bonn Convention, signed by Romania. Even if the protected area was declared for the protection of 16th birds' species of community interest, here can be find much more vulnerable and endangered species in the migration and breeding season.

But the protected area is not important only for birds' protection, but also because of the habitats of community interest that covers a very big surface and also for a representative population of *Marsilea quadrifolia* (four leaf clover). Other relevant species which deserve our attention are *Lutra*

lutra (European otter), *Spermophillus citellus* (ground squirell), and big colonies of *Merops apiaster* (European bee-eater) and *Riparia riparia* (sand martin).

Also in the administrative territory of Gruia village we can find a beach forest, a very good habitat for raptors, which are protected by national and international laws.

The management of the ornithological special protected area needs adequate management plans, specific to the sites that are designated or integrated on other plans or legal, administrative or contractual measures, to avoid the species natural habitats degradation, but also to avoid the discomfort of the protected species.

The management of a protected area follows to maintain a harmony between man and nature, through the protection of the habitats and landscape diversity, promoting the traditional activities, encouraging them.

Research methods and materials

a) Methods

The fixed points and transects methods have been used for the inventory of bird species in Gruia - Gârla Mare area.

In the transects method, transects are being established that will be walked on, on the pond embankments and the ponds' edges. While completing the transect, each identified individual is noted down, on a species level, in the end centralizing these values based on species.

In the fixed points' method, these are being chosen so that the visibility over the pond will be as great as possible and the entire space adjacent to the pond is included in. In the fixed point, using the telescope, each identified individual at a species level is counted, thus overflying the entire ecosystem. To this count is added the number of specimens observed in flight from the observation point.

Thereby, for the Gârla Mare complex, 4 observation points have been established, and for Vrata – Gârla Mare pond, so far, one, that expressly targets the heron and spoonbill colony. For the Vrata pond 3 other observation ponds have been chosen, and for the Danube bank the transect method was used, a distance of 1 km being covered.

The observations started at 6.30 - 7.00 in the morning and continuend until evening at dusk, around 20.00 hours.

Along the personal observations, bibliographical references have been included, in order to be able to realize an overview on the actual and historical status of the bird species populations.

b) Equipment and materials

The following tools have been used for the inventory:

Nikon Monarch 10x42 binoculars: waterproof, with the following technical specifications:

Power x Obj. Dia.: 10x42
Field of View: 314 ft. at 1000 yds.
Exit Pupil: 4.2 mm

Eye Relief: 15.5 mm
Dimensions 5.6 x 5 in.
Close Focus: 8.2 ft.
Weight: 21.5 oz.
Weatherproofing: Waterproof/Nitrogen Purged
Prism Material: Phase-coated BaK-4
Coatings: Fully Multi-coated
Armoring: Rubber
Eye Cups: Twist-up with Detents
Design Type: Roof Prism

Jiehe 25-75x60, telescope: cu următoarele detalii tehnice:
Diametru ocular: 10 mm
Diametru obiectiv: 60 mm
Putere maxima de mărire: 75x

Maksutov – Cassegrain optics telescope
Zoom: 38 – 114x70
Twist-Up Eyecup

Compact camera Nikon Coolpix 80
Garmin CSX76 GPS receiver

For the identification of species, when needed, the „Bird Guide - the most complete field guide to the birds of Britain and Europe" determinator is used, Killian Mullarney et al., Collins series, 2006.

All the observations have been noted down in the field, the centralization of data being performed afterwards.

The database and graphical representations for this study have been realized with Microsoft Excel software (Office 2007), and the statistical processing of the data has been performed with PAST 2.01 software.

Also, the EURING codes (European Union for Bird Ringing) have been used in tables - Ardral, Aytnyr etc.

c) Research stages

- the field stage - includes 18 field trips, on a 9 months period of time, with 2 trips each month. After each trip a trip report has been written down, which stood at the basis for the redaction of the monthly report and afterwards for the redaction of the quarterly report.

- the office stage - includes the redaction of these reports, and especially the consultation of the bibliographical resources existent for this area, from a biological and ecological point of view as well as from a geographical one.

At the end of the research 8 monthly and 3 quarterly reports have been submitted, which were at the basis of elaborating the inventory study on specific birds for the Natural Protected Area Gruia-Gârla Mare.

Analytical and syntethical data processing methods

Several ecological parameters have benn used to process the collected material, as follows:

The Abundancy (A) (Simionescu, 1983) represents the absolute number of specimens from a species, present in an area. This indicator is expressed in its absolute value, as it is the base on calculating the other indicators. Based on the abundancy value we characterize the species in the study area by using the expressions: rare, less frequent, abundant, very abundant.

Considering as sample the movement month, the calculations show that the most abundant species is the pygmy cormorant - *Phalacrocorax pygmaeus,* and the rarest, as expected, is the common pelican - *Pelecanus onocrotalus* (see the data in Table 1).

The Dominancy (D) (Simionescu, 1983) shows in what relationship the effective of a species is to the sum of individuals of the other species with which it is associated, expressing thus the relative abundancy. The dominancy is considered as a productivity indicator, as it shows the percentage of participation for each species in the biomass production in the biocoenosis. It is calculated using the equation:

$$DA = (nA/N)*100$$

where:

DA - dominancy of A species;

nA - total number of individuals of the A species, found in the examined samples;

N - Total number of individuals of all the species present in the examined samples.

Based on the percentage value that expresses their individual dominancy, the species are distributed in the following classes:

D1 - subrecedent - under 1.1%;

D2 - recedent - between 1.1 - 2%;

D3 - subdominant - between 2.1 - 5%;

D4 - dominant - between 5.1 - 10%;

D - eudominant - over 10%.

The bird species in the studied area have the percentage abundancies shown in Table 1.

As seen in the cyclogram from Fig. 1, in the bird community from the studied area, by aggregating the observations to date, the eudominant species are: the pygmy cormorant *Phalacrocorax pygmaeus* (42%), the ferruginous duck *Aythya nyroca* (17%) and the whiskered tern *Chlidonias hybridus* (13%), dominant species are the squacco heron *Ardeolla ralloides* (6.84%), the great egret *Egretta alba* (5.04%) and the common tern *Sterna hirundo* (5.7%).

We also ascertained the absence of the following species of birds of prey: white-tailed eagle *Haliaeetus albicilla* and saker falcon *Falco cherrug*.

The values of absolute abundancy are also presented in Table 1, ascertaining the fact that, the pygmy cormorant *Phalacrocorax pygmaeus* is the most abundant species, followed by the ferruginous duck *Aythya nyroca* and the whiskered tern *Chlidonias hybridus*.

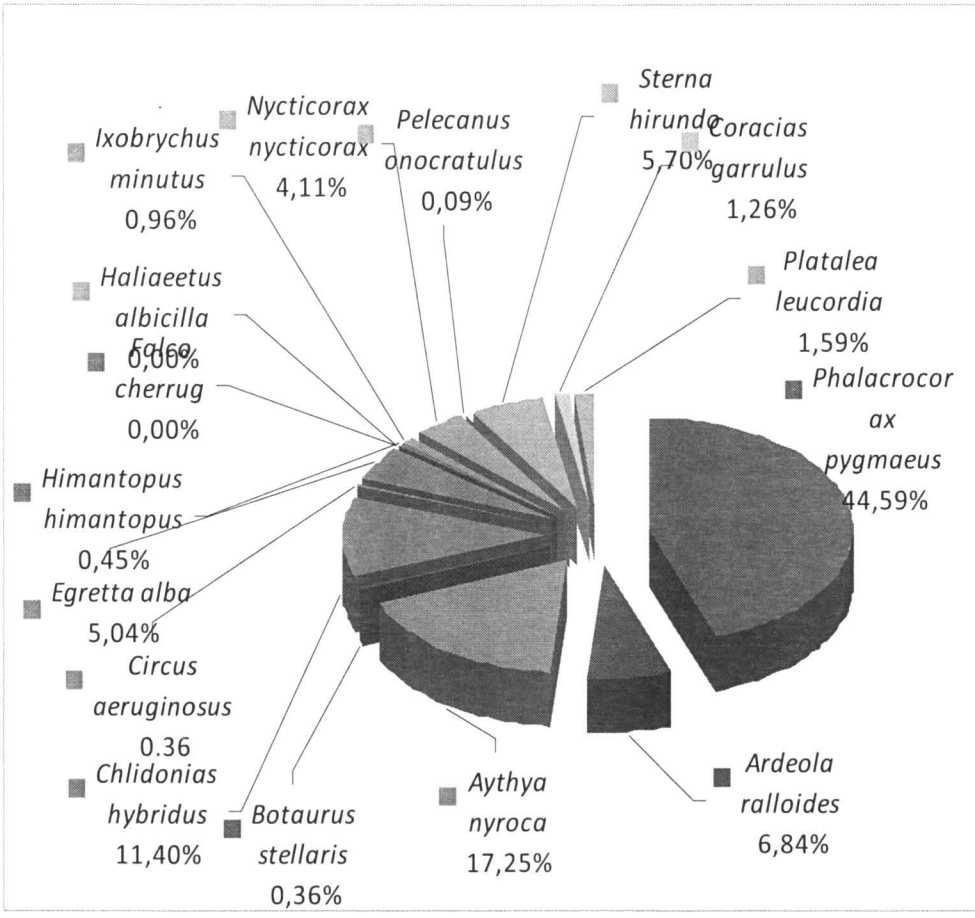

Fig. 1 The percentage dominancy for bird species of communitary importance from the Protected Natural Area Gruia-Gârla Mare, in 2010

Table1 Absolute abundancy and dominancy for bird species covered by the project, in the investigated months

Species code	May		June		July		August		September	
	A	D%	A	D%	A	D%	A	D%	A	D%
Phapyg	130	24.07	20	6.37	180	27.91	280	24.6	456	62.21
Ardral	38	7.04	17	5.41	87	13.49	150	13.18	23	3.14
Aytnyr	70	12.96	24	7.64	70	10.85	470	41.3	31	4.23
Botste	2	0.37	2	0.64	7	1.09	4	0.35	1	0.14
Chlhyb	118	21.85	160	50.96	70	10.85	95	8.35	89	12.14
Ciraer	8	1.48	0	0	6	0.93	3	0.26	0	0
Egralb	25	4.63	3	0.96	58	8.99	17	1.49	17	2.32
Falche	0	0	0	0	0	0	0	0	0	0
Halalb	0	0	0	0	0	0	0	0	0	0
Himhim	4	0.74	0	0	14	2.17	2	0.18	1	0.14
Ixomin	20	3.7	12	3.82	0	0	10	0.88	3	0.41
Nycnyc	25	4.63	1	0.32	8	1.24	39	3.43	97	13.23
Pelono	0	0	0	0	0	0	4	0.35	0	0
Stehir	65	12.04	70	22.29	80	12.4	50	4.39	1	0.14
Corgar	21	3.89	4	1.27	10	1.55	10	0.88	14	1.91
Plaleu	14	2.59	1	0.32	55	8.53	4	0.35	0	0
TOTAL	**540**	**100%**	**314**	**100%**	**645**	**100%**	**1138**	**100%**	**733**	**100%**

Table1 (continued) Absolute abundancy and dominancy for bird species covered by the project, in the investigated months

Species code	October		November		December		TOTAL	
	A	D%	A	D%	A	D%	A	D%
Phapyg	685	83.74	250	80.9	80	47.05	2001	44,49
Ardral	4	0.49	0	0	0	0	319	7.62
Aytnyr	70	8.56	40	12.94	30	17.64	775	17.23
Botste	0	0	1	0.32	0	0	17	0.37
Chlhyb	0	0	0	0	0	0	532	12.7
Ciraer	0	0	0	0	0	0	17	0.41
Egralb	37	4.52	18	5.82	60	35.29	175	3.81
Falche	0	0	0	0	0	0	0	0
Halalb	0	0	0	0	0	0	0	0
Himhim	0	0	0	0	0	0	21	0.5
Ixomin	0	0	0	0	0	0	45	1.07
Nycnyc	22	2.69	0	0	0	0	192	4.58
Pelono	0	0	0	0	0	0	4	0.1
Stehir	0	0	0	0	0	0	266	6.35
Corgar	0	0	0	0	0	0	59	1.41
Plaleu	0	0	0	0	0	0	74	1.77
TOTAL	**818**	**100%**	**309**	**100%**	**170**	**100%**	**4497**	**100%**

The Constancy (C) (Simionescu, 1983) expresses the continuity of apparition for a species in the given biotope. This characteristic shows how a certain species participates in the biocoenosis structure. The higher the indicator value which characterizes the constancy is, the better adapted the species is considered to the biotope conditions. The constancy is estimated with the relationship:

$$CA = (np\ A/Np)/100$$

where:

CA - species A constancy;

np A - number of samples in which A species is being found;

Np - total number of examined samples.

Based on the value of this indicator, the species are distributed in the following classes:

C1 - accidental (present between 1 - 25% of samples);

C2 - accessory (present between 25.1 - 50% of samples);

C3 - constant (present between 50.1 - 75% of samples);

C4 - euconstant (presente between 75.1 - 100% of samples).

Table 2 Procentual values of species constancy In the Protected Natural Area Gruia-Gârla Mare, in 2010

Species	Constancy (%)	Class
Phalacrocorax pygmaeus	100.00	euconstant
Ardeola ralloides	75.00	euconstant
Aythya nyroca	100.00	euconstant
Botaurus stellaris	75.00	euconstant
Chlidonias hybridus	62.50	constant
Circus aeruginosus	37.50	accidental
Egretta alba	100.00	euconstant
Falco cherrug	0.00	absent
Haliaeetus albicilla	0.00	absent
Himantopus himantopus	50.00	accessory
Ixobrychus minutus	50.00	accessory
Nycticorax nycticorax	75.00	euconstant
Pelecanus onocratulus	12.50	accidental
Sterna hirundo	62.50	constant
Coracias garrulus	62.50	constant
Platalea leucordia	50.00	accessory

Thus, by considering the values expressed in Table 2 and Fig. 2, it is ascertained that in the protected natural area Gruia - Gârla Mare, in 2010, the euconstant species have been: the pygmy cormorant *Phalacrocorax pygmaeus*, the squacco heron *Ardeola ralloides*, the ferruginous duck

Aythya nyroca, the Eurasian bittern *Botaurus stellaris,* the great egret *Egretta alba* and the black crowned night heron *Nycticorax nycticorax.*

The following have been identified as constant species in this area: the whiskered tern *Chlidonias hybridus*, the common tern *Sterna hirundo* and the European roller *Coracias garrulus* (Table 2, Fig. 2).

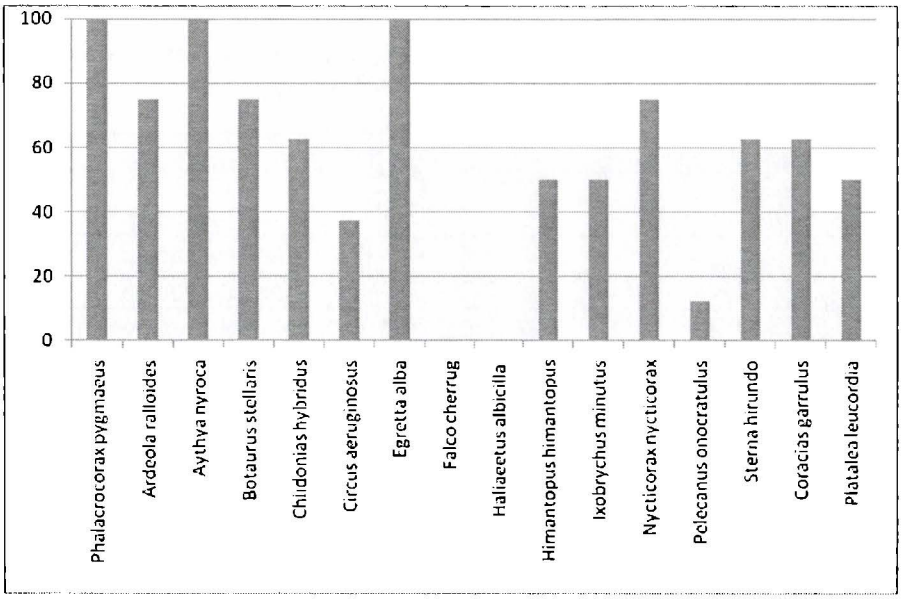

Fig. 2 Percentual constancy for bird species of communitary importance in the Protected Natural Area Gruia-Gârla Mare, in 2010

Ecological significance index (W) (Simionescu, 1992), represents the relationship between the structural index (C) and the productive index (D), reflecting more eloquent the position of a species in the biocoenosis.

It is calculated with the equation:

$$WA = (CA*DA)/100$$

By considering the values obtained for this indicator, the species are divided in the following classes:

W1 with values under 0.1%;
W2 with values between 0.1 - 1%;
W3 with values between 1.1 - 5%;
W4 with values between 5.1 - 10%;
W5 with values over 10%.

W1 class corresponds to accidental species, W2 and W3 classes - to accessory (accompanying) species and W4 and W5 classes - to characteristic species for the given coenosis.

According to the data in table 3 and those illustrated in figure 3, in the investigated protected area, characteristic species are: the pygmy cormorant *Phalacrocorax pygmaeus,* the squacco heron *Ardeola ralloides,* the

ferruginous duck *Aythya nyroca,* the whiskered tern *Chlidonias hybridus* and the great egret *Egretta alba*.

The great white pelican *Pelecanus onocratulus* is an accidental species in this area, and the rest of the species have been classified as accessory (accompanying) species, according to the data in Table 3 and illustrated in Fig. 3.

Table 3 Percentage values of ecological significance for species of communitary interest in the Protected Natural Area Gruia-Gârla Mare

Species	W	
Phalacrocorax pygmaeus	44.59	Characteristic sp
Ardeola ralloides	5.13	Characteristic sp
Aythya nyroca	17.25	Characteristic sp
Botaurus stellaris	0.27	Accessory (accompanying) sp
Chlidonias hybridus	7.12	Characteristic sp
Circus aeruginosus	0.14	Accessory (accompanying) sp
Egretta alba	5.04	Characteristic sp
Falco cherrug	0	Absent sp
Haliaeetus albicilla	0	Absent sp
Himantopus himantopus	0.22	Accessory (accompanying) sp
Ixobrychus minutus	0.48	Accessory (accompanying) sp
Nycticorax nycticorax	3.09	Accessory (accompanying sp)
Pelecanus onocratulus	0.01	Accidental sp
Sterna hirundo	3.56	Accessory (accompanying) sp
Coracias garrulus	0.79	Accessory (accompanying) sp
Platalea leucordia	0.79	Accessory (accompanying) sp

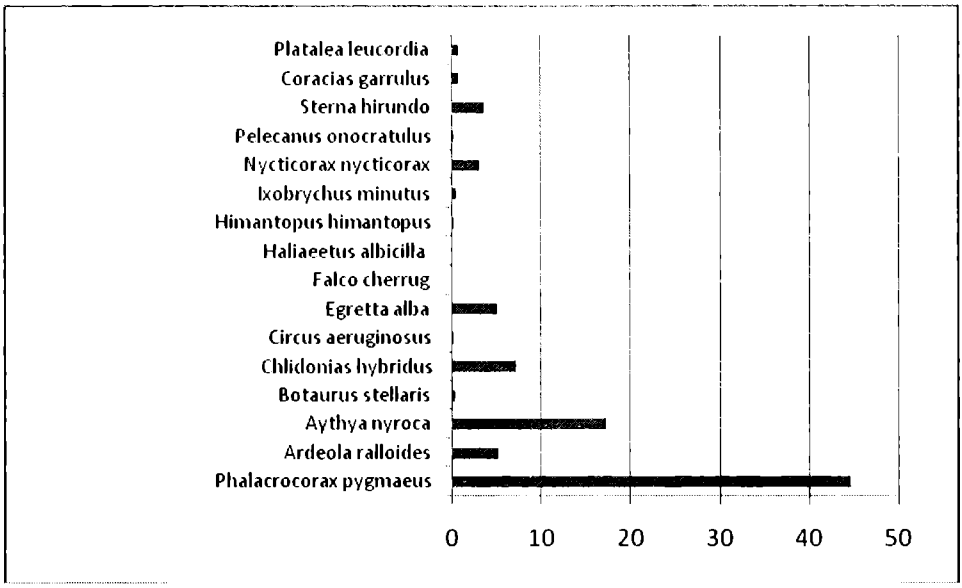

Fig. 3 Ecological significance for bird species of communitary importance in the Protected Natural Area Gruia - Gârla Mare, in 2010

Diversity and equity indexes (Pesenko, 1982). MacArthur proposed for the first time that the information theory is used also in support for ecological research. He stated the following: *„the more complex a biocoenosis, the higher its information content and stability are*".

The most widely used diversity index is the Shannon-Wiener index, that measures the degree of organization (or disorganization) of a system, along with its diversity.

$$\bar{H} = -\sum_{i=1}^{S} pi \cdot \log_2 pi$$

Where: pi = the proportion of each species in the given biocoenosis (no. of individuals of i species/total no. ofindividuals

The Simpson diversity index (D) (Andreev, 2002) is based on the probability theory. It illustrated the probability that when we randomly extract 2 individuals in a biocoenosis, they are of the same species. It is a diversity index that takes into account the number of species as well as the proportions between individuals (thus being one of the most widely used diversity indicators).

$$D = 1 - \sum_{i=1}^{S} pi^2$$

pi = proportion for each species in the given biocoenosis (no of i species individuals indivizi /total no of individuals)

This indicator allows for the evaluation and measurement of the organization (disorganization) degree of a biocoenosis.

Pielou equity index

$$E = \frac{\bar{H}}{\bar{H}\max}$$

$\bar{H}$ = observed diversity (calculated by us)

$\bar{H}\max$ = maximum diversity in case the respective species would be equitably distributed in the biocoenosis. It is calculated by logarithming the number of species.

$\bar{H}\max = \log S$

So that:

$$E = \frac{\bar{H}}{\log S}$$

The diversity and equity indicators have been calculated for each month, and also for the data cumulated in the entire study (see Table 4 and Fig. 4). By analyzing these values we can ascertain that in what regards the birds of communitary interest, the Protected Natural Area Gruia - Gârla Mare sustains a greater variety of species in the spring and early summer months.

This diversity starts to decrease in summer and as autumn begins, to reach a minimal in the period between October and November.

This dynamics is explained by the fact that most species of communitary interest use this protected area as a nesting site, few of the species nesting in other places.

Once the autumn arrives and the winter season begins (end of November, December), the diversity of species rises (not reaching the summer values), by increasing the abundancy of species that remain to winter in this protected area (because the diversity indicators used– Shannon Wiener and Simpson, take into account nu just the number of species but also their abundancy in the community that they belong to).

Table 4 Diversity and equity indicators values calculated for the bird species community from the Protected Natural Area Gruia-Gârla Mare, in 2010

Indicator	may	jun	Jul	aug	sept	oct	nov	dec	Total
Diversity *Shannon-Wiener Index*	2.13	1.50	2.09	1.67	1.27	0.62	0.62	1.03	**1.78**

Diversity *Simpson Index*	0.85	0.68	0.85	0.74	0.58	0.29	0.33	0.62	**0.75**
Equity *Pielou Index*	0.83	0.63	0.84	0.63	0.53	0.39	0.45	0.94	**0.67**

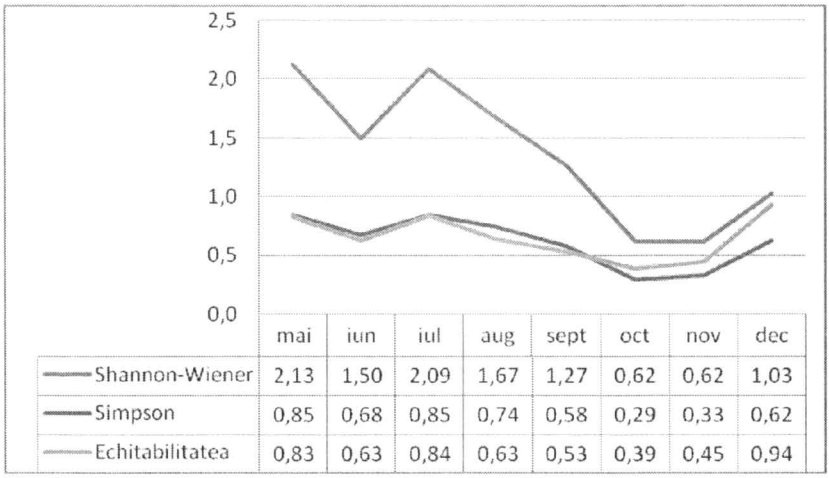

Fig. 4 Diversity and equity indexes calculated for the bird species of communitary importance from the Protected Natural Area Gruia-Gârla Mare, in 2010

Taxonomic analysis of avifauna from the Protected Natural Area Gruia - Gârla Mare

The birds of communitary interest, for which the special avifaunistic protection area Gruia - Gârla Mare has been established are part of 6 orders, 12 families, 16 genuses (see Table 5 and Fig. 5).

Table 5 Taxonomic overview of protected avifauna in Gruia-Gârla Mare site (GGM)

No	ORDER	GRUIA-GÂRLA MARE SITE			Number of species in Romania	Percentage of waterfowl in GGM / Romania
		Family	Genus	Species		
1	Pelecaniformes	3	3	3	5	60 %
2	Ciconiiformes	2	5	5	12	41.66 %
3	Anseriformes	1	1	1	22	4.54 %
4	Falconiformes	2	3	3	27	11.11 %
5	Charadriiformes	3	3	3	37	8.10 %
6	Coraciiformes	1	1	1	4	25 %

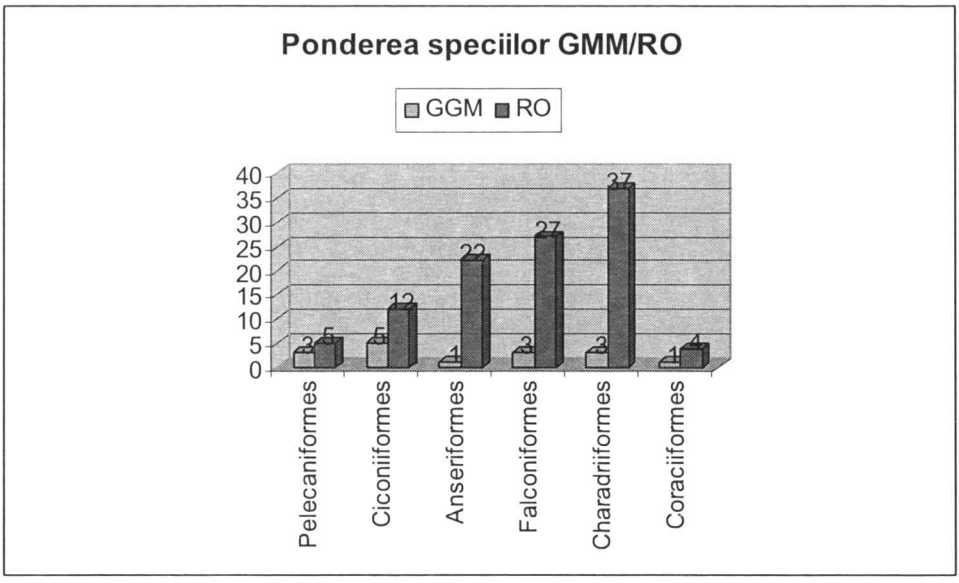

Fig. 5 Taxonomic structure of bird species for which the site has been established, compared to the total species of birds in Romania

Geographic origin of avifauna from the Protected Natural Area Gruia - Gârla Mare

Each species has its origins in a certain geographical area that is considered its genetic center. In ornitholohy there are several systems of zoogeographical classification of bird species, each taking into consideration certain classification criteria. For Romania, in which we encounter many zoogeographical classes because of the diversity of environments and habitats, we used the Vouss system (1960).

From a zoogeographical point of view the bird species for which Gruia - Gârla Mare has been declared an avifaunistic protection area are pretty diverse as it can be ascertained form Table 6.

Table 6 The geographic origin of the species for which ROSPA 0046 Gruia - Gârla Mare site has been established and their food regime

Nr. crt.	Species name	Geographic origin (after Vouss, 1960)	Food regime
1	*Ardeola ralloides*	Ethiopian species (ET)	Zoophagous species (ZOO)
2	*Aythya nyroca*	Turkestano-mediteranean species (TK-MED)	Vegetarian species (VEG)
3	*Botaurus stellaris*	Palearctic species (PAL)	Zoophagous species (ZOO)
4	*Chlidonias hybridus*	Species found in the Old World (LV)	Zoophagous species (ZOO)
5	*Circus aeruginosus*	Palearctic species (PAL)	Prădător (PR)

6	*Egretta alba*	Cosmopolite species (CO)	Zoophagous species (ZOO)
7	*Falco cherrug*	Mongolo-tibetan species (MO-TIB)	Predator (PR)
8	*Haliaeetus albicilla*	European species (EU)	Predator (PR)
9	*Himantopus himantopus*	Cosmopolite species (CO)	Zoophagous species (ZOO)
10	*Ixobrychus minutus*	Species found in the Old World (LV)	Zoophagous species (ZOO)
11	*Nycticorax nycticorax*	Cosmopolite species (CO)	Zoophagous species (ZOO)
12	*Pelecanus onocratulus*	Sarmatic spread species (SAR)	Ichthyophagous species (IHT)
13	*Phalacrocorax pygmaeus*	Sarmatic spread species (SAR)	Ichthyophagous species (IHT)
14	*Sterna hirundo*	Holarctic species (HOL)	Zoophagous species (ZOO)
15	*Coracias garrulus*	European-tukestanic type species (EU-TK)	Insectivore species (INS)
16	*Platalea leucordia*	Species found in the Old World (LV)	Insectivore species (INS)

Thus, as ascertained from figure 12, of the target species of the present study, with equal proportions (of 19%), are represented the cosmopolite species (CO) and those found in the Old World (LV), and with a percentage of 13% of the total species were recorded the palearctic species (PAL).

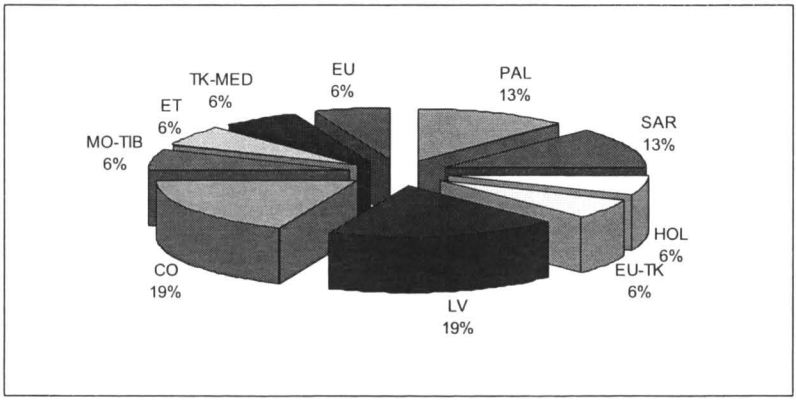

Fig. 6 Geographic origin analysis of the bird species for which the Natura 2000 site Gruia-Gârla Mare has been established

From the point of view of the food regime, most of the species targeted by the project are zoophagous species (see Table 6 and Fig. 7).

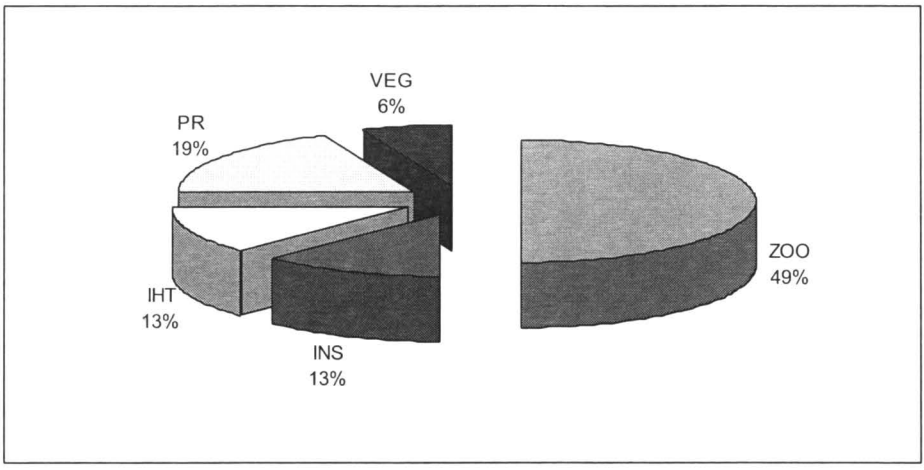

Fig. 7 Food regime analysis of the bird species for which the Natura 2000 site Gruia-Gârla Mare has been established

Table 7 Geographic origin (after Vouss, 1960), food regime and phenology of communitary and national interest species observed in Gruia - Gârla Mare area (*ET = Ethiopian species; TK-MED = tukestano-mediteranean species; PAL = palearctic species; LV = species found in the old world; CO = cosmopolite species; MO-TIB = mongolo-tibetan species; SAR = sarmatic spread species; EU-TK = europeo-tukestanic type species; HO = holarctic species; IN-AF = indo-african species; EU = European species; OV = summer guest; OI = winter guest; RI = summer guest, rarely in winter; S-E = sedentary or sedentayr-erratic species; P = passing species*)

Nr. crt	Species name	Geographic origin	Food regime	Phenology
1	*Ardeola ralloides*	ET	Zoophagous species (ZOO)	OV
2	*Aythya nyroca*	TK-MED	Vegetarian species (VEG)	OV,RI
3	*Botaurus stellaris*	PAL	Zoophagous species (ZOO)	OV,RI
4	*Chlidonias hybridus*	LV	Zoophagous species (ZOO)	OV
5	*Circus aeruginosus*	PAL	Predator (PR)	OV,RI
6	*Egretta alba*	CO	Zoophagous species (ZOO)	S-E
7	*Falco cherrug*	MO-TIB	Predator (PR)	S-E
8	*Haliaeetus albicilla*	EU	Predator (PR)	S-E
9	*Himantopus himantopus*	CO	Zoophagous species (ZOO)	OV
10	*Ixobrychus minutus*	LV	Zoophagous species (ZOO)	OV
11	*Nycticorax nycticorax*	CO	Zoophagous species (ZOO)	OV
12	*Pelecanus onocratulus*	SAR	Ichthyophagous species (IHT)	OV
13	*Phalacrocorax pygmaeus*	SAR	Ichthyophagous species (IHT)	S-E
14	*Phalacrocorax carbo*	LV	Ichthyophagous species (IHT)	S-E
15	*Sterna hirundo*	HOL	Zoophagous species (ZOO)	OV
16	*Coracias garrulus*	EU-TK	Insectivore species (INS)	OV
17	*Platalea leucordia*	LV	Insectivore species (INS)	OV
18	*Podiceps cristatus*	LV	Zoophagous species (ZOO)	OV, RI
19	*Tachybaptus ruficollis*	LV	Ichthyophagous species (IHT)	OV

Nr. crt	Species name	Geographic origin	Food regime	Phenology
20	*Ardea cinerea*	PAL	Zoophagous species (ZOO)	S-E
21	*Ardea purpurea*	TK-MED	Zoophagous species (ZOO)	OV
22	*Egretta garzetta*	LV	Zoophagous species (ZOO)	OV
23	*Ciconia ciconia*	PAL	Zoophagous species (ZOO)	OV
24	*Plegadis falcinellus*	LV	Zoophagous species (ZOO)	OV
25	*Cygnus olor*	PAL	Mixt species (MIXT)	S-E
26	*Anas strepera*	HOL	Mixt species (MIXT)	OV
27	*Anas platyrhynchos*	HOL	Mixt species (MIXT)	S-E
28	*Anas crecca*	HOL	Mixt species (MIXT)	OI
29	*Anas penelope*	PAL	Mixt species (MIXT)	OI
30	*Aythya ferina*	PAL	Vegetarian species (VEG)	S-E
31	*Circus gallicus*	IN-AF	Predator (PR)	OV
32	*Buteo buteo*	HOL	Predator (PR)	S-E
33	*Accipiter gentilis*	HOL	Predator (PR)	S-E
34	*Accipiter brevipes*	PAL	Predator (PR)	OV
35	*Falco tinnunculus*	LV	Predator (PR)	S-E
36	*Pandion haliaetus*	CO	Predator (PR)	P
37	*Galinulla chloropus*	CO	Zoophagous species (ZOO)	OV
38	*Fulica atra*	PAL	Mixt species (MIXT)	S-E
39	*Rallus aquaticus*	PAL	Zoophagous species (ZOO)	S-E
40	*Tringa glareola*	PAL	Zoophagous species (ZOO)	P
41	*Tringa stagnatilis*	PAL	Zoophagous species (ZOO)	OV
42	*Tringa ochropus*	PAL	Zoophagous species (ZOO)	P
43	*Actitis hypoleucos*	HOL	Zoophagous species (ZOO)	OV
44	*Gallinago media*	HOL	Zoophagous species (ZOO)	P
45	*Vanellus vanellus*	PAL	Zoophagous species (ZOO)	OV
46	*Calidris temminckii*	PAL	Zoophagous species (ZOO)	P
47	*Larus cachinnas*	HOL	Mixt species (MIXT)	S-E
48	*Larus ridibundus*	PAL	Mixt species (MIXT)	S-E
49	*Streptopelia decaocto*	IN-AF	Vegetarian species (VEG)	S-E
50	*Asio otus*	HOL	Predator (PR)	S-E
51	*Cuculus canorus*	PAL	Insectivore species (INS)	OV
52	*Alcedo atthis*	LV	Ichthyophagous species (IHT)	S-E
53	*Merops apiaster*	TK-MED	Insectivore species (INS)	OV
54	*Upupa epops*	LV	Insectivore species (INS)	OV
55	*Dendrocopus minor*	PAL	Insectivore species (INS)	S-E
56	*Galerida cristata*	PAL	Insectivore species (INS)	OI
57	*Riparia riparia*	HOL	Insectivore species (INS)	OV
58	*Hirundo rustica*	HOL	Insectivore species (INS)	OV
59	*Motacilla alba*	PAL	Insectivore species (INS)	OV
60	*Motacilla flava*	PAL	Insectivore species (INS)	OV
61	*Saxicola rubetra*	EU	Insectivore species (INS)	OV
62	*Acrocephalus arundinaceus*	EU-TK	Insectivore species (INS)	OV
63	*Parus major*	PAL	Insectivore species (INS)	S-E
64	*Lanius collurio*	PAL	Insectivore species (INS)	OV
65	*Pica pica*	PAL	Zoophagous species (ZOO)	S-E
66	*Corvus cornix*	PAL	Mixt species (MIXT)	S-E
67	*Sturnus vulgaris*	EU	Vegetarian species (VEG)	S-E
68	*Passer domesticus*	PAL	Mixt species (MIXT)	S-E
69	*Carduelis carduelis*	EU-TK	Mixt species (MIXT)	S-E
70	*Emberiza citrinella*	PAL	Mixt species (MIXT)	S-E
71	*Phylloschopus trochillus*	PAL	Insectivore species (INS)	OV

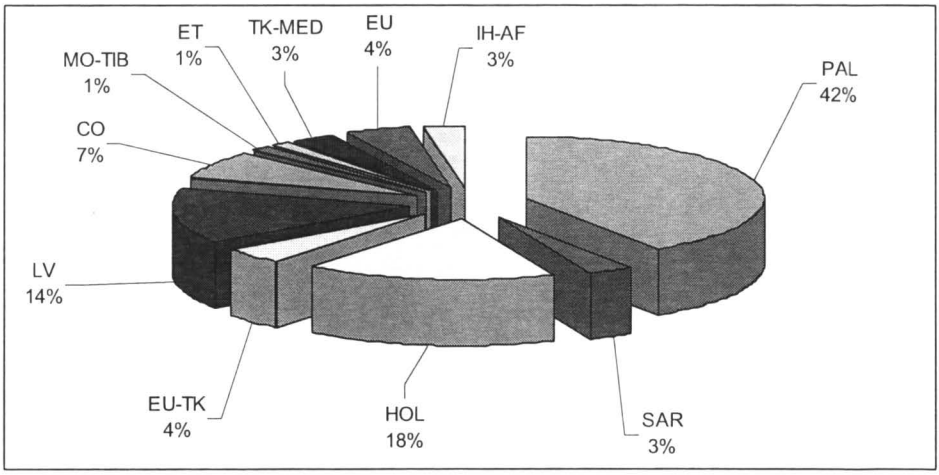

Fig. 8 Geographic origin analysis for species of communitary and national importance observed in the Natura 2000 site, Gruia - Gârla Mare

The palearctic origin species have the highest percentage, representing 42% of the total (Fig. 14). These species have their origin in the Eurasian part of the holarctic region, being adapted to very different environment conditions, geographical as well as of habitat, which makes them clearly prevailing than the other categories.

The holarctic type fauna is specific to cold regions, temperate and subtropical of the entire northern hemisphere of the Globe, occupying very different environments and thus not having common biotic needs.

The Europeo-turkestanic type fauna has its genetic center between the Mediterranean and Turkestan lands (temperate and Mediterranean areas of Europe and South-West Asia) and is comprised of species that live mainly in lowlands, swamp vegetation areas, areas with rare bushes and a few species specific to compact forests.

The avifauna typical to the Old World includes species with broad spreading in Eurasia and Africa, some nesting even in Australia. Most of these species are dependent on aquatic environments, especially interior freshwater, most of European species being partially migratory.

The cosmopolite type fauna contains those species whose areas span on all or almost all of the continents.

Turkestano-mediterranean type avifauna comprises species characteristic to regions from south Europe and Asia, with xerophile vegetation, but also with some lake basins with swamp vegetation, regions that are characterized by hot, dry summers.

The sarmatic type fauna contains bird species that during the Tertiary and Pleistocene periods enhabited the banks of the Sarmatian Sea, stretching form the actual Pannonian plain to lake Aral. All these species are linked to the aquatic environment, living along the shores, in lagoons but

also on broad expanses of water. Some of these species kept their initial range on the Sarmatian Sea across time, but others expanded their range during the Quaternary period, reaching northern Africa, Western Europe and even south and east Asia.

The indo-african type avifauna had in the upper Tertiary and Pleistocene periods an area that comprised a wide area from southern Asia to north and central Africa, but which today had suffered significant changes. These species are adapted generally to a hot climate, usually dry, favoring areas with herbaceous vegetation or rare trees, swamps or rocky outcrops. From a food regime pont of view we have the following situation: the highest percentage is represented by zoophagous species (34%), followed by the species with a mixed food regime and predators (Fig. 15).

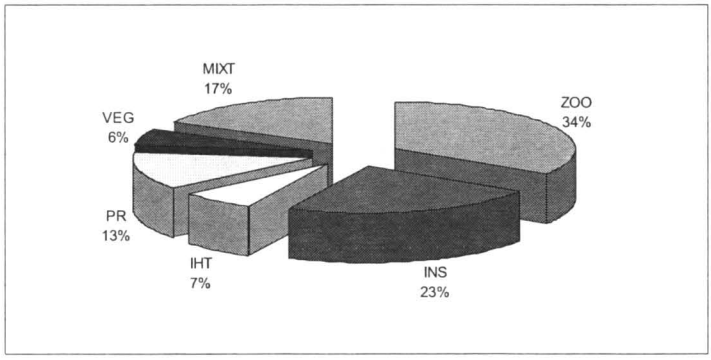

Fig. 9 Food regime analysis of the observed birds in the Protected Natural Area Gruia-Gârla Mare

Phenological analysis of the avifauna in the Protected Natural Area Gruia - Gârla Mare

The pheonologic picture for the bird species of communitary and national interest found in the Protected Natural Area Gruia-Gârla Mare encloses: 4 sedentary species (25%), 1 partially sedentary species (6.75%), 1 passage species (6.75%), 10 summer guest species (62.5%), which can be observed also in figure 16.

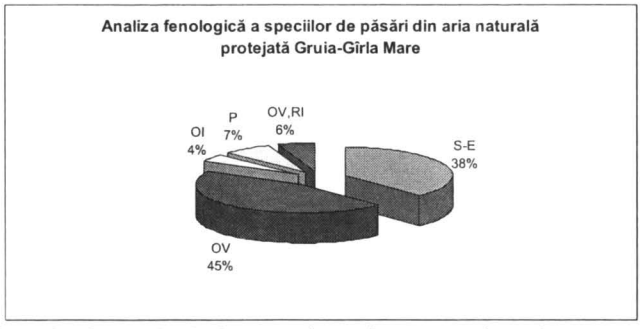

Fig. 10 Phenologic analysis for species of communitary interest, for which it has been declared a special avifaunistic protection area

(S-E = sedentary or erratic-sedentary, OV = summer guest, OI = winter guest, P = passage species, OV,RI = summer guest, rarely in winter)

Biotope preferences of bird communities in the Protected Natural Area Gruia - Gârla Mare

The birds' life is the result of a dynamic balance that is established between them and the environment. Some of the biotic or abiotic factors are favorable to the birds others are damaging or indifferent. The interaction between the genetic characteristics and the environmental influences determine the birds' life style. Adaptations such as: constant and high body temperature, reproduction perfectioning, a varied diet, flight locomotion, allows the birds to be widely spread and to populate almost the entire Earth surface.

In order to use in the best way, the favorable factors and to prevent the negative effect of the unfavorable ones, the different species of birds respond by ereditary adaptations which lead to the establishment of specific ecological relations, whose character determine their vital form. The ecologic parallelism or the resemblance in structure and habitus, determined by the mode of locomotion, the mode to search for food or by the biotope, the resemblance in annual cycles or nictemeral activity, of reproduction periods or of the intraspecific organization of populations, they all convene the different species of birds in the same vital forms.

The vital form represents the ecological characterization of a species, eventually of a larger systematic group and determines their localization in certain biotopes. There are stenotope species, narrowly localized in a certain biotope and euritope species which can live in more biotopes, sometimes pretty different between each other. For a biotope are characteristic the stenotope species, along which there are also the euritope ones, which in many cases are more numerous, as number of species as well as of number of individuals.

The main ecological groups, characteristic to certain biotopes, are:
- forest and bush birds (oak forests, coniferous forest, meadow forest etc.)
- swamp birds
- steppe and desert birds
- aquatic birds

The species targeted by the project fall in the following categories: forest and meadow bushes birds, swamp birds and aquatic birds.

Forest and meadow bushes birds

The forests in the Protected Natural Area Gruia - Gârla Mare are typical plain forests, which occupy very small spaces, with an insularity character. The meadows in this area have a secondary character and they occupy mainly the parcels that were not suitable for agriculture. The herbaceous layer is formed from fescue type grasses, to which are added numerous ruderal plants, because of degradation due to overgrazing.

The forests can also be classified in different categories, after the composition of their brushes: typical plain forests, plantation forests, formed on places where deforestations occurred in the past, and the natural willow forests and meadows have been replaced with poplar plantations.

In the forest habitat the species that occur with a higher frequency are: *Accipiter gentilis, Accipiter nisus, Buteo buteo, Falco tinnunculus; Falco vespertinus, Asio otus, Dendrocopos major, Dendrocopos minor; Upupa epops, Cuculus canorus, Sylvia communis, Sylvia curruca, Turdus merula, Turdus philomelos*, etc.

Of the species that populate the meadow bushes characteristic are: *Muscicapa striata; Sylvia atricapilla; Luscinia luscinia; Phoenicurus phoenicurus; Parus major; Parus caeruleus; Fringilla coelebs; Corvus corone cornix* etc.

The swamp birds are closely linked to the swampy grounds, with moist soil or covered with shallow water and with rich vegetation, where they take their food from. They build their nests on the plants around the aquatic basins, but some lay their eggs directly on the ground or on small floating islands. Many of them have long legs with long toes and usually without an interdigital membrane. They form several types:

Stilts, with long neck and beak, very high legs (Ardeidae, Gruidae, Threskiornithidae families), birds able to search food in shallow water, on the soil and in a vegetation lower than their stature.

Pond climbers, that live in pond and flooded meadow thickets (*Porzana sp., Rallus sp.*, etc.). Their body is laterally compressed with very long toes that allow them to easily navigate the aquatic plant thickets. They gather their food, which consists of aquatic animal and plant species, from the soil.

Bank (limicol) birds comprise small species that feed on aquatic animals that they gather from the soil, from under the rocks or the bottom of shallow water (*Gallinago* sp., *Lymnocryptes* sp., *Numenius* sp., *Tringa* sp., etc.). Some species of Passeriformes have adapted to life in reed-covered habitats, without changing their morphologic characters (*Acrocephalus* sp., *Emberiza* sp., etc.), as well as some predators (*Circus aeruginosus*, etc.).

Aquatic birds, with ovoidal shape, dorsoventrally compressed, covered in rich feathering, compact and waterproof, with adipose deposits under the tegument and uropigian gland well developed, with short legs and palmed, they live in aquatic environments and after the degree of water dependency are grouped in several types:

Divers more linked to water and generally not good flyers, and slow movers on land. They acquire their food in water and nest on the banks or on small floating islands (Gaviidae, Podicipedidae families).

Aquatic-aerial (of the families Procellariiformes, Stercorariidae, Laridae, Sternidae, etc.), excellent flyers, they acquire their food from water, flying above it. They are very good swimmers, but only a few species can also dive.

Terrestrial-aquatic (*Anser* sp., *Anas* sp., *Aythya* sp.) are less linked to the aquatic environment. Thus, the swimming ducks often nest a long way of the

water, usually feed on dry land, and in aquatic pools they populate the shallows. They fly and swim well but they dive heavier. The geese (*Anser* sp.) nest near the aquatic basins, they feed mostly on dry land, and they only rest on water. The species of diving ducks (*Aythya* sp.) are more connected to the aquatic environment because they nest near waters, feed in them, they swim and dive well.

The crops environment, another ecological group, is made of human settlements and transformed lands through uses of any kind (especially agricultural). But this biotope has a heterogeneous aspect and is populated mostly by euritope species. Here on observe sinantrope species, adapted to life in the close proximity of humans, even in buildings (the swallow *Hirundo rustica*, the sparrow *Passer domesticus*, the barn owl *Tyto alba*).

The birds that are adapted to special biotopes are those that have adapted to very different living conditions. The swallows *Hirundo rustica* and martins (the common house martin *Delichon urbica* and the sand martin *Riparia riparia*) are aerial birds, but they use more intensely the solid undergarments, for rest during the day and night.

According to the data in Table 8, most of the species for which the Natura 2000 site Gruia - Gârla Mare has been established, are those represented in the reed fields, that serve as feeding, refuge, rest and nesting sites for a number of 11 species. The next habitat is that represented by anthropogenic dams, covered in herbaceous and shrub vegetation that separate the ponds and the wetlands adjacent. This hbitat is used by 8 species.

Table 8 Biotope preferences for birds of communitary interest.
(Biotope 1 = Body of water; Biotope 2 = Reed field; Biotope 3 = Water banks, shallows; Biotope 4 = Meadow forest with willow and poplar; Biotope 5 = Body of water with natant vegetation and reed tufts; Biotope 6 = Anthropogenic dams with herbaceous and shrub vegetation; Biotope 7 = Quercus spp. forests)

	1 LA	2 T	3 MAL	4 PL	5 VEG NAT	6 DIG	7 PQ
A024 *Ardeola ralloides*		x	x			x	
A060 *Aythya nyroca*	x	x			x		
A021 *Botaurus stellaris*		x					
A196 *Chlidonias hybridus*					x	x	
A081 *Circus aeruginosus*		x		x			
A027 *Egretta alba*		x	x			x	
A511 *Falco cherrug*				x			
A075 *Haliaeetus albicilla*				x			x
A131 *Himantopus himantopus*		x					
A022 *Ixobrychus minutus*		x		x		x	
A023 *Nycticorax nycticorax*		x		x		x	
A019 *Pelecanus onocratulus*	x	x					
A393 *Phalacrocorax* pygmaeus	x	x		x	x	x	
A193 *Sterna hirundo*	x		x		x	x	
A231 *Coracias garrulus* *							x
A034 *Platalea leucordia*		x	x			x	
Total specii	**4**	**11**	**4**	**6**	**4**	**8**	**2**

**The most numerous individuals have been observed in the areas with Riparia riparia martin colonises and European bee-eater Merops apiaster.*

Cenosys affinity of bird communities in the Protected Natural Area Gruia - Gârla Mare

The coenosis affinity indicators reflect the relationships existent between the species of a given biocoenosis. Based on the value of this indicators, we can accurately say which are the characteristic species, these having the highest affinity.

When two or more overpopulated systems are compared, the values of coenosis affinity indicators, between all the combinations of communities taken two by two will be able to be arranged in a similitude matrix (coenosis affinity).

In the similitude analysis (coenosis affinity) is important only the presence and absence of species in the compared areas.

The presence is denoted with a „1", the absence with a „0". If we have two communities M and N, we denote: a = the number of species present in both communities M and N;

b = the number of species present in M community and absent in N;

c = the number of species present in N and absent in M;

One of the most widely used indicators of coenosis affinity / similitude is the Jaccard index.

The formula for this index is:

$$S = (a * 100) / (a+b+c)$$

By calculating the coenosis affinity / similitude index for the territory of the protected natural area, comparing Gruia-Pristol and Gîrla Mare-Vrata, for all the months in which observations were made in the natural protected area Gruia-Gîrla Mare, the following results occur:

$$S = 1400 / (14+1+1)$$

$$S = 87.5\ \%$$

This value shows a great similitude between the two investigated areas, form the point of view of bird communities, which allows unitary approaches for the entire Protected Natural Area Gruia - Gârla Mare.

Bird communities structure in various biotopes from the Protected Natural Area Gruia - Gârla Mare

The structure analysis of bird communities in this phase of the research shows that the specific diversity varies little from a biotope to another. By reporting both to data obtained in the field as well as to literary data, we can say that the highest values of diversity are encountered, as expected, in migration periods, respectively the spring migration (march-april) and the autumn migration (september-october).

When analyzing the structure of bird communities, the species not targeted by the project but present in the protected area will be taken into account.

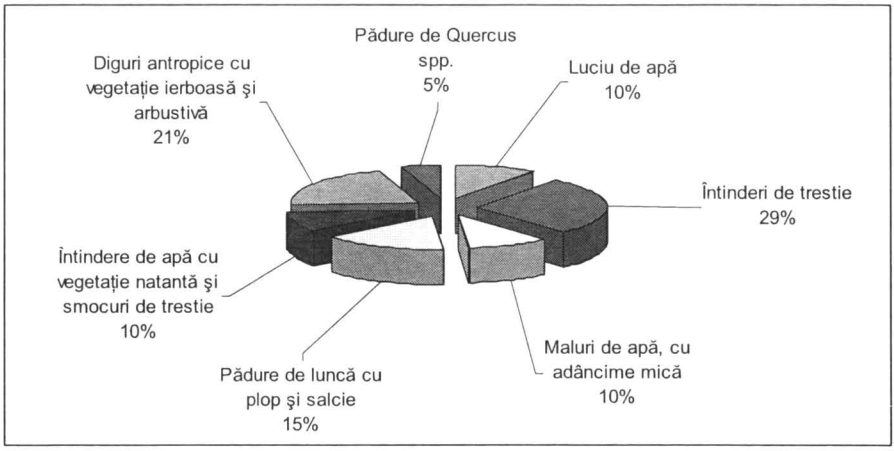

Fig. 11 Communities structure for birds of communitary importance in the biotopes from the area Gruia - Danube bank

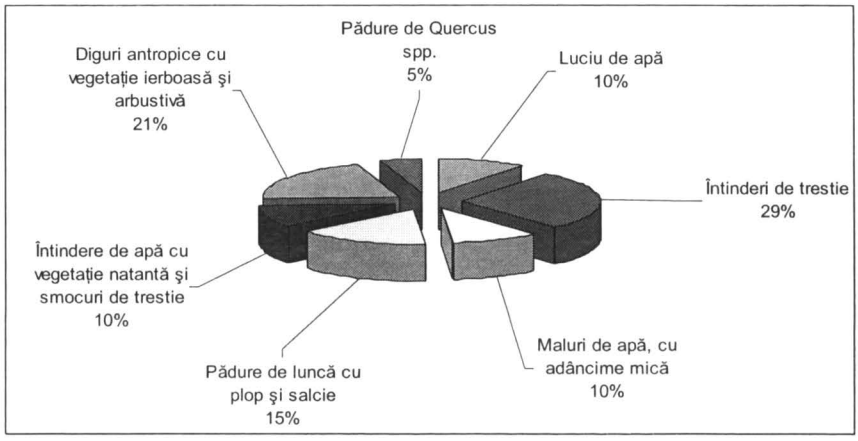

Fig. 12 The structure of bird communities, observed in the area Gruia - Danube bank (other than those for which the site Gruia - Gârla Mare has been established)

The diversity od bird communities in different types of biotopes from the Protected Natural Area Gruia - Gârla Mare

The diversity of bird communities from the **reed fields' biotope** is lower than that of the other biotopes. In these was an area it is found the permanent ground (refuge, nesting and food) of the Eurasian bittern *Botaurus stellaris,* the little bittern *Ixobrychus minutus* and the purple herons *Ardea purpurea.* Here is also where the marsh harriers *Circus aeruginosus*

and great egrets *Egretta alba* retreat for nesting. This biotope is used as a refuge by all the species of the families Anatidae *Cygnus* sp., *Anser* sp., *Anas* sp., *Aythya* sp. during the shedding period, when the "eclipsed" plumage doesn't allow them a fast flight.

The body of water biotope is used by all the species dependent directly or indirectly on water, especially for obraining food. The species of the family Anatidae use the body of water also to form gregarious formations, in the diverse phonological aspects.

The species of the Podicepedidae family are directly linked to the body of water, natural divers, and being poor flyers. These have even nuptial rituals linked to the body of water biotope. Another category of species that frequently uses the body of water is that of the Rallidae family, especially the coots which are not very easily scared.

In terms of specific diversity, compared to the reed fields biotope, the body of water is characterized by the presence of more species, also very well represented in numbers.

Higrophyle biotopes, like water banks, shallows or temporary flooded meadows, are preferred by limicols, which use them as nesting and food territory. Also, this type of biotope is used by other species like herons, storks, geese or ducks, even divers, especially during the wintery aspect of their phenology.

The body of water with natant vegetation, like the yellow water-lily *Nuphar luteum,* the white water-lily *Nymphaea alba* or the fringed water-lily *Nymphoides peltata*, is the biotope with almost the highest specific diversity, being used as food and nesting territory by Anatidae (the ferruginous duck *Aythya nyroca* builds its nest from plant debris), Ardeidae (the squacco heron *Ardeola ralloides*), and especially by the whiskered tern *Chlidonias hybridus* and the water rail *Rallus aquaticus* etc.

The dams are also used by all bird species, except the natural divers (great crested grebe *Podiceps cristatus*, the little grebe *Tachybaptus ruficollis*). These are often used by cormorants to dry themselves, by ducks, egrets and storks for rest, by passeriforms, by predators, thus becoming one of the most complex biotopes.

Nesting particularities of birds in the Protected Natural Area Gruia - Gârla Mare

According to the standard form of the Natura2000 ROSPA0046 site Gruia - Gârla Mare 13 nesting species are declared in the protected natural area. Of these, 2 species have not been encountered in the protected natural area during the period of field observations - the white tailed eagle and the saker falcon - and the great egret is represented by a maximum of 10 nesting pairs.

Table 9 Nesting particularities for bird species of communitary interest (*non-nesting species in the studied area)

	Preferred habitat for nesting	*Type of anthropic pressure*	*Intensity of anthropic pressure*
A024 *Ardeola ralloides*	Spreads of reed	Reed burning Reed cutting	High, in April
A060 *Aythya nyroca*	Spreads of reed	Reed burning Reed cutting	High, in May
A021 *Botaurus stellaris*	Spreads of reed	Reed burning Reed cutting	Medium, in May
A196 *Chlidonias hybridus*	Body of water with vegetation	Clearing the lilies from the pond	High, in May
A081 *Circus aeruginosus*	Spreads of reed Meadow forest with willow and poplar	Reed burning Reed cutting Deforestation Acacia planting	Medium, end of April – half of May
A027 *Egretta alba*	Spreads of reed Waterbanks, with shallow water Meadow forest with willow and poplar	Reed burning Reed cutting	Low, in May-June
A511 *Falco cherrug* *	Meadow forest with willow and poplar	Cutting of old trees Acacia planting	-
A075 *Haliaeetus albicilla* *	Meadow forest with willow and poplar *Quercus* spp. forest	Cutting of old trees Acacia planting	Low, in April
A131 *Himantopus himantopus*	Waterbanks, with shallow water	Liquidation of limni areas	Low, in April - May
A022 *Ixobrychus minutus*	Spreads of reed Meadow forest with willow and poplar	Reed burning Reed cutting Deforestation Acacia planting	High, in May-June
A023 *Nycticorax nycticorax*	Spreads of reed Meadow forest with willow and poplar	Reed burning Reed cutting Deforestation Acacia planting Poaching	High, in May-June
A019 *Pelecanus onocratulus* *		Reed burning Reed cutting Poaching	-
A393 *Phalacrocorax pygmaeus*	Spreads of reed Meadow forest with willow and poplar	Reed burning Reed cutting Deforestation Acacia planting	High, in April - May
A193 *Sterna hirundo*	Body of water with floating vegetation and reed smirks	Clearing the pond of floating vegetation	High, in May
A231 *Coracias garrulus*	*Quercus* spp. forest	Deforestation Acacia planting	Small, in May
A034 *Platalea leucordia*	Spreads of reed Meadow forest with willow and poplar	Reed burning Reed cutting Deforestation	Medium, in May

The dynamic of bird communities in various habitat types from the Protected Natural Area Gruia - Gârla Mare

a) Bird species frequency on the Protected Natural Area Gruia - Gârla Mare territory

Following field observations it was ascertained that species like the pygmy cormorant *Phalacrocorax pygmaeus*, the ferruginous duck *Aythya nyroca*, the great egret *Egretta alba*, have been sighted in each month of investigations, and the saker falcon *Falco cherrug* and the white-tailed eagle *Haliaeetus albicilla* have not been observed in the area.

Table 10 The frequency for species of communitary interest in the natural protected area Gruia-Gârla Mare (*grey color indicates presence of species in the respective month*)

Species code	May	June	July	August	September	October	November	December
Phapyg								
Ardral								
Aytnyr								
Botste								
Chlhyb								
Ciraer								
Egralb								
Falche								
Halalb								
Himhim								
Ixomin								
Nycnyc								
Pelono								
Stehir								
Corgar								
Plaleu								

b) Seasonal dynamics and bird migration from the Protected Natural Area Gruia - Gârla Mare (summer guest species, passage species, winter guest species, sedentary - erratic species)

One of the most interesting facts and, at the same time, fascinating and full of mystery in the living world, is the migration. Under different forms and aspects, this phenomenon is found in most groups of the animal kingdom.

Known from ancient times, the bird migration is undoubtebly a unique aspect. From empirical observations, and sometimes fantastic, the bird migration could only be scientifically approached with the development of modern research techniques. Even so, there still remain many mysteries that a wait to be explained in the near or more distant future. On this level we can talk about 2 types of migration: that of migratory birds and that of partially migratory-sedentary birds.

The migration routes follow favorable areas for feeding, rest and flight that exist between nesting sites and wintering quarters. The Protected Natural Area Gruia - Gârla Mare is limitary to the Danube River which is one of the main migration paths of Romania.

The spring migration, also known as prenuptial, takes place in the period between the first decade of January and the second half of May. The limits for this interval are not strict, as they can be moved a number of days or even weeks ahead or after, depending on the climate factors.

During this time period we assist to the migration of many phonologic categories of birds, but which can be synthetically grouped in winter guests, passage species and summer guests. We distinguish migratory birds that leave (winter guests) and migratory birds that arrive (summer guests). From this point of view the spring migration can be either of leaving (difug) or of arrival (afin). What clearly differentiates the two types of migrations are the wintering and nesting quarters of the birds.

For the species that perform the difug type migration, the wintering quarter is represented by the ponds existent in the protected natural area and the Danube river, and the nesting quarter is found in the north of the European continent; for the birds covering the afin type migration, the wintering quarter is established in the areas from northern or southern Africa, whilst the nesting quarter is represented by the wetland habitats specific to the protected natural area.

The autumn migration, also called postnuptial, takes place between the first half of August and the first half of November. As with the spring migration, for the autumn migration we can group the birds in the two phonologic categories, summer guests, winter guests and of passage. According to the migrating species phenologic apartenence and closely linked with the way in which it is made, the autumn migration can also be of difug type (leaving) and afin type (arrival).

A special type of migration is realized by sedentary - partially migratory species during the winter months. The triggering factor for partially migratory - sedentary birds is the drop of temperature below 0°C and the formation of an ice bridge over the ponds, which stops them from feeding and resting. There is no specific time frame in this interval of the winter months that can be designated as a landmark for the beginning or the end of

this atypical winter migration. A mild winter without sudden drops in air temperature offers favorable conditions for the bird species that are usually summer guests to station here, like: the Eurasian bittern *Botaurus stellaris,* the marsh harrier *Circus aeruginosus,* the ferruginous duck *Aythya nyroca.*

In the Protected Natural Area Gruia - Gârla Mare, the winter aspect takes place between November and February. During this time the small ponds in Gruia - Gârla Mare complex are either frozen or dried, and the bigger and deeper ones are partially frozen. During the winter aspect were observed species like the pygmy cormorant *Phalacrocorax pygmaeus*, the ferruginous duck *Aythya nyroca*, the great egret *Egretta alba*, and also a specimen of Eurasian bittern *Botaurus stellaris* in November. From a numerical point of view, the pygmy cormorant and the great egret were dominant during this time.

Besides these species there were also sightings of individuals from the following species Eurasian teal *Anas crecca,* mallard *Anas platyrhynchos,* great cormorant *Phalacrocorax carbo,* common pochard *Aythya ferina,* black headed gull *Larus ridibundus,* grey heron *Ardea cinerea,* mute swan *Cygnus olor,* Eurasian coot *Fulica atra* etc.

The birds come here constantly starting with the second decade of December and leave the area at the end of January or even in the second decade of February.

A totally special case is represented by some summer guests who could also be seen ir the winter season. Among the aquatic and semiaquatic birds we can mention the northern lapwing *Vanellus vanellus*, which can station in the area until the end of November.

The prevernal aspect takes place between march-april, period that coincides with the spring migration. This period was not comprised in the observations that make the basis for this study but it can be mentioned that from the prevernal species are the following: the white stork *Ciconia ciconia,* the little egret *Egretta garzetta,* the ferruginous duck *Aythya nyroca,* the Eurasian bittern *Botaurus stellaris,* the mallard *Anas platyrhynchos,* the Eurasian coot *Fulica atra,* the Eurasian spoonbill *Platalea leucordia* etc.

The vernal aspect includes the entire month of May, being characterized by the continuity of limicols passage to the north and the beginning of the reproductive season for most sedentary and summer guest species, which have already arrived during the rpevernal period, remaining in the area only the nesting pairs, for which the reproductive season is in full progress.

The summer aspect takes part in June, when all bird activities are centered around the nest and the nestlings. So, in June, in the case of aquatic birds the netslings are already hatched and can be observed following their parents; the passeriforms that nest in wetlands are at the beginning of incubation.

The presence of brooding birds in a territory is influenced by the existence of a favorable environment and by the level of anthropic pressure. The presence or absence of hydrophyle vegetation conditions the installation

of aquatic species. The meadow forests attract the *Phalacrocorax sp.* cormorants, *Ardea cinerea*, *Nyctycorax nyctycorax herons* or *Egretta alba, Egretta garzetta* egrets, and the meadow shrubs made of willows and poplars attract day and night predators as well as aquatic passeriforms.

The human daily activities, continuos or temporary in the area of aquatic surfaces, have a negative influence on the number of nesting pairs.

The serotinal aspect takes place in the Protected Natural Area Gruia-Gârla Mare between the months of August and September when the autumn migration starts, which takes place in this area until the second decade of November.

Since the first decade of July the first groups of limicols start to come in the area, stopping on the swampy surface of the ponds.

Towards the end of July and the beginning of August, can be encountered the first congregations of ciconiforms, made out of groups of: Eurasian spoonbills *Platalea leucorodia,* grey herons *Ardea cinerea,* glossy ibises *Plegadis falcinellus,* great egrets *Egretta alba,* little egrets *Egretta garzetta.*

The autumn migration takes place mucsh slower than the spring one, the birds staying for a long time in the territories that offer them abundant food resources, using them as points where they accumulate fat resources which provide them with flight energy during the long migration time.

The months corresponding to the autumnal aspect are September-October, interval characterized by the continuity of the autumn migration. The group of passing birds is dominant, which stop here only for a rest, feeding and replenishing of fat resources.

Most aquatic and semiaquatic birds are grouped in flocks that consist of tens - in the case of ciconiforms, hundreds or even thousands individuals, in the case of anseriforms, larides and limicols.

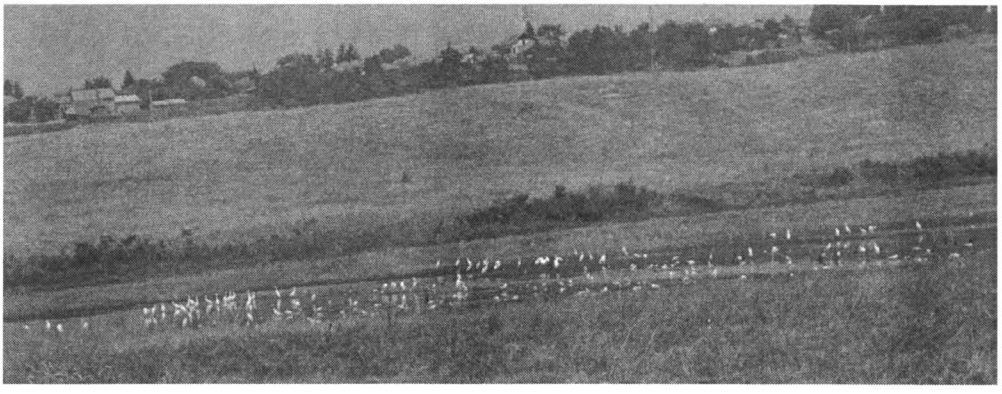

Fig. 13 Congregation of great and little egrets and Eurasian spoonbills in Gârla Mare area, 21 July 2010 (Foto: Amalia Bălăşoiu)

Fig. 14 *Pandion haliaetus* - Osprey - passing species, 9 October 2010 (Foto: Amalia Bălăşoiu)

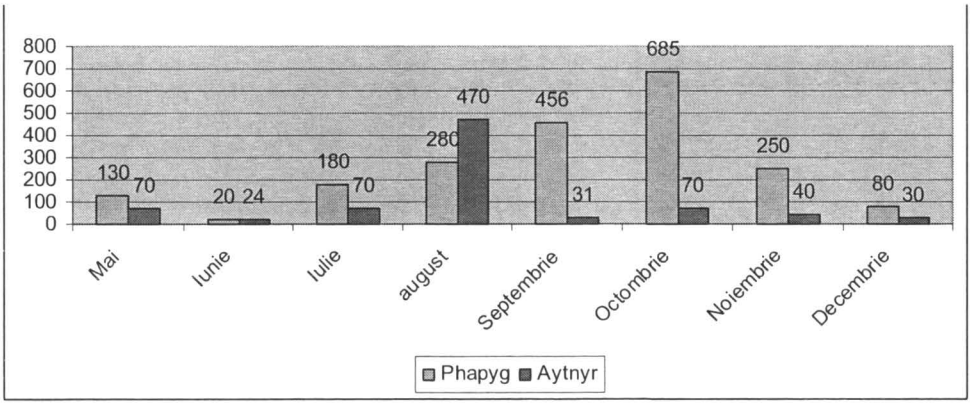

Fig. 15 Season dynamics for the pygmy cormorant *Phalacrocorax pygmaeus* (Phapyg), compared to the ferruginous duck *Ayhya nyroca* (Aytnyr), în anul 2010

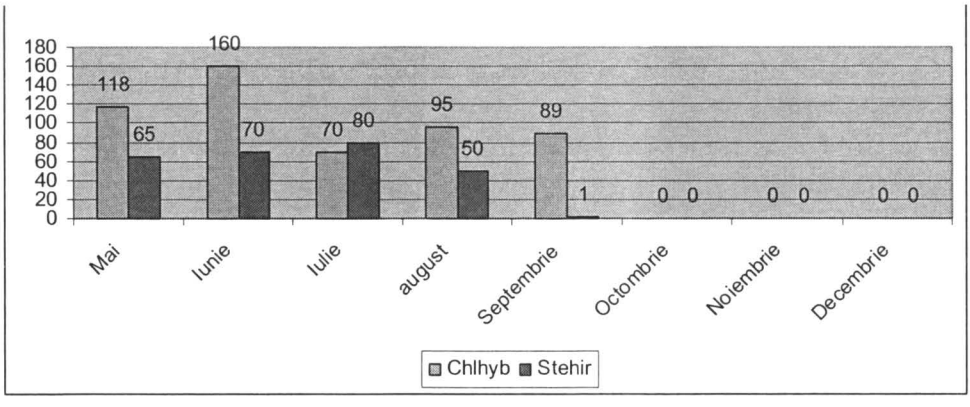

Fig. 16 Season dynamics of the whiskered tern Chydonias hybrida (Chlhyb), compared to the common tern Sterna hirundo (Stehir), in 2010

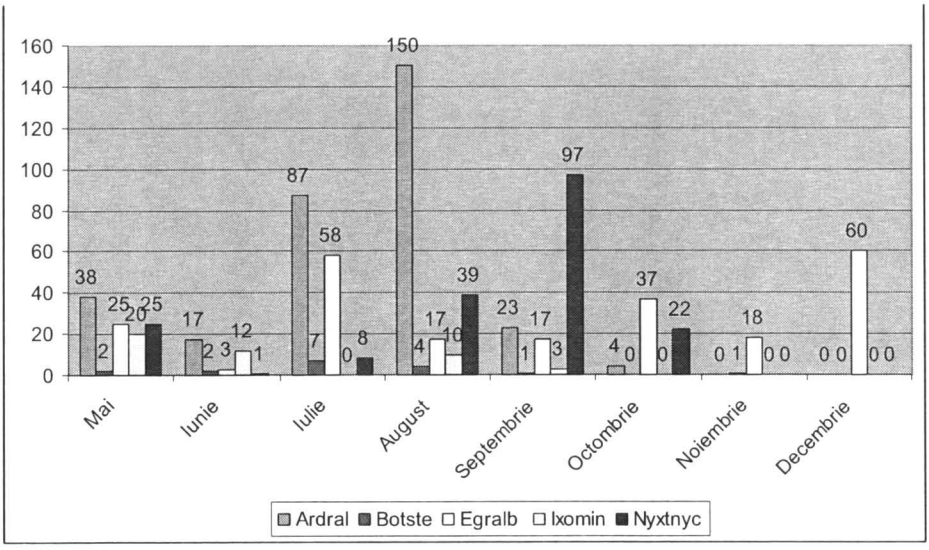

Fig. 17 Season dynamics for heron species of communitary interest from the protected natural area in 2010 (the squacco heron *Ardeolla ralloides* = Ardral, the Eurasian bittern *Botaurus stellaris* = Botste, the great egret *Egretta alba* = Egralb, the little bittern *Ixobrychus minutus* = Ixomin, the black crowned night heron *Nyctycorax nyctycorax* = Nycnyc)

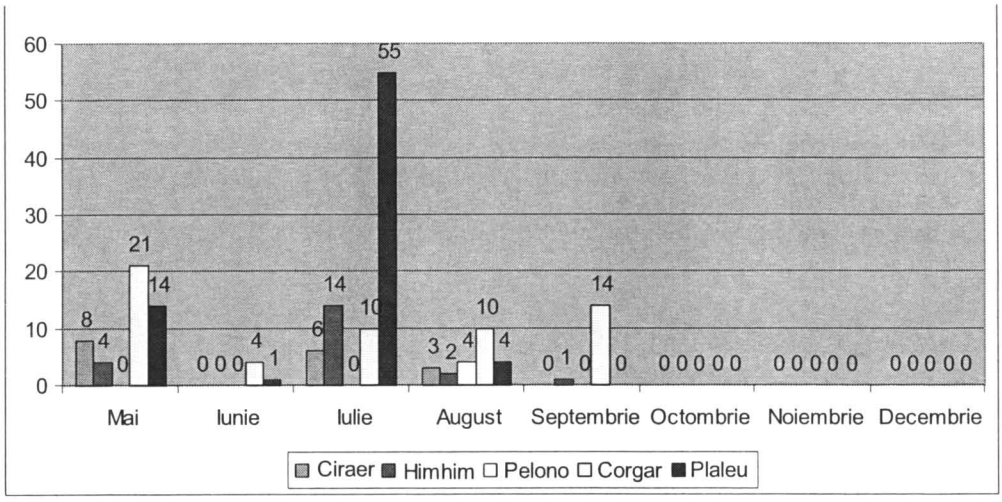

Fig. 18 Season dynamics of the marsh harrier *Circus aeruginosus* (Ciraer), the black winged stilt *Himantopus himantopus* (Himhim), the white pelican *Pelecanus onocrotalus (Pelono)*, the European roller *Coracias garrulus* (Corgar) and the Eurasian spoonbill *Platalea leucorodia* (Plaleu), in 2010

The protection and conservation of bird species of communitary importance from the Protected Natural Area Gruia - Gârla Mare

a) The influence of environment factors on the number and density of bird populations from different biotopes of the Protected Natural Area Gruia - Gârla Mare

Of the natural factors that have a clear influence on the bird opulations in the lower course of the Danube River, we enumerate: floods, air currents, air temperature, precipitation and predatorism. The predominancy of air currents from North and South generate constant masses of air throughout the year. The periods with the most numerous intensifications of air current circulation were those of the cold season, respectively the autumn-winter months (November - December) and spring (March - April). The late autumn this year made it possible to observe bird species that normally in October and November should have already left. Among these we mention the Eurasian bittern *Botaurus stellaris,* the short toed snake eagle *Circaetus gallicus* and the swallow *Hirundo rustica*.

This year floods occurred especially due to the machining of the Danube waters, through the 2 Iron Gate dams have been signaled exactly in the final period of incubation and nestlings eclosion. Although no drowned nestlings or destroyed nests have been sighted, as long as the access on the ponds was admitted, it is well known that water management should be carefully monitored especially in the nesting period.

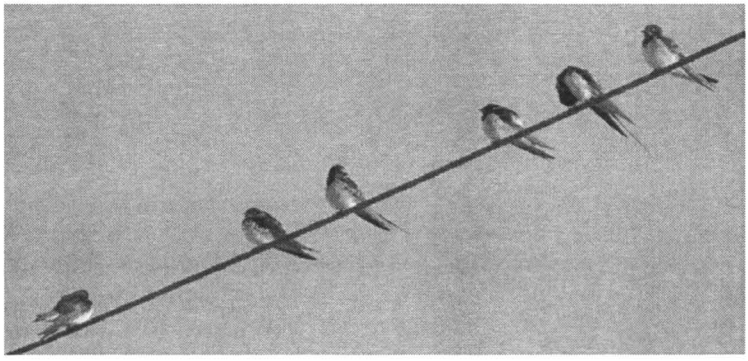

Fig. 19 Swallow group *Hirundo rustica* observed at Gruia in 9 October 2010

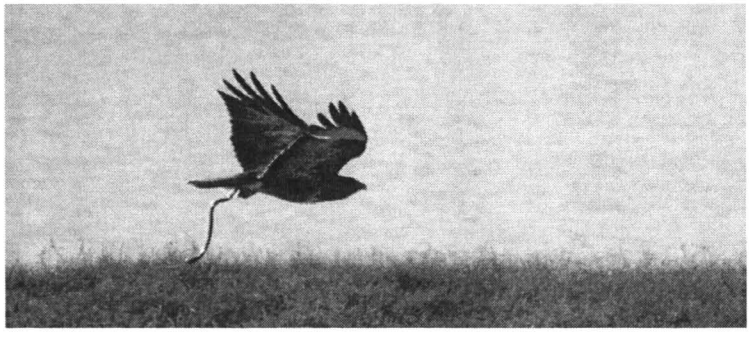

Fig. 20 *Circaetus gallicus* - the short-toed snake eagle - observed on 13 November 2010

Conclusions

The making of this study on a period of 8 months (May - December 2010), in The Natural Protected Area Gruia - Gârla Mare, with bimensal rhythmicity, led to the following conclusions:

- From the species of birds for which The Natural Protected Area Gruia - Gârla Mare was declared, there have been found eudominant the following species: the pygmy cormorant (*Phalacrocorax pygmaeus* - 42%), the ferruginous duck (*Aythya nyroca* - 17%) and the squacco heron (Ardeola ralloides - 13%).
- From the point of view of the absolute abundance, the pygmy cormorant *Phalacrocorax pygmeus*, is the most encountered of the investigated species.
- The species that have been found as being permanent in The Natural Protected Area Gruia - Gârla Mare are: the pygmy cormorant *Phalacrocorax pygmeus*, the squacco heron *Ardeola ralloides*, the ferruginous duck *Aythya nyroca*, the Eurasian bittern *Botaurus stellaris*, the great egret *Egretta alba* and the black-crowned night heron *Nyctycorax nyctycorax*.
- Characteristic species are: the pygmy cormorant *Phalacrocorax pygmaeus*, the squacco heron *Ardeola ralloides*, the ferruginous duck *Aythya nyroca*, the whiskered tern *Chlidonias hybridus* and the great egret *Egretta alba*. The white pelican *Pelecanus onocratulus* is in this area an accidental species, and the rest of them where declared as being accompanying species.
- The species of birds for which The Natural Protected Area Gruia - Gârla Mare was declared belong to 6 classes and 12 families.
- From the point of view of the geographical origin, the highest proportion belongs to the palearctic species, followed by the holarctic ones.
- From the point of view of the food regime, from the total number of species for which the Natura 2000 site wasestablished, a percent of 34% are zoophagous, 23% insectivores, and the smallest percent being vegetarians, of 6%.
- From the point of view of the phenological aspect, the summer guests are with the highest prercentage, followed by the sedentary species, the smallest percentage beeing represented by the winter guests. In conclusion, The Natural Protected Area Gruia - Gârla Mare is, from the point of view of species with community interest, a highly important area for nesting.
- Most of the species of communitary interest for which The Natural Protected Area Gruia - Gârla Mare was established have as favourite biotope the spreads of reed. In this sense, the management measure that has to be urgently implemented, is forbidding the burning of vegetation in this biotope.
- If it were to take into account the whole spectrum of species observed in The Natural Protected Area Gruia – Gârla Mare (which also includes the 14 species of communitary interest) the most important biotope for these, is that of the shores of shallow water, that concentrate a large diversity of species.

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INTERACTIVE INFORMATION SYSTEMS USED IN THE NEW PERMANENT EXHIBITION OF THE NATURAL SCIENCES DEPARTMENT OF THE OLTENIA MUSEUM CRAIOVA

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Abstract: INTERACTIVE INFORMATION SYSTEMS USED IN THE NEW PERMANENT EXHIBITION OF THE NATURAL SCIENCES DEPARTMENT OF THE OLTENIA MUSEUM CRAIOVA

This paper presents seven interactive themes from the new permanent exhibition of the Department of Natural Sciences of Oltenia Museum Craiova. These themes played using interactive information systems through interactive multimedia animated 3D/2D presentation, Flash technology, are: „The physical and geographical conditions in Romania", "Species of flora and fauna of national and Community interest from Romania", "Levels of integration and organization of the living matter", "The circuit of the matter in nature", "The pond ecosystem", "Trophic chains and networks in an aquatic ecosystem" and "The diversity of the ecosystems".

Key words: interactive information systems, exhibition, Oltenia Museum Craiova.

Introduction

The Department of Natural Sciences Museum of Oltenia Craiova was founded 88 years ago under the name of "Natural History Museum of Craiova". It was inaugurated on 2 December 1923. It became Department of the Museum of Oltenia in 1928 (Firu, 1969).

Over the years, the Natural Science Department was housed in various buildings in Craiova and its heritage was enriched gradually, through acquisitions, donations and particularly by research activities of the specialists of the Department (Chimişliu 1998, 1999, 2003).

The first permanent exhibition of the Natural Science Department was opened in 1962, at the ground floor of the Department of History and Archaeology of the Oltenia Museum. In 1974 it was dissolved and the assets and staff of the Department were moved to another building. The Department exhibitional activity stopped for 12 years due to the lack of space for exhibitions. It was resumed in 1986, through two temporary exhibitions at the ground floor of the building situated in Popa Şapcă Street No. 8 (Fig. 1). Until 2008, here, the specialists of the Natural Science Department have arranged here dozens of temporary exhibitions (Chimişliu, 2010). The richness and diversity of the valuable heritage of the Natural Science Department was the core of the exhibitional activity.

Content

The new permanent exhibition of the Department of Natural Sciences of Oltenia Museum Craiova, was inaugurated on 18 September 2008 with the occasion of the XIV edition of the International Scientific Conference "The museum and the scientific research." The inauguration was attended not only by citizens of Craiova, but also by prominent scientific personalities in biology (academics, researchers, curators), from Romania and from abroad.

Fig. 1 The building of the Natural Sciences Department (Chimişliu, 2010)

The exhibition was realized within the project "Increasing tourist attractiveness of Craiova and Dolj County by creating the permanent exhibition from the first floor of the Department of Natural Sciences of Oltenia Museum" financed by PHARE Programme - Economic and Social Cohesion CFP 2001 3/2002, grant scheme for small infrastructure projects (Chimişliu, 2010).

The exhibition was done according to scientific themes developed by the curators of the Department with the financial assistance of Dolj County Council. The new exhibition is arranged on a surface of 528 sqm. and offers the visitors the possibility to learn about the physical and geographical conditions, ecosystems, flora and fauna of Oltenia (Chimişliu, 2010).

For this exhibition were used both traditional museum techniques (simple and bright photo panels, showcases exhibits), and modern techniques (interactive information systems through interactive multimedia presentation animated, 3D/2D, Flash technology) (Chimişliu, 2010).

The permanent exhibition reflects the great biodiversity of nature in Oltenia. Because Oltenia is a region of Romania, we considered necessary to provide, at the beginning of the exhibition, some data on the geographical

location and the physical and geographical conditions of Romania. For this we chose to use interactive systems.

The first interactive information system, begins with the location of Romania on the globe, and continues with:

- "*Geographical position*" - the physical map of Romania and information regarding the latitude, longitude, area, borders of Romania etc.;

- "*The relief*" - general informations about the mountains, hills and plateaus, plains and the Danube Delta, areas which are also illustrated (Fig. 2);

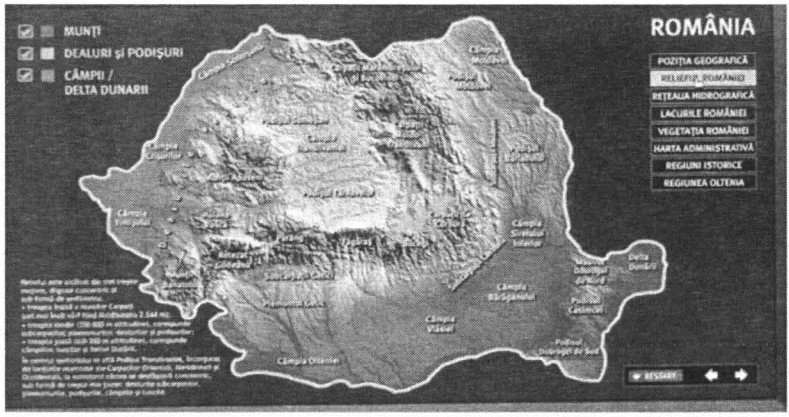

Fig. 2 The relief of Romania (original)

- "*The hydrographic network*" - maps, pictures and data about river basins, major rivers, natural and man-made lakes from Romania;

- "*Vegetation of Romania*" with illustrations of the areas: meadow, steppe, hills and plateaus, mountain subalpine and alpine;

- *"Administrative Map of Romania*" with the county administrative division;

- *"Historical regions of Romania";*

- *„Oltenia administrative map*", realizing the introduction to Oltenia, which is presented in the exhibition area.

The second interactive information system contributes to the knowledge of the diversity of flora and fauna from Romania. The visitors can view the protected species and species of national interest from the fauna of Romania which are preserved in the Department collections. The system includes the complete lists of the Annexes of the GEO no. 57/2007. In this system are illustrated species from all the 8 categories of wildlife species mentioned in the lists: mammals, birds (Fig. 3, 4), reptiles, amphibians, fish, insects, mollusks and plants.

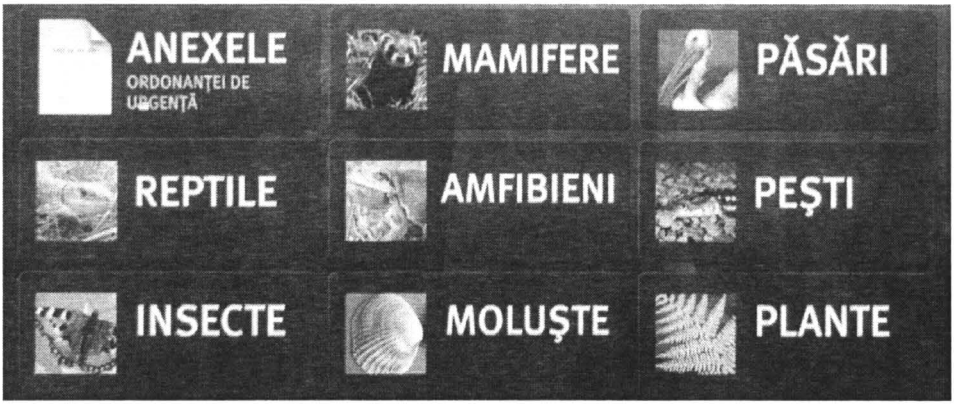

Fig. 3 Species of community and national interest present in the heritage of the Oltenia Museum (Chimişliu, 2010)

Fig. 4 Protected birds of national and community interest (Chimişliu, 2010)

Before the presentation of the ecosystems from Oltenia, visitors have the possibility to learn the basics of ecology through two interactive information systems. There are currently five themes presented in the two systems.

1. ***"Levels of integration and organization of living matter"*** (Fig. 5), begins by defining the living matter, the system, the integration and organization levels of living matter. Levels of integration are illustrated first, starting from non-living systems (atoms) followed by biological systems (molecules) - cells (plant and animal) - tissues (plant and animal) - organs (plant and animal) that integrate within the organism (plant and animal).

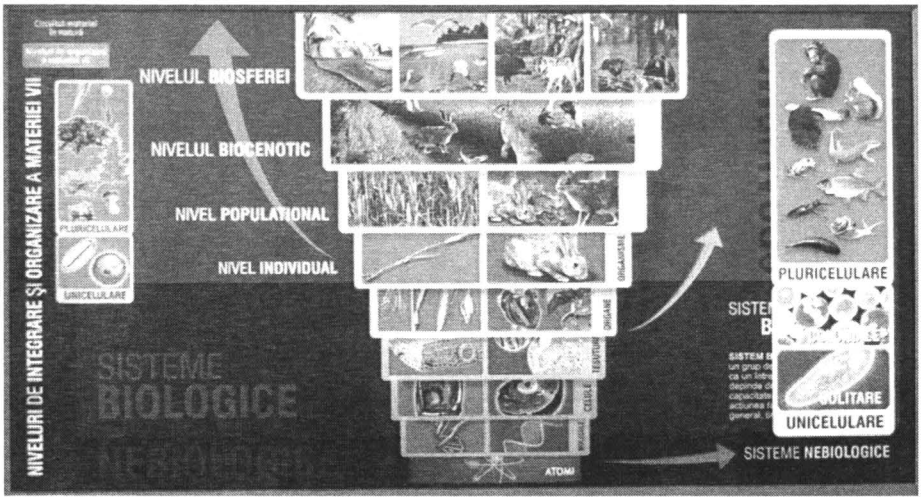

Fig. 5 Levels of integration and organization of the living matter (Chimişliu, 2010)

The organism is the higher level of living matter integration and at same time the first level of living matter organization. Next, the following levels of living matter organization are presented: the population level (of the species), the biocenotic and biosphere levels. Along with images, there are also provided the definitions of organisms, species, population, and biocenosis. For the vegetable world, levels were presented on a green background while for the animal world; the color red has been used. Around the central schema, the phylogenies of the vegetable and animal world are schematically presented.

2. "***The circuit of matter in nature***", offer the visitors the opportunity to understand in an easy way the functions of plants: photosynthesis, respiration and perspiration, which are the main link of the circuit of matter. Because of their functions, plants synthesize organic substances and oxygen necessary for life on earth.

At first, we presented the soil illustrating the water, the minerals and the bacteria (Fig. 6). You can then follow the route of the raw sap (water + minerals) through the root, stem, leaf, up to the plant cell. Here, at the chloroplasts level oxygen and organic substances are synthesized through *photosynthesis* (Fig. 7). Oxygen is released into the atmosphere and organic substances combine with water to form elaborated sap, which nourishes the vegetative organs of the plant and stores in seeds, fruits, tuberous roots, etc. which are used in herbivores and omnivores feed.

By *respiration*, the organic substances which reached the mitochondria level, are decomposed into carbon dioxide (which is released in the atmosphere), energy (part is used by the plant, part is eliminated outside the plant) and water.

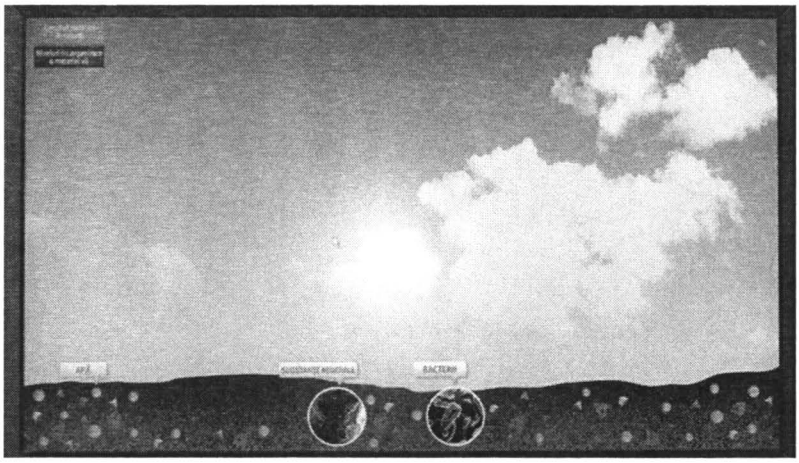

Fig. 6. (original)

By *perspiration*, water is released into the atmosphere as vapors or water drops. In this way, water re-enters the water circuit. After death, both plants and animals, reach the ground, where eventually decompose in water and minerals. In this way, they return into the circuit.

In addition to illustration, visitors can access the texts with the presented concepts (photosynthesis, respiration, organic substances etc.).

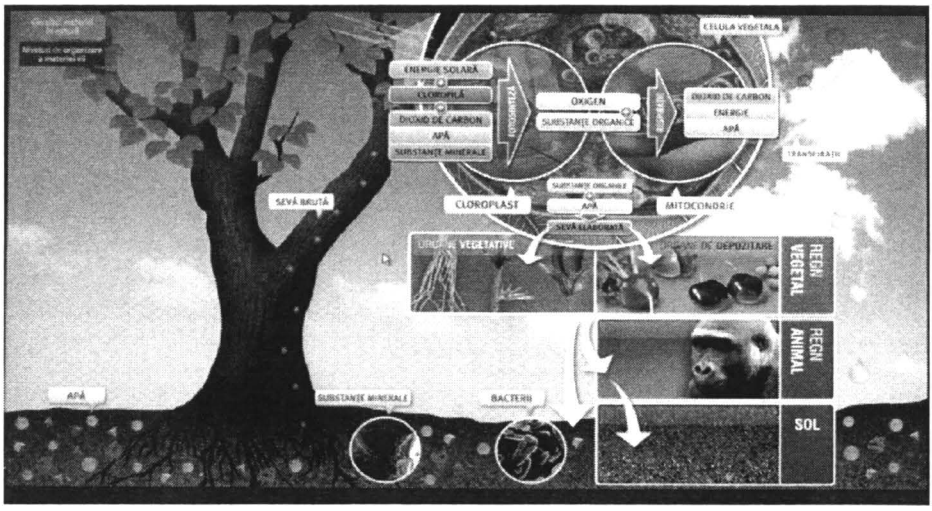

Fig. 7 The circuit of the matter in nature (Chimişliu, 2010)

3. ***"The pond ecosystem"*** is presented as a whole with two components: biotope and biocenosis. The three concepts are defined and illustrated with all components in a pond ecosystem. The visitors can see one by one, the biotope with the abiotic components (soil, water, air, clouds,

etc.), the biocoenosis, with the biotic components (plants and animals) and the ecosystem as the sum of the two components (Fig. 8).

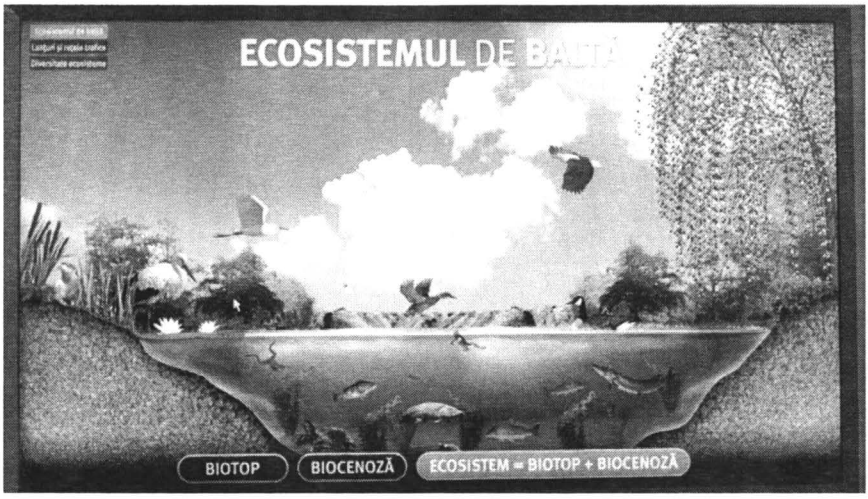

Fig. 8 Pond ecosystem (original)

4. "***Trophic chains and networks in an aquatic ecosystem***" initially present theoretical and illustrative the complex trophic relations which are established between the organisms of an aquatic ecosystem. There are three categories of organisms presented: producers, consumers and decomposers. The complexity of interspecific trophic relations which are established between the three trophic categories is presented as a complex scheme (Fig. 9). The visitor can separately see each trophic category and can easily track on the scheme, the trophic relations between certain groups of organisms.

Fig. 9 Trophic chains and networks in an aquatic ecosystem (original)

5. "***The diversity of ecosystems",*** presents an illustrated classification of ecosystems and offers visitors the possibility to learn the types of ecosystems (Fig. 10). The used criteria are: the nature of ecosystems, the three dimensions of space, the dominance of the activity of autotrophic or heterotrophic organisms and the development degree of the ecosystems.

Fig. 10 Ecosystems classification (original)

Conclusions

The materials presented through the interactive information systems in this segment of the exhibition form a documentary - scientific and educational basis. They contribute to environmental education of youth in particular, but also of other categories of the visitors. These materials also represent an interactive learning material suitable for carrying out the lessons of ecology.

The interactive systems used in our exhibition contribute to transmission of information in a modern, attractive and instructive way.

Through them, visitors are able to learn more, to diversify and to improve their knowledge of geography, biology and ecology.

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METHODS TO IMPROVE A SOIL POLLUTED FROM UNCONTROLLED HUMAN ACTIVITY

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Abstract: METHODS TO IMPROVE A SOIL POLLUTED FROM UNCONTROLLED HUMAN ACTIVITY
Pollution causes significant changes, leading to the disappearance of many species, leading to decreased soil fertility, its most important property that allows support plant and animal life and therefore human. In areas of extraction of oil, waste oil pollution phenomena are quite extensive, the impact on ecosystems beyond the intensity of other human actions.
Key words: pollution, oil, salt water, ecosystem.

Introduction

Romania is a country with a tradition of producing and processing oil. Because of this unwanted phenomena occurred that led to environmental pollution by oil and residues from processing of oil. This paper proposed an assessment of polluted land and salt water mixed with oil, showing how to produce pollution and its effect on soil. Also Remediation solutions are found by physicochemical methods.

Material and methods

The study was conducted in four phases: documentation (Fig. 1) - data collection and information about environmental elements of literature, study materials previously developed by OSPA Arges, ICPA Bucharest and SC ALFRID Ltd., phase of land - soil sampling and soil on the surface of backwater derived from precipitation, phase laboratory-chemical and physical measurements, phase office - systematization of data from field and laboratory and interpretation of results. Based on this interpretation has been developed to improve the methodology.

For chemical characterization and identification of pollutants laden with water, a sample was harvested from the land surface of backwater, to petroleum sounder nr. IV (Fig. 2).

The work was carried out in 2 years. Samples were collected from OSPA Arges and ICPA Bucharest, resulting in five surveys of soil and water proof. Soil Survey gave information on the state of land quality, degree of pollution, providing comments on the changes produced during the year.

Fig. 1 Zone positioning ortophotoplan

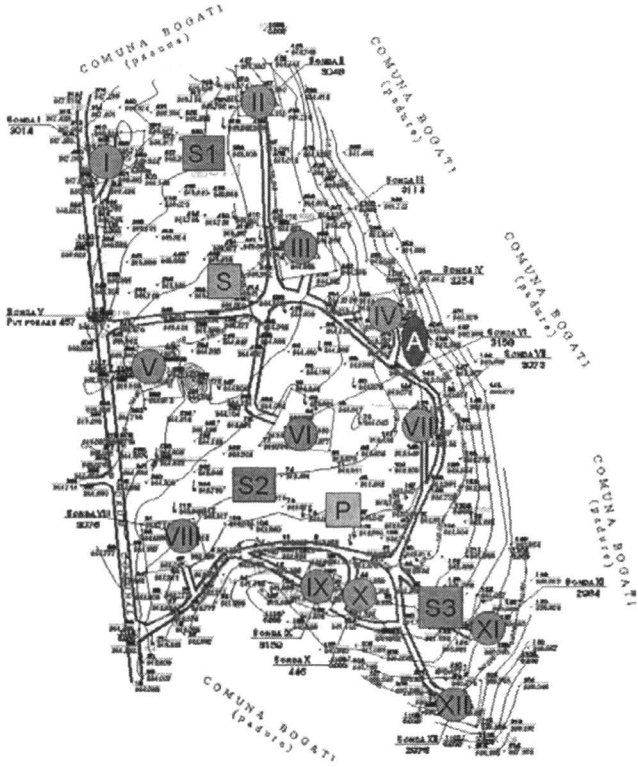

Fig. 2 Water sample - location, positioning of existing wells in the field and high soil samples ICPA, OSPA

Table 1 The legal situation of land

The total area	Of which (mp)			Leased area (access paths and petroleum sounder)
(mp)	Pasture	Access roads	Petroleum sounder	(mp)

60852	46233	3791	10828	4575

During the measurements, a SOUTH NTS-350 total station was used, which is produced by South Surveying, and which uses a dual optical fiber system of sending and receiving the signal, having a better quality and performance. In the measurement of the distances, the workstation used a 3mm+2ppm precision. There was also used SOKKIA GPS, Stratus model, receivers that have 12 channels, L1 signal, C/A code, 5m-1m precision, 5mm, cold temperature-start in 2 minutes, warm temperature - start in 45 seconds, rerun 3 seconds, internal antenna.

The water sample was determined: the total content of salts, anions and cations contents, total hydrocarbons from oil. The soil samples were determined following physical properties, hydro and chemical properties: particle size fractions, bulk density, porosity, total standard penetration resistance, initial moisture of the soil saturated hydraulic conductivity, organic matter (humus) / total organic carbon, pH site, total nitrogen, phosphorus mobile, exchangeable cations, total exchange acidity, cation exchange capacity overall, the total content of salts, anions and cations contents, available potassium (mobile), total hydrocarbons from oil.

Results and discussions

Staging oil extraction produced a mixed pollution is generalized to the whole territory. Mostly it is salt water pollution, oil pollution is reduced over time due to degradation of natural and human factors from. Soil laden with crude oil does not go very low class and the soluble salts generally weak to moderate in surface and depth, reach and strong sometimes. The area polluted with oil and salt water has a ground that belong luvisol, type and subtype luvosol stalled, sometimes vertical. Stagnant water from the surface is loaded with soluble salts. Traces of water pollution and groundwater reach. Deep sea pollution creates difficult problems, pollutant removal is based on the size and speed the flow of water from precipitation, infiltration rate and the time allocated for this. There are imbalances reflected in the increasing ratio C/N. Lack of nitrogen increased in time when pollution today. Pollution upward, acting in close dependence on climatic conditions and human intervention, is determined, in particular, the degree of pollutant loading of stagnant water, the seasonal fluctuations in groundwater levels and the presence or absence Btwy horizon. Soil salinization, the majority in the territory, was the main and most severely limiting factor in lowering fertility by slowing or disappearance level of development of microorganisms. To apply the methodology of improvement to eliminate waste and oil soluble salts in the soil and water, it is necessary to apply before agropedology amelioration measures to eliminate chemical pollution, remediation measures to be applied physics. The soil is polluted weak, both oil and salt water or mixed, can be improved in a breeding cycle of two years, subject to improvement methodology and implementation of improvement measures.

Conclusions

After conducting soil studies that have evaluated ecopedological factors ground cover and pollutant loading degree of ownership of the body, the result that this territory from oil exploitation and transportation were two types of pollution: chemical pollution (with oil and salt water - mixed pollution) and physical pollution (through drilling activities, mining and transportation of crude oil). Studied plot is affected by natural pollution: soil compaction, excavation, reducing pasture area by filling surfaces produced by the network of roads approved or not, electric and telephone lines, pipelines and underground over the density and locations of wells, deposits materials, construction, etc. Lacking a clear delineation of some of the squares of the probe, partial or total destruction of the dam that separates the surrounding land which the presence of numerous roads, the presence of gravel derived from decommissioned roads. To improve the execution of the polluted soil are still required, the following steps: surveying the study showing that erosion affected areas (gully), longitudinal and transverse sections through the formation, geotechnical, hydrological and hydro geological conditions in which stratification resulting land, geotechnical characteristics, evaluation of surface water flow related to basin formation by erosion, ground water level. Next perform a feasibility study that will determine the design solution, the work necessary costs. By the end of the project can be an anarchic road stripping to a depth of 30 cm, a scraping, to a depth of 30 cm of areas with salinisation and petroleum residues: the probes II, III, IV, VI, VII, collection remnants of gravel, concrete, scaffolding, removing stripped or underground pipes are not used or degraded.

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MANAGEMENT PLAN OF THE GRUIA - GÂRLA MARE PROTECTED AREA

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Abstract: MANAGEMENT PLAN OF THE GRUIA-GÎRLA MARE PROTECTED AREA

Gruia - Gârla Mare protected area was declared trough the Government Decision 1284/2007, regarding the designation of the ornithological special protection areas, being part of the Natura2000 Network, with a surface covering 2756.2 hectares and overlapping on the administrative territory of 4 units: Gruia, Gârla Mare, Pristol, Vrata.

Localized on the Danube floodplain, this protected area is a real heaven for the breeding of some waterfowls, like *Podiceps cristatus, Chlidonias hysbridus*, but also for the migration period, when you can find an amazing number of species and individuals in such a small area. From the biogeographic regions, Gruia - Gârla Mare protected area is considered to be "continental".

Key words: Gruia - Gârla Mare, species, protected area.

General objectives of the Gruia - Gârla Mare Natural Protected Area Management plan

The scope of this Management Plan is to conserve, to maintain or to give back a favourable conservation condition to the birds' species and their natural habitats, like it is defined in every national and international act, concerning also the demands of the European Union.

The objectives of the Management Plans are:

1. To maintain properly the condition of the population of the protected species and their habitats, but also to conserve the specific floodplain landscapes;
2. To maintain and promote the cultural heritage and the traditional activities;
3. Building up through ecological education, information, awareness and consultation, of an adequate attitude based of the local communities, decision factors concerning the site values, but also to influence the perception and the behaviour of the visitors in the spirit of the protection the natural and cultural heritage;
4. To maintain and promote the economic activities, based on the sustainable development and to decline the ones that are susceptible for a negative impact on the environment;
5. To assure all the opportunities for the tourism and the recreation activities to develop having in consideration the protection and conservation issues;

6. To ensure a very good and properly administration of the protected area, having in consideration the financial, human being and logistic resources.

General information of the protected area

Gruia - Gârla Mare protected area was declared trough the Government Decision 1284/2007, regarding the designation of the ornithological special protection areas, being part of the Natura 2000 Network. As an ornithological special protection area, the main objective is the conservation, maintaining, and where it is needed, giving back a favourable condition to the birds 'species and their natural habitats, especially to the ones that are included on the 3th and 4th Annexes of 57/2007 Law.

Gruia-Gîrla Mare protected area is situated in Mehedinţi County, continental biogeographic region, on the administrative territory of the following localities: Gârla Mare (10%), Gruia (6%), Pristol (less than 1%), and Vrata (37%), having 2756, 2 hectares surface, with the following geocoordinates: 44°10'42"N and 22°48'22".

Gruia - Gârla Mare protected area is overlapping with Gârla Mare - Salcia wetland, declared by Mehedinţi County Council in 2000. It is very important for a lot of protected birds, under the Birds Directive, but also for species that are protected trough Bonn Convention, signed by Romania. Even if the protected area was declared for the protection of 16th birds' species of community interest, here can be find much more vulnerable and endangered species in the migration and breeding season.

But the protected area is not important only for birds' protection, but also because of the habitats of community interest that covers a very big surface and also for a representative population of *Marsilea quadrifolia* (four leaf clover). Other relevant species which deserve our attention are *Lutra lutra* (European otter), *Spermophillus citellus* (ground squirell), and big colonies of *Merops apiaster* (European bee-eater) and *Riparia riparia* (sand martin).

Also in the administrative territory of Gruia village we can find a beach forest, a very good habitat for raptors, which are protected by national and international laws.

The management of the ornithological special protected area needs adequate management plans, specific to the sites that are designated or integrated on other plans or legal, administrative or contractual measures, to avoid the species natural habitats degradation, but also to avoid the disconfort of the protected species.

The management of a protected area follows to maintain a harmony between man and nature, through the protection of the habitats and landscape diversity, promoting the traditional activities, encouraging them.

General aspects concerning flora and fauna

Even if Gruia - Gârla Mare protected area is declared for the birds' protection, we can observe also much more plant and animal species that are protected, on the national and European level or priority species.

Form the plants point of view, the floristic inventory counts 131 species, from 82 genera and 40 families (Matacă S. Ş., 2007). The protected species through different laws or convention are represented in the next table:

Tabel 1 Protected plant species in Gruia - Gârla Mare protected area

No.	Scientific name	Common name	IUCN	Habitats Directive	Law 57/2007	Berna Conv.
1.	*Marsilea quadrifolia*	Four leaf clover	EN	Annex II	Annexes 3 and 4A	Annex I
2.	*Salvinia natans*	Floating fern	-	-	-	Annex I
3.	*Trapa natans*	Water caltrop	-	-	-	Annex I
4.	*Nuphar luteum**	Yellow pond lily	-	-	-	-

*Nuphar luteum** - species of local interest, specific for 3160 habitat

The conservation condition of these plants is different and also the disturbing factors.

The habitats of the community interest, which have been identified in the Gruia - Gârla Mare protected area, are:

3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae *and/or of the* Isoëto-Nanojuncetea*;*

3150 Natural eutrophic lakes with Magnopotamion *or* Hydrocharition*-type vegetation;*

3160 Natural dystrophic lakes and ponds;

92A0 *Salix alba* and *Populus alba* galleries.

Fauna

The zoobenthos is represented of protozoa (amoeba), gastropods, lamellibranch, oligochete, briozoare, crustaceans, ephemeris, chironomide, culicide, fish and eel grig (characteristic benthic zone).

Consists of zooplankton population zooflagelate, rizopode, rotiferi, cladocere, copepode, ostracode, and hidrocarieni filopode. The plant stems underwater sponges is permanently fixed and insect larvae. On the water surface we can find bodies floating, like insects - *Hydrometa* and *Gerris*, and on the edge of pond, crayfish (*Astacus astacus, Astacus leptodactilus*).

The nekton is well represented, consisting of populations of *Cyprinus carpio* (carp), *Esox lucius* (pike), *Stizostedion lucioperca* (pike perch), *Abramis brama* (bream), *Rutilus rutilus* (roach), *Leuciscus idus* (widow), *Scardinius erythrophalmus* (rudd), *Tinca tinca* (linus) and *Perca fluviatilis* (perch).

Amphibians are represented by smooth *Triturus vulgaris* (newt), *Bombina bombina* (fire bellied toad), *Bufo viridis* (European green toad),

Hyla arborea (European tree frog), *Rana ridibunda* (marsh frog), *Rana esculenta* (edible frog), *Rana dalmatina* (agile frog) and the reptiles by snakes, *Natrix natrix, Natrix tessellata* (freshwater species), *Emys orbicularis* (water turtle), *Lacerta viridis* (green lizard), *Lacerta agilis* (field lizard) and *Testudo hermanni* (tortoises).

In the meadows we can observe birds that nest on the banks - *Merops apiaster* (European bee-eater), *Riparia riparia* (the sand martin), *Motacilla alba* (wagtail), *Ciconia ciconia* (white stork) - which seeks its food in this area.

Fauna of the coppices is represented by *Remiz pendulinus* (penduline tit), *Locustella fluviatilis* (river warbler), *Circaetus gallicus* (short-toed eagle), *Alcedo atthys* (kingisher). On the edge of the lake, foraging, we can find Charadrius spp (plovers), *Vanellus vanellus* (lapwing), Tringa spp (sandpipers), *Platalea leucordia* (spoonbill), *Ardea purpurea* (purple heron), *Ardeola ralloides* (squacco heron), *Nyctycorax nyctycorax* (night heron) *Galinula chloropus* (moorhen), *Rallus aquaticus* (water rail) etc.

Concerning the brooding birds, the most representative are the ones said to that site as protected area under Natura2000. In addition they can score high great *Podiceps cristatus* (crested grebe), *Aythya ferina* (common pochard), *Falco tinnunculus* (common krestel), *Cuculus canorus* (cuckoo), *Upupa epops* (hoopoe), Parus spp (tits), *Stretopelia turtur* (Turtle Dove), *S. decaocto* (Collared Dove), *Sturnus vulgaris* (Starling) etc.

Reeds are represented by songbirds, like nightingales and reed marsh and Acrocephalus spp (warblers), *Panurus biarmicus* (tit reed) etc. Above the sedges fly birds like *Chlidonias hybridus* (whiskered tern), *Larus cachinnans* (yellow-legged gull), and *Anas platyrhynchos* (mallard), *Anas querquedula* (garganey), *Anas clypeata* (shoveler), *Anas penelope* (Wigeon).

Mammals are represented by the *Nyctalus noctula*, Rhinolophus spp. Myotis spp (bats), *Lutra lutra* (European otter), *Capreolus capreolus* (deer), *Mustela putorius* (European polecat), *Talpa europaea* (European mole), *Spermophillus cittelus* (European ground squirrels), *Sus scrofa* (wild boar), *Sciurus vulgaris* (red squirrel), *Erinaceus concolor* (Southern White-breasted Hedgehog).

Table 2 Protected species by the European and national laws, observed in Gruia-Gârla Mare protected area

Major group	Species number	Species	Population condition		
			Favourable	Unfavourable	Unrated

			Range	individuals	Twilling range	Individuals twilling	
Amphibians	8	*Triturus vulgaris* (Ber, DH, OUG 57)					X
		Bombina bombina (Ber, DH, OUG 57)					X
		Bufo viridis (Ber, DH, OUG 57)					X
		Hyla arborea (Ber, DH, OUG 57)					X
		Pelophylax ridibunda (Ber)					X
		Pelophylax esculenta (Ber)					X
		Pelophylax dalmatina (Ber, DH, OUG 57)					X
		Pelobates fuscus (Ber, DH, OUG 57)					X
Reptiles	6	*Natrix natrix* (Ber)					X
		Natrix tessellata (Ber, DH, OUG 57)					X
		Lacerta viridis (Ber, DH, OUG 57)					X
		Podarcis taurica (Ber, DH, OUG 57)					X
		Emys orbicularis (Ber, DH, OUG 57)	X				
		Testudo hermanni (Ber, DH, OUG 57)					X
Birds	41	*Tachybaptus ruficollis* (OUG 57, DP)	X				
		Phalacrocorax pygmeus (Ber, Bonn, DP, OUG 57)	X	X			
		Pelecanus onocrotalus (Ber, DP, OUG 57)				X	
		Ixobrychus minutus pygmeus (Ber, Bonn, DP, OUG 57)				X	
		Botaurus stellaris (Ber, DP, OUG 57)	X	X			
		Nycticorax nycticorax (Ber, DP, OUG 57)	X	X			
		Ardeola ralloides (Ber, DP, OUG 57)	X	X			
		Egretta garzetta (Ber,	X	X			

		Was, DP, OUG 57)					
		Egretta alba (Ber, DP, OUG 57)			X		
		Ardeola ralloides (Ber, DP, OUG 57)	X	X			
		Ardea purpurea (Ber, Bonn, DP, OUG 57)		X			
		Ciconia ciconia (Ber, Bonn, DP, OUG 57)	X	X			
		Platalea leucorodia (Ber, Bonn, Was, DP, OUG 57)	X	X			
		Plegadis falcinellus (Ber, Bonn, DP, OUG 57)	X	X			
		Aythya nyroca (Bonn, DP, OUG 57)	X	X			
		Bucephala clangula (Ber, DP, OUG 57)					X
		Aquila heilaca (Ber, Was, DP, OUG 57)					X
		Circaetus gallicus (Ber, Was, DP, OUG 57)					X
		Circus aeruginosus (Ber, Was, DP, OUG 57)	X	X			
		Pandion haliaetus (Ber, Was, DP, OUG 57)					X
		Accipiter nisus (Was, Bonn)		X			
		Accipiter gentilis (Was, Bonn)		X			
		Falco cherrug (Ber, Bonn, Was, DP, OUG 57)				X	
		Falco tinnunculus (Ber, Bonn, Was, DP, OUG 57)				X	
		Himantopus himantopus (Ber, DP, OUG 57)	X			X	
		Tringa glareola (Ber, Bonn, Was, DP, OUG 57)					X
		Chlidonias hybridus (Ber, Was, DP, OUG 57)	X	X			
		Sterna hirundo (Ber, Bonn, DP, OUG 57)	X	X			
		Alcedo atthis (Ber, DP, OUG 57)	X	X			
		Dendrocopus minus (Ber)					X

		Lanius collurio (Ber, DP, OUG 57)					X
		Athene noctua (Ber, DP, OUG 57)					X
		Asio otus (Ber)					X
		Upupa epops (Ber, DP, OUG 57)	X	X			
		Merops apiaster (Ber, DP, OUG 57)	X	X			
		Motacilla alba (DP, OUG 57)	X	X			
		Monticola saxatilis (DP, OUG 57)	X	X			
		Charadrius dubius (Ber)					X
		Remiz pendulinus (DP, OUG 57)					X
		Oriolus oriolus (DP, OUG 57)					X
		Carduekis carduelis (DP, OUG 57)	X	X			
Mammals	>5	**Lutra lutra* (Ber, DH, OUG 57)					X
		Nyctalus noctula (Ber, DH, OUG 57)					X
		Spermophillus cittelus (Ber, DH, OUG 57)					X
		Rhinolophus spp. (Ber, DH, OUG 57)					X
		Myotis spp. (Ber, DH, OUG 57)					X

Abbreviations:
Ber - The Bern Convention on the Conservation of European Wildlife and Natural Habitats
Bonn - The Convention on the Conservation of Migratory Species of Wild Animals
Was - *Convention on International Trade in Endangered Species of Wild Fauna and Flora*
DH - Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
DP - Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds
OUG 57 - Government Emergency Edict 57/2007 regarding the protected areas, the conservation of the natural habitats and wild plants and animals species

From the abundance and dominance point of view, the protected species situation is as:

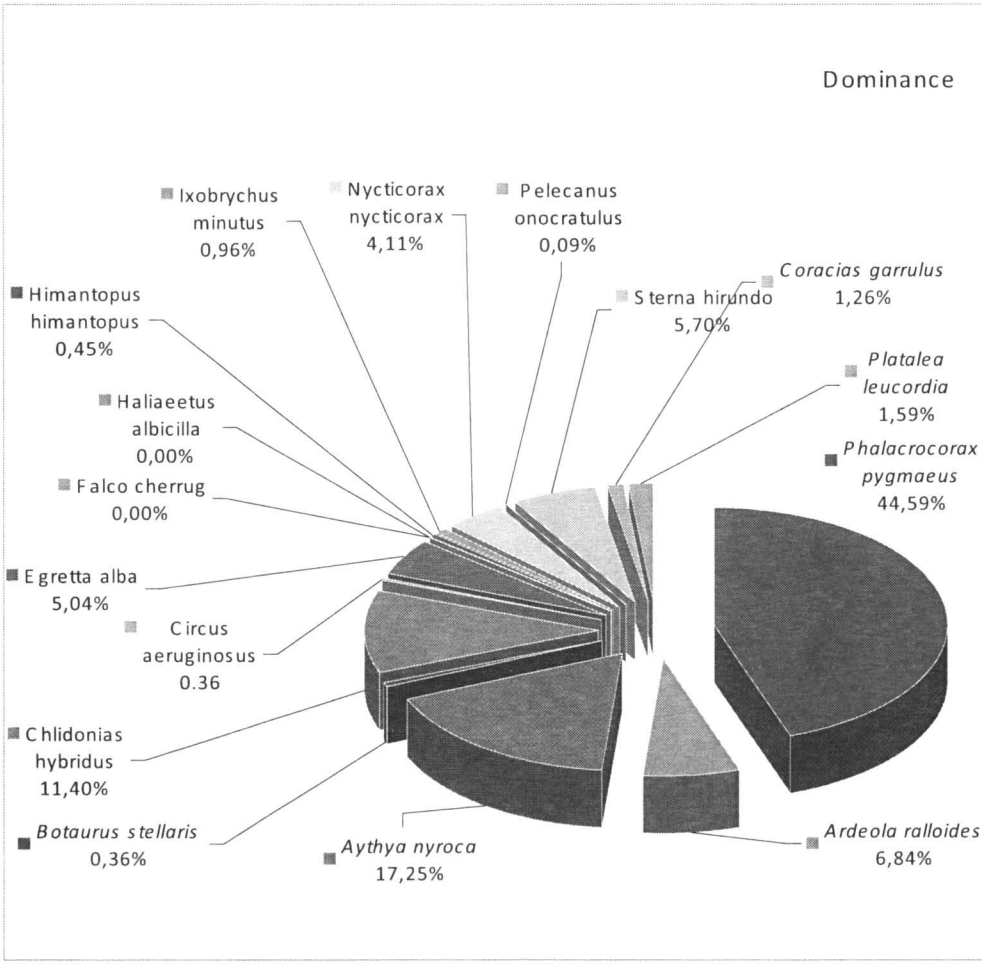

Fig. 1 The dominance of birds' species of community interest from Gruia-Gârla protected area

Objectives for each species and habitat

Monitoring the proposed actions trough Management Plan is a very important action and should be realised by all the stakeholders, directly involved and with responsibilities in the administration of the Gruia - Gârla Mare protected area, like: central public authority with responsibilities in environment protection, Romanian Academy, and the Custodian.

The scope of this monitoring is to identify if:

-actions taking place in time;

-proposed actions produce the desired results;

-proposed actions have to achieve the objectives that should contribute to the declared purpose of Natura 2000 and established by law.

It also aims to quantify the results from the proposed actions to create a database of them. Following analysis and evaluation database so constituted by all the factors mentioned above is to establish measures and actions to improve the activities and review of the Management Plan in order to achieve sustainable development of protected area Gruia - Gârla Great and the region as part of the Green Corridor.

Table 3 Objectives, conservation measures and the implementation period for each species

Species	**Objective**	**Specific conservation measures**	**Conservation condition wanted**	**Implementation period**
Ardeola ralloides	To maintain the breeding and nesting population to a favourable conservation status	1. Realising a sample monitoring and applying it 2. Awareness of the local communities concerning the species importance and the importance of the protected area 3.A periodical evaluation of the population density and abundance	A	2011-2016
Aythya nyroca	To maintain the breeding and nesting population to a favourable conservation status	1.Monitoring the breeding and the wintering populations 2. Researches concerning the ecology of the species 3. Developing a public awareness program, especially among hunters	A	2011-2016
Botaurus stellaris	To maintain the breeding and nesting population to a favourable conservation status	1. Limiting loss of reed areas. 2. Avoid drainage especially during nesting 3. Developing an awareness program so as to include issues such as not using pesticides, mechanized agriculture during nesting 4. Local community involvement in conservation of species preferred by efficient management of reeds 5. Prohibition of fishing during the nesting area	A	2011-2016
Chlidonias hybridus	To maintain the breeding and nesting population to a favourable conservation status	1. Monitoring the nesting population, but also the condition of the floating vegetation	A	2011-2016
Circus aeruginosus	To maintain the breeding and nesting population to a favourable conservation status	1. Limiting loss of reed areas. 2. Avoid drainage especially during nesting 3. Developing an awareness program in order to be included issues such as not using pesticides, mechanized agriculture during nesting 4. Local community involvement in conservation of species preferred by efficient	A	2011-2016

		management of reeds 5. Prohibition of fishing during the nesting area		
Egretta alba	Monitoring the egrets colonies	1. Maintain nesting willow trees to increase the possibility of reach. 2. Limiting loss reed surfaces 3. Avoid drainage especially during nesting 4. Developing an awareness of local communities, especially in regard to proper management of waste and ecoagriculturii practice	A	2011-2016
Falco cherrug	Planning a research program to highlight the inter-and intraspecific relations practice in Gârla Gruia-Mare natural protected area	1. Particularly protection of the gopher populations 2. Keeping poplars and willow trees on the banks of the Danube. 3. Monitoring and inventory corvide nests	A	2011-2016
Haliaeetus albicilla	Planning a research program to highlight the inter-and intraspecific relations practice in Gârla Gruia-Mare natural protected area	1. Monitoring of individuals which visit natural protected area in winter 2. Develop a public awareness program, both among local governments and the population on the status of prey species, their ecology and trophic regime	A	2011-2016
Himantopus himantopus	Develop and implement a monitoring program for species of waders	1. Avoid nesting habitat fragmentation and pollution damage it with chemicals and household waste 2. Develop a public awareness program and presentation of the European local communities in the management and natural resource management in Natura 2000 sites	A	2011-2016
Ixobrychus minutus	To maintain the breeding and nesting population to a favourable conservation status	1. Limiting loss of reed areas 2. Avoid drainage especially during nesting 3. Developing an awareness program in order to be included issues such as not using pesticides, mechanized agriculture during nesting 4. Local community involvement in conservation of species preferred by efficient management of reeds 5. Prohibition of fishing during the nesting area	A	2011-2016
Nyctycorax nyctycorax	Monitoring the herons colonies	1. Limiting loss of reed areas. 2. Avoid drainage especially during nesting 3. Developing an awareness program in order to be included issues such as not using pesticides, mechanized agriculture during nesting 4. Local community involvement in conservation of species	A	2011-2016

		preferred by efficient management of reeds 5. Prohibition of fishing during the nesting area		
Pelecanus onocrotalus	Monitoring the pelicans population	1. Public awareness especially among hunters on the importance of this species and the need to eliminate disturbance during the passage	A	2011-2016
Phalacrocorax pygmaeus	Maintain nesting population at favorable conservation status. Monitoring individuals wintering in protected natural area Gârla Gruia-Mare	1. Monitoring of breeding population, but also the existing population in the winter season. 2. Reserches on food distribution and ecology of the species 3. Develop and implement a local action plan, integrated into the national one for both species and for conservation of wetlands 4.Programe public awareness, both among local communities and among hunters and fishermen	A	2011-2016
Sterna hirundo	Maintain nesting population at favorable conservation status	1. Monitoring nesting population 2. Developing an awareness among local communities, highlighting the importance of the species	A	2011-2016
Coracias garrulus	Maintain nesting population at favorable conservation status	1. Develop a monitoring protocol and its implementation 2. Monitoring of nest sites 3. Developing an awareness program, to be achieved in subjects such as organic farming, the importance of species, maintenance of solitary trees	A	2011-2016
Platalea leucordia	Monitoring spoonbills colonies	1. Developing a monitoring program by hiring researchers and specialized institutes 2. Counting of nesting pairs 3. Developing an awareness of local communities	A	2011-2016

Table 4 Additional measures for the conservation of habitats and species directly dependent on water from the Gruia - Gârla Mare natural protected area (related to Annex 9.21 of the Jiu River Basin Management Plan)

Nr. crt.	Domain	Measure	Efficiency
1	**Conservation of the habitats dependent on water**	a) Develop and implement specific conservation standards b) renaturation works, wetland rehabilitation c) Promote, coordinate and support research to maintain a favorable conservation status of habitats; d) Monitoring of waste-generating activities especially in priority habitats areas	- Reducing the risk of diminishing habitat area protected - Ensuring the necessary conditions for the existence of habitats, particularly of the priority habitats - Better knowledge of the situation in the field both on the spatial distribution and quality - Reduction of eutrophication in

			water bodies - Protection of groundwater bodies
2	**Conservation of the water dependent species**	a) Qualitative and quantitative studies on biodiversity to prevent a sharp increase or decrease populations b) Developing Positive reference values for jeopardized / priority species c) Implementation of conservation measures necessary to maintain populations of species jeopardized/ priority to the favorable reference values d) Restoration of endangered species populations e) improvement / restoration of spawning f) Develop and implement specific conservation standards g) Restoration of riparian vegetation h) conduct regulation of human activities that could affect biodiversity, i) Promotion, coordinating and supporting research to maintain a favorable conservation status of habitats and local species	- Identification of priorities in terms of protected species - Reducing the risk of species decline - Identification of spawning and growth areas - Better knowledge of the situation of qualitative and quantitative water dependent protected species - Reducing the risk of reducing the biocoenosis oxygen need of water bodies
3	**Sustainable use of resources**	a) Periodic assessment of resources to monitor the effects of actions b) Develop procedures for sustainable use of resources c) Development of best practice measures for the recovery of resources and services and to eliminate conflicts due to the imposition of protective measures d) Support measures for development of traditional activities (crafts, fishing, traditional products, etc.) e) Support the development of organic farming f) regulation of fishing in waters protected natural area, including sport fishing	- Reduce the risk of diminishing resources - Coordination of the stakeholders - Reduce conflict situations between interested institutions - Qualitative and quantitative improvement of the situation of the water dependent species, that are economically important
4	**Management and administration**	a) The materialization of all the Gruia-Girla Mare protected area boundaries, Natura 2000 site b) Delimitation of priority habitats dependent on water c) Display of general rules in Gruia-Girla Mare natural protected area	- Increase education and public awareness and prevent degradation of natural ecosystems

The timetable for implementation of Management Plan

Table 5 Biodiversity

THEME	A. PROTECTION AND MANAGEMENT OF THE BIODIVERSITY AND LANDSCAPE												
Objective	Maintaining populations and habitats of Community interest, characteristic landscapes												
Management actions	Indicators of achievement	Priority	Activity at half										Implementation cooperators
			Year 1		Year 2		Year 3		Year 4		Year5		
			S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	
A1 Inventory of natural area within the range of biodiversity elements	Flora and fauna inventories	1											Scientific institutions
A2 Eliminating growth in captivity, killing, collection and marketing of the species of interest	Awareness campaign	1											Local mass-media NGO-s
A3 Limiting hunting and stop poaching at the species of interest	Partnerships with Districts Forestry and hunting and fishing associations	1											Districts Forestry and hunting and fishing associations
A4 Development and implementation of a monitoring plan bidoversităţii	Functional monitoring plan	1											Scientific institutions NGO-s
A5 Based on monitoring results, specific actions to protect species and habitats	Key species and habitats are protected by measures stipulated in the Management Plan	1											Environment Protection Agency Local communities Local public authorities
A6 Awareness of local government to include biodiversity conservation measures in development maps	Development maps based on the principle of conservation and protection of species, habitats and landscape	1											Local Coucils County Council
A7 Working with local authorities and environment authorities to create an efficient system of waste collection and disposal of domestic waste on the bank to stop water	"Cleaning" the area	1											Local Councils Environment Protection Agency of the Mehedinţi County National Environment Guard, Mehedinti

												County Commissioner
A8 Notification to public authorities on environmental damage by biotic and abiotic businesses and individuals	Competent public authorities notified											Environment Protection Agency of the Mehedinţi County National Environment Guard, Mehedinti County Commissioner

Tabel 6 History and culture

THEMA	B.PROTEJAREA ŞI PROMOVAREA PATRIMONIULUI CULTURAL ŞI ISTORIC PROTECTING AND PROMOTING CULTURAL AND HISTORICAL HERITAGE												
Objective	**Maintaining and promoting cultural values and common traditions and/or specific to each ethnic group**												
Management actions	Indicators of achievement	Priority	Activity at half										Implementation cooperators
			Year 1		Year 2		Year 3		Year 4		Year5		
			S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	
B Inventory of monuments of architecture, historical monuments and archaeological sites	Inventory of the historical objectives	2											Museums Research institutions NGO-s
B2 Making popular calendar	Popular calendar	2											Museums Research institutions NGO-s
B3 Reassessment of the visiting strategy area	Visiting strategy reassessed	2											NGO-s Museums
B4 Cultural objectives promotion	Specific articles and mass-media promotion	2											NGO-s Local councils Museums

Tabel 7 Tourism and recreation activities

THEME	C. THE MANAGEMENT OF THE TOURISM AND RECREATION ACTIVITIES												
Objective	**Providing opportunities for tourism and recreation take place in accordance with the imperatives of conservation of the heritage in the protected area**												
Management actions	Indicators of achievement	Priority	Activity at half										Implementation cooperators
			Year 1		Year 2		Year 3		Year 4		Year5		
			S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	
C1 Information and awareness of local communities in terms of eco-tourism	A campaign for information and awareness of the local communities for developing the eco-	1											NGO-s Public authorities

	tourism												
C2 Develop materials to promote eco-tourism	Promotion materials	2											NGO-s Museums
C3 Creating preconditions for scientific tourism organization	Researches, symposiums	2											Research institutes Universities Museums NGO-s

Table 8 Local communities. Socio-economic development

THEME	**D. COMMUNITIES AND LOCAL ECONOMY**												
Objective	**Maintenance and promotion of the sustainable use of resources and elimination of the ones that are likely negative impact on the environment, biodiversity and geodiversity**												
Management actions	Indicators of achievement	Priority	Activity at half										Implementation cooperators
			Year 1		Year 2		Year 3		Year 4		Year5		
			S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	
D1 Monitoring activities with environmental impact	Environmental impact studies	1											Environment Protection Agency of the Mehedin i County National Environment Guard, Mehedinti County Commissione r
D2 Monitoring the exploitation of the natural resources from the protected area	Reducing the resources exploitation	1											Environment Protection Agency of the Mehedin i County National Environment Guard, Mehedinti County Commissione r

Table 9 Education and public awareness

THEME	**E. EDUCATION AND PUBLIC AWARENESS**												
Objective	**Training trough the environmental education, information, awareness, consultation of a favourable attitude of the local communities and policy makers to the site values, influencing perception and behaviour of visitors in the spirit of the conservation of natural heritage imperatives and local and regional sustainable conservation**												
Management actions	Indicators of achievement	Priority	Activity at half										Implementation cooperators
			Year 1		Year 2		Year 3		Year 4		Year5		
			S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	
E1 Ecological education of local communities and the young generation by implementing an environmental education program in schools in the natural	Information campaigns	1											Schools NGO-s Mass-media

area												
E2 Developing activities on issues of environmental protection (waste management, biodiversity conservation)	Biodiversity conservation	1										Local councils Schools
E3 Awareness actions of the specific legislation	Information campaigns	1										Schools Local councils NGO-s
E4 Updating of the website of natural area	Website updated	1										NGO-s
E5 Organization of actions aimed at knowledge of flora and fauna diversity and species of community interest	Local communities informed	2										Schools Local councils NGO-s
E6 NGO involvement in actions to support the goals of natural area	Partnership	2										NGO-s

Table 10 Gruia - Gârla Mare protected area management

THEME	**F. Gruia-Girla Mare protected area management**											
Objective	**Management area by providing human, financial and logistical achievement and recognition for local, national and international protected**											
Management actions	Indicators of achievement	Priority	Activity at half									Implementation co-operators
			Year 1		Year 2		Year 3		Year 4		Year5	
			S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	
F1 Redistribution of responsibilities	Updated job descriptions	1										Custodian
F2 Establish training needs and participate in appropriate training programs	Courses to increase institutional capacity to manage the area	1										Custodian NGO-s
F3 Delivery of equipment and technology necessary for carrying out proper equipment	Necessary equipment for carrying out proper equipment	2										Custodian NGO-s
F4 Identifying and obtaining funding sources	Funding	1										Custodian NGO-s Public authorities
F5 Promoting permanent modern and efficient management	Increase of staff performance	1										Custodian
F6 Developing annual programs in accordance with the management plan	annual work plan	1										Custodian

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DEMOGRAPHIC CHARACTERISTICS OF THE MUNICIPALITY DROBETA TURNU SEVERIN

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Abstract: DEMOGRAPHIC CHARACTERISTICS OF THE MUNICIPALITY DROBETA – TURNU SEVERIN

In 1833 year, General Kisseleff requires "that Severin town must be a trade city by resettlement of the inhabitants of Cerneti in Severin field after their own wish". An important role in the development of the city of Severin had the ruler of Romanian country Alexandru Ghica who lived between the years of 1834-1840, being considered as "the second ruler of Severin" By that, from the order of the ministry of defence Mihail Ghica the engineer Xavier Vilacruz proposes that the centre of the town must be at the north of the medieval ruins of the city.

The first inhabitants of the city were the innkeepers who sell their products to the constructors, being followed by the fugitive peasants from the surroundings, those who are offering cheap labour.

Beginning with the year 1837, the measure of approval for buying the house places by the citizens or by the neighbourhood residents decision, which will have important consequences for the city development.

Key words: dynamics, natality, mortality, natural increasing, ethnics.

The numerical evolution of population

In the year 1841 the town counts approximately 200 inhabitants. The number of the inhabitants will be increased by the beginning of the year 1858 because of Austrian agency for ships from Schela Cladovei to Severin and founding the Ship Yard.

By that, because of the average of the foreign merchants (Italians, Serbians, Bulgarians), in 1859 Severin had a population of 2700 inhabitants. Once with the economical growth of the town the neighbourhood population will be attracted too.

In 1867 the city had 501 houses and the population was over 3000 inhabitants.

In 1887 the city had 14000 inhabitants and in the year of 1899 the population will be of 18600 inhabitants (Table 1, Fig. 1).

Table 1 Population of Drobeta Turnu-Severin

Year	1859	1867	1887	1899
Number inhabitants	2700	3000	14000	18600

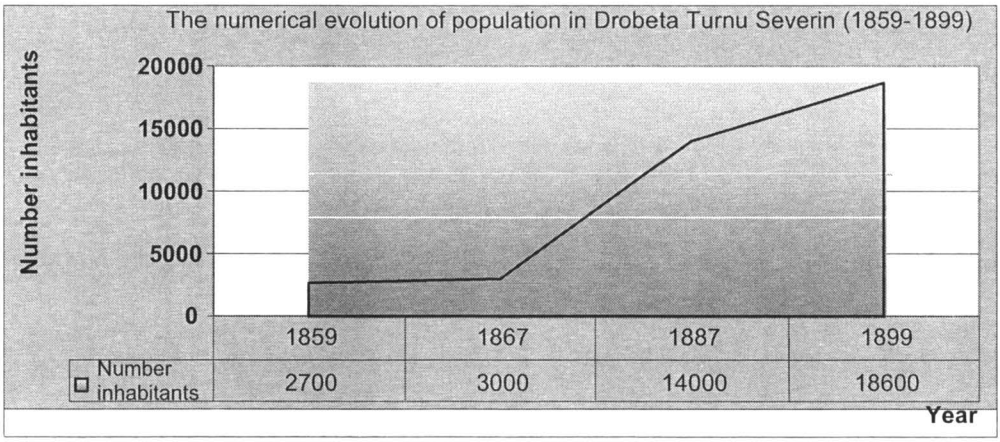

Fig. 1 The numerical evolution of population in Drobeta Turnu Severin (1859-1899)

In the 20th century Severin population has registered a continuous increasing. The first half of the 20th century is characterised by a gently increasing of the inhabitants number due to the two world wars. At the beginning of the 20th century the population of the city reached at 20000 inhabitants.

In 1928 has registered the first important increasing of population who owe of the economical crisis which persisted with the beginning of fourth decade (24171 inhabitants in 1930). Beginning with this year Severin has met an increasing economy, fact that influenced the continuing development of the inhabitants number, until the beginning of the second world war. Because of the applied policies in 1956, Severin had a population of 30070 inhabitants and in ten years this population increased reaching the number of 50806 inhabitants.

The population was continuing to increase until the year 1995 (118816 inhabitants by the first of July), than the population continuously decreased until the year of 2000 (115979 inhabitants at the first of July), Fig. 2. During the twentieth-first century the city population registered a maximum number of inhabitants at the first of July 2001of 116342 inhabitants and a minimum of 106451 inhabitants. At the first of July 2099 it is observed a slightly increase of the inhabitants number of the municipality.

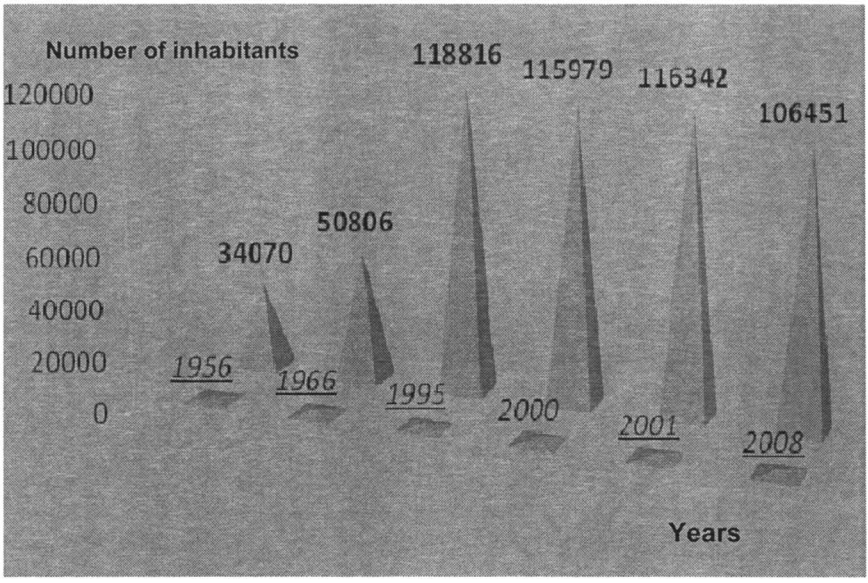

Fig. 2 The numerical evolution of population in Drobeta Turnu Severin (1990-2009)

The population density in urban

The demographical landscape characterises itself from a continuity of millennial existence given by the attraction of the Danube River of the shelter of his terraces, but also by the development of his economical structure. The urban population density has registered values over 900 inhabitants by square kilometre. Beginning with 1966 and has exceeded the number of 1500 inhabitants by square kilometre in 1980, because of the natural growth increasing of population and pro-natality policies practiced by the state. Because of the inhabitants migration from villages to city for finding a working place, the density of population in Drobeta Turnu Severin has reached to 1901 inhabitants by square kilometre in the year of 2002, but in the year of 2008 has reached the value of 1946 inhabitants by square kilometre (Table 2, Fig. 3).

Table 2 Population density in Drobeta Turnu Severin (1966-2008)

Year	1966	1980	2002	2008
Inhabitants/km^2	977	1599	1901	1946

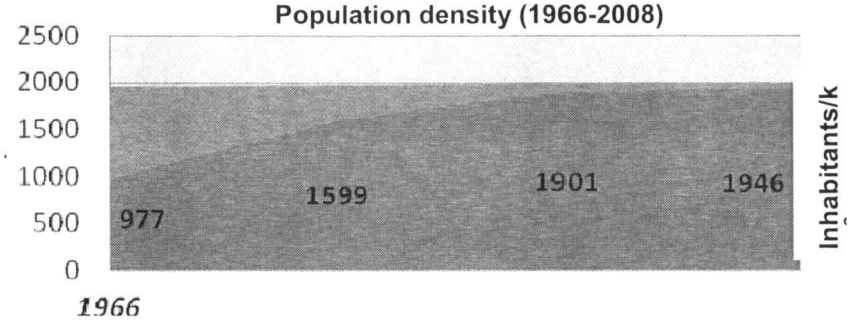

Fig. 3 Evolution of population density in Drobeta Turnu Severin (1966-2008)

The characteristics of population dynamics

The population dynamics is the one that defines by natality, mortality and natural growth, the demographical indicators influenced by the demographical policy, the social development and the economical tendencies and those one of the Danube trace.

Between the years 1990-2008 the indices of natality maintain on a descendant line, and those of the mortality on an increasing line.

At the beginning of 21 century, the number of the children born alive continued to decrease to the year 2002 at the value of 851, following by a growth reaching the number of 942 children born alive in year 2005.

In the next two years the natality was under 836 born alive in the year 2007. During the year 2008 the natality had a growth line. The natality registered a maximum value of born alive in the year of 1990 and a minimum value in the year of 2000 by only 836 born alive. By this period the natality was the lowest than mortality.

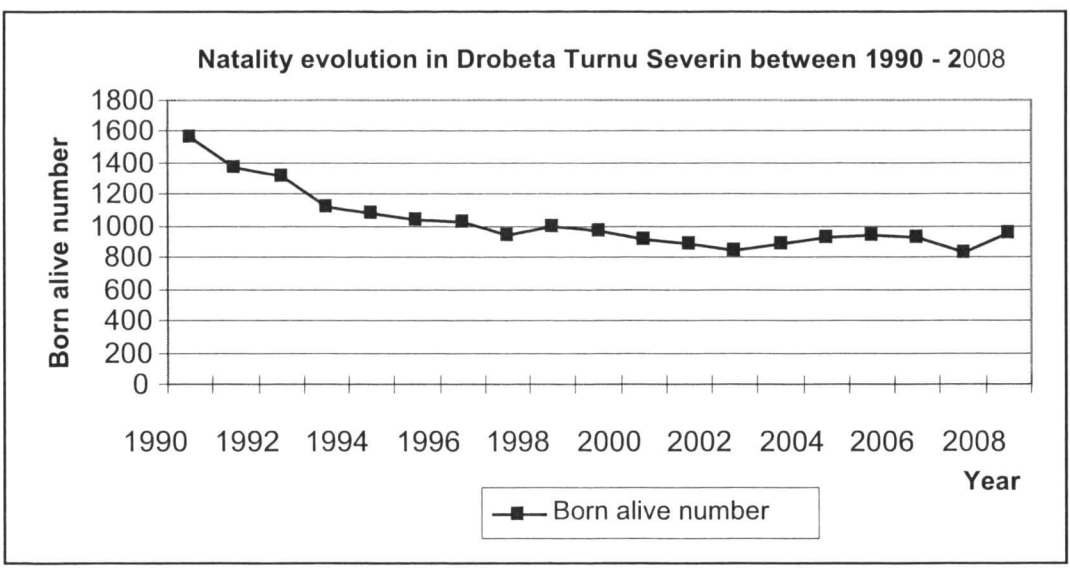

Fig. 4 Natality evolution in Drobeta Turnu Severin

The mortality registered a minimum number of 374 deceased characters beginning with the year 1990 after that it increased until year 1994, maintaining under the number of 800 annual deceased. At the end of the 20th century, the mortality was over the number of 800 annual deceased people with the exception of 1999 when this year registered a number of 786 deceased people.

At the beginning of 21 century, until 2002, the mortality is maintaining at the number of annual deceased. By the beginning of the year of the 2002 mortality maintains under the order of 800 annual deceases, excepting year 2000 when 823 deceases had been registered.

Beginning with 2003, the mortality maintains over the level of 800 dead people with a maximum of 893 deceased in 2007. In 2008 the mortality had a descendant tendency. The minimum of mortality was of 374 deceased in the year of 1990 and a maximum of 893 deceased, in the 2007 when this was more than natality (Fig. 5).

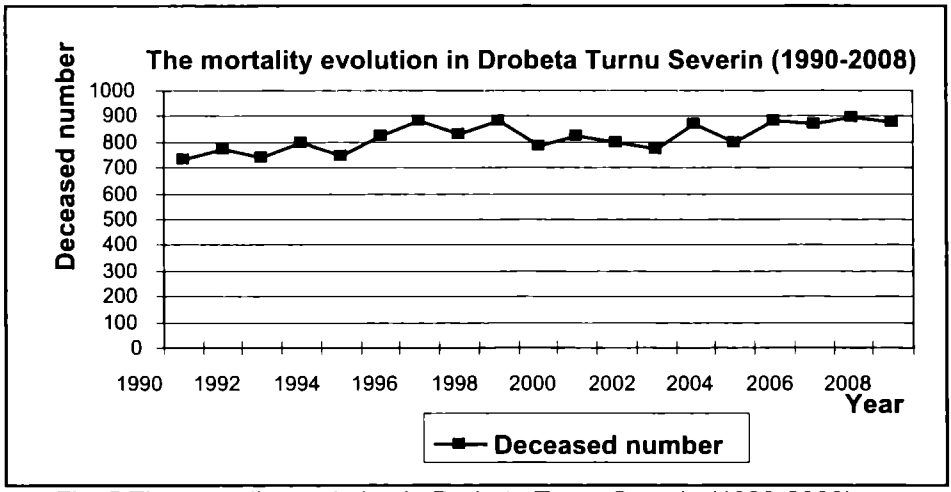

Fig. 5 The mortality evolution in Drobeta Turnu Severin (1990-2008)

Natural growth. In the year of 1990 has registered a natural growth of 837 characters, decreasing by the level of 103 people in 1997.

In the next two years this increased to 189 characters (1999).

By the beginning of the 21 century the natural growth was permanently decreasing in Drobeta Turnu Severin to 24 people in year 2003. In the year of 2004 it is registered a natural growth of 128 people being the highest value registered in the first decade of this century. In the beginning of 2005 the natural growth was lower until year 2007 when the negative value is registered of - 57 people. During the year 2008 the natural growth had the descendant tendencies, registering the value of 81 people. The maximum value of the natural growth during studied period was that of 837 characters by the time of 1990 and the minimum value was of - 57 people, by the time of the year 2007 (Table 3, Fig. 6)

Table 3 The total population and the dynamics characteristics of the municipality population from Drobeta Turnu Severin at 1 July (1990-2009)

Year	The population at 1 July	Born alive	Deceased number	Natural growth
1990	107460	1571	734	837
1991	108416	1377	773	604
1992	116713	1313	738	575
1993	118086	1122	796	326
1994	118383	1082	747	335
1995	118816	1034	823	211
1996	118114	1026	883	143
1997	117882	937	834	103
1998	117865	995	886	109
1999	117340	975	786	189
2000	115979	919	823	96
2001	116342	893	799	94
2002	109935	851	774	77
2003	109941	891	867	24
2004	109450	929	801	128
2005	109444	942	881	61
2006	109134	922	868	54
2007	107882	836	893	-57
2008	106451	957	876	81
2009	107248			

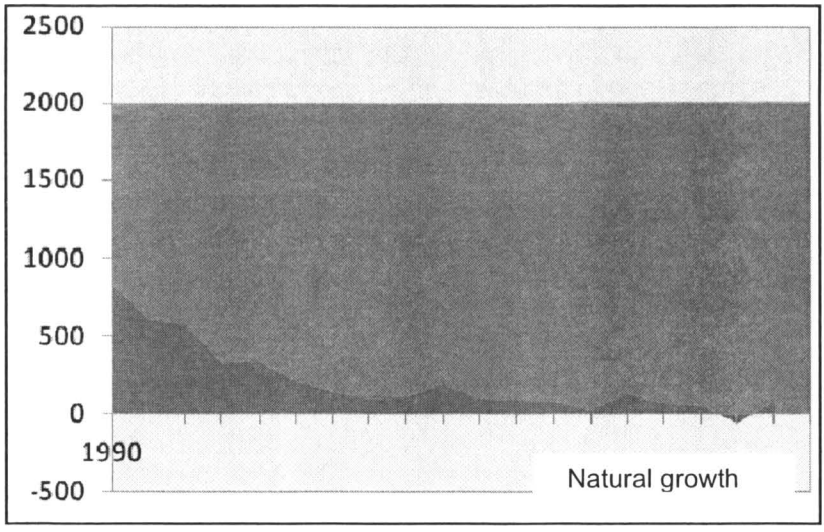

Fig. 6 The natural growth evolution in Drobeta Turnu Severin (1990-2008)

Population structure

The demographical structure of the economical development of the municipality is also influenced by the Danube River. The ethnicity of the city population of Drobeta Turnu Severin highlights the following evolution:

The Romanians. Drobeta Turnu Severin had at the beginning a majority foreign population.

Though the German population was majority and the Romanian had an insignificant predilection, almost all the inhabitants being employed by the shipyard agency.

Beginning with the twentieth it is remarked that in the twentieth century it is remarked that is a continuous growth of the Romanians population because of the people migration from country side to cities for covering the necessary admitted enforcement of the city.

So by the time of 1930 the Severin had 21482 Romanian people from the whole population of 24171 inhabitants of the city. By the recession from 2002 from the total population of 104557 of inhabitants the ethnics structure was: Romanians: 103600; Rroms 586; Hungarians: 102; Germans: 75; Serbians: 51; Turkish: 39; Greeks: 15; Czechs: 14; Jewish: 3; (in May of 2009 it remained only one) The Hungarians were representing by the time of 1869 an amount of 3.5% from the total population a share in continuously decreasing, at this moment being only 0,098 %

German population. In 1865, Severin was city who was much more than a German city. By the time their number diminished and by 1932 there were only 400 Germans and Austrians.

The Serbians came in Severin after 1865. In 1932 a number of 256 from the heads of the families who lived in the city were declaring Serbians.

The Jewish gathered in Severin from other main cities of the balkanic cities and from other occidental cities. In 1899 there were 815 and in 1929 their number was 531.

The Greeks were from Epir and Macedonia, in 1865 there were in Severin 20 Greeks and in 1932 were 52 head families of Greek origin.

Table 4 Population structure in Drobeta Turnu Severin in 2002

ethnic	total	Romanians	Serbians	Czechs	Rroms	Hungarians	Germans	Turkis
people		103600	51	14	586	102	75	39
%		99,2	0,04	0,01	0,56	0,1	0,07	0,04
ethnic		Greeks	others					
people		15						
%		0,01	0,01					
	104482							

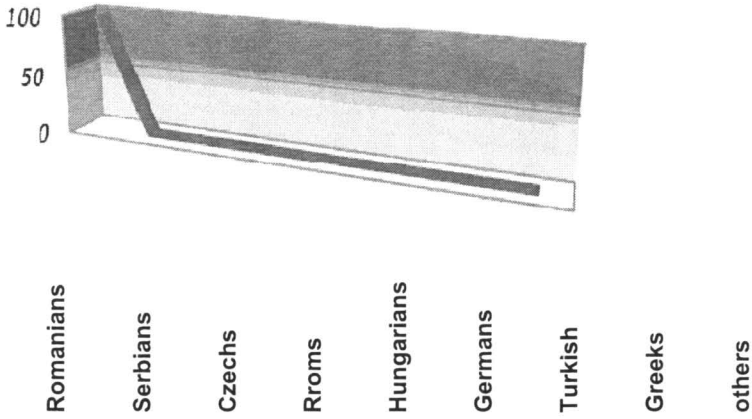

Fig. 7 Ethnical structures in Drobeta Turnu Severin in 2002

In 2002 the confessional structure it is presenting like this: Orthodox: 108939; Romano Catholics: 445; Baptist: 244; Pentecostal: 178; Greeks Catholics: 77; Reformats: 52.

During the world period Severin had four cemeteries, The Orthodox one, the Heroes one, and mosaic one.

The analyse of population structure by types of age, it gives the specifically value of the active number of inhabitants and an order of human potential, for perspective, also by it's impact in real life. Between the years 1966 – 2002, there was a slowly process, but constantly an ageing process of the population, especially because of the low natality.

At the date of first January 2009, the municipality population registers an ageing phenomenon (chart 5), the greatest density of the people being around the groups of age, situated between 20 and 39 years old (37091 persons) 40 and 60 years old (34844 persons), at this group of age between 0 and 19 years old being registered only 21299 persons (Table 5, Fig. 8).

Table 5 The municipality population on Drobeta Turnu Severin, structured by groups of age and gender

	TOTAL		
	Both gender	Masculine	Feminine
Drobeta Turnu Severin	106507	51345	55162
0 - 4 years	4536	2368	2168
5 - 9 years	4276	2151	2125
10-14 years	4789	2466	2323
15-19 years	7698	3897	3801

20-24 years	8785	4444	4341
25-29 years	9153	4501	4652
30-34 years	9757	4731	5026
35-39 years	9396	4393	5003
40-44 years	9677	4519	5158
45-49 years	8551	4035	4516
50-54 years	9390	4543	4847
55-59 years	7226	3540	3686
60-64 years	4407	2132	2275
65-69 years	2816	1288	1528
70-74 years	2697	1123	1574
75-79 years	1737	659	1078
80-84 years	1124	396	728
85 years and on	492	159	333

The structure of population ordered by gender it is characterised by a continuing fluctuation of male/female share due to social economical phenomenon, political and historical.

Between the years 1930-2002 the male population has registered the average value of 50.1%. An important phenomenon which contributed at this number was the working male request by naval sector.

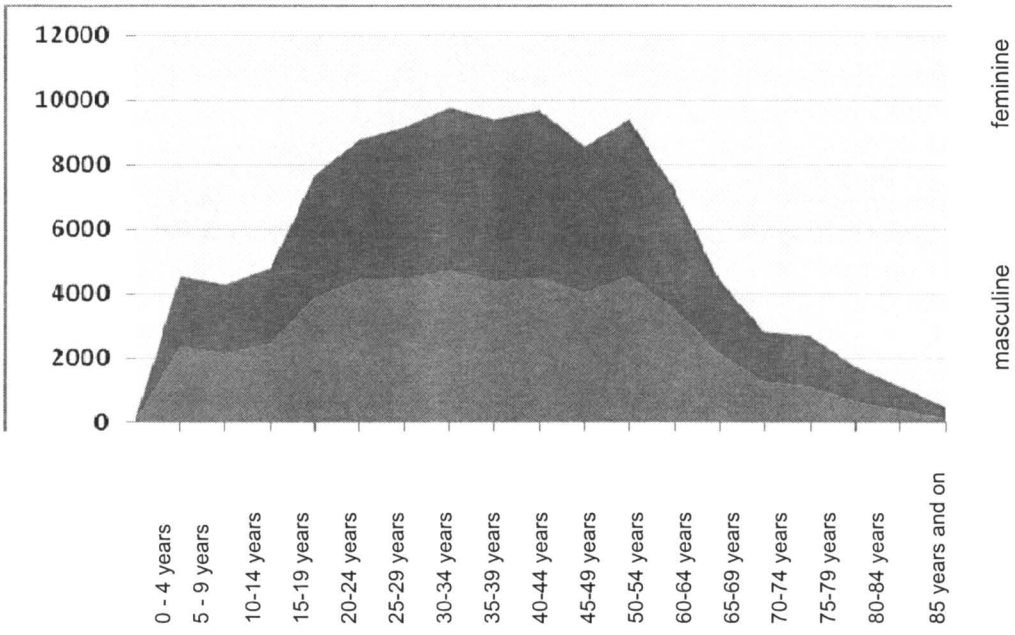

Fig. 8 The population on Dr. Tr. Severin, structured by groups of age and gender

During the years 1930-1956, the male population was very low, because of the two world wars, the average being of 48.5 %. Because of founding of some economical aims in 1966 had happened a pro-male

dynamics, the index being of 51.4 %. After that in the year of 2000 the two gender proportion was brought to an equal level. Beginning with 2002 it is remark a female domination of population due also to the economical structure developments of the cities, but also because national and international migration of male characters for finding new place to work. Because of that, at the first January 2009 for the total inhabitants 106507, we observe that we have 51345 male characters and 55162 female gender persons.

The occupied population structure at the time of the 2002 year the population structure was presenting like that: (Table 6, Fig. 9)

Table 6 The structure of occupied population census and of the housing of 2002

Total active population	44326
Occupied population	37893
Unemployed searching for the first place of work	2162
Unemployed searching for another place of work	4271
Inactive population	60231
Pensioners	16502
Pupils, students	22984
Housewives	9906
Dependents	10839
Total population	104557

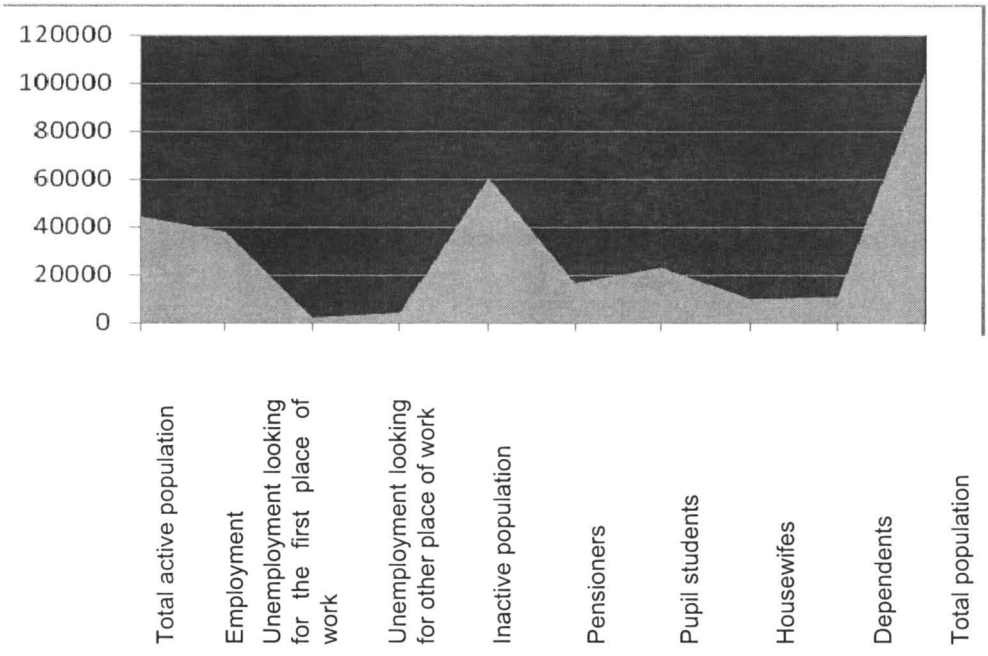

Fig. 9 Population structure of Drobeta Turnu Severin 2002

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