

## PART I – VEGETAL BIOLOGY

## NEW CONTRIBUTIONS TO THE STUDY OF THE MACROMYCETES FROM THE BASIN OF THE PRALEA BROOK (BACĂU COUNTY)

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## ABSTRACT

The mycological research was conducted during 2011 – 2012 in 3 forests situated in the basin of Pralea brook. A total of 122 macromycete taxa representing 2 genera, classes and 2 phyla (Ascomycota and Basidiomycota) were identified. The macromycetes species belong to 9 biological forms and to 7 ecological categories. The present communication reports that thirty-five macrofungi species were new to the mycobiota of the area. Three species have been identified as being threatened, in the forests of Pralea brook basin: *Strobilomyces strobilaceus* (Scop.) Berk., *Mutinus caninus* (Huds.) Fr. and *Xylaria carpophila* (Pers.) Fr.

**Key words:** fungi, mushrooms, macromycetes, museum, Pralea brook basin, Căiuți, Bacău, România.

## Introduction

The Pralea brook is an important tributary to Trotuș river, with 22 km length and is situated on the territory of the Căiuți commune, Bacău County (fig. 1, 2). The hydrographical basin occupies a 65 km<sup>2</sup> surface and it stretches between 46°11" N and 26°86" E. From a geological point of view, the whole basin of Pralea brook is included in the Subcarpathian piedmont developed East to Oușorul summit which is the northernmost sector of Vrancea Subcarpathians.

The first research on the diversity of macromycetes in the area was published by the author in a previous paper (4).

## Material and method

The mycological research was conducted during 2011 – 2012 in 3 forests situated in the basin of Pralea brook: Coconăș forest, Beleleu forest and Pralea Ursoaia Mare forest.

The collection of the macromycete species was conducted in summer to autumn, six plots were

selected for this research, two plots each for the three forests.

The mycological material was collected in two vegetal associations: *Pulmonario rubrae - Fagetum* (Soó 1964) Täuber 1987 and *Hieracio transsilvanico – Fagetum* (Vida 1963) Täuber 1987.

The collected mushrooms specimens were identified using the mycological literature and database (2, 3, 5, 6, 8).

Taxa and their authors were given according to an amended Index Fungorum database (Kirk and collab.) (7).

The classification of the macromycetes regarding the bioform (life form), their use and importance for people was made after G. Sălăgeanu (5) and E. Boa (1).

The collected species were dried and conserved. The mycological material can be found in the Herbarium of the “Ion Borcea” Natural Science Museum Complex of Bacău.

Species recorded for the first time from area are indicated by an asterisk (\*).

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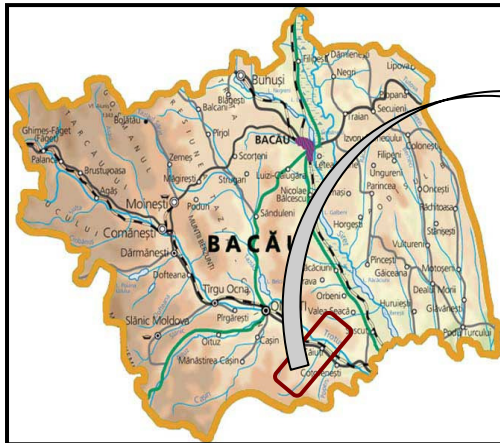


Fig. 1 – Map of Bacău County

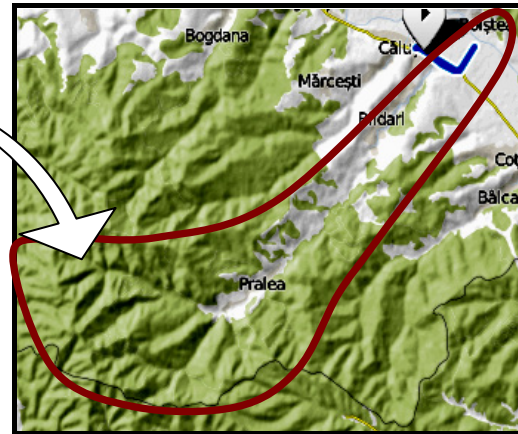


Fig. 2 –The map of Pralea brook basin

### Results and discussions

The list of mycobiota includes 122 species of macrofungi belonging to: 1 kingdom (Fungi), 2 phylums (Ascomycota – 8 species and Basidiomycota – 114 species), 5 classes, 13 orders, 30 families, 63 genera (tab. 1).

The genus with the highest number of species was *Russula* with 30 species.

The macromycete species belong to 9 biological forms and 7 ecological categories (tab. 1). The bioform spectrum is dominated by mycetogeophyta mycorrhiza (Gm) with 46 species (tab. 1). The ecological spectrum is generally dominated by the saprotrophic fungi (56 species) followed by ectomycorrhizal fungi (46), saproparasitic on wood (17) and parasitic fungi (3) (tab.1, fig. 3).

In the forest Pralea Ursoaia Mare we found most macromycete species (87) followed by forest

Beleleu (72) and the fewest species were found in the forest Coconaș (47) (tab.1).

From the point of view of economic importance the most numerous are the inedible species – 53, followed by the edible species – 45, medicinal mushrooms species – 30, food species – 12 and poisonous species – 10 (tab.1, fig. 4).

Among food species the most frequently noted were *Russula delica* Fr., 1838, *Russula cyanoxantha* (Schaeff.) Fr 1863, *Agaricus silvicola* (Vittad.) Peck 1872, *Boletus erythropus* Pers. 1796, *Amanita rubescens* Pers. 1797.

The present communication reports that thirty-five macrofungi species were new to the mycobiota of the area. Three species have been identified as being the threatened, in the forests of Pralea brook basin: *Strobilomyces strobilaceus* (Scop.) Berk., *Mutinus caninus* (Huds.) Fr. and *Xylaria carpophila* (Pers.) Fr.

Table 1 - Macromycete species collected in the Pralea brook basin (2011-2012)

No.	Sistematic positions and species name	Biological forms	Ecological category	Economic importance of fungi	PB	PC	PUM
	<b>Kingdom FUNGI</b>						
	<b>Phylum Ascomycota</b>						
	<b>Class Leotiomycetes</b>						
	<b>Order Helotiales</b>						
	<b>Family Helotiaceae</b>						
1.	<i>Hymenoscyphus fructigenus</i> (Bull.) Gray 1821	Gs	Sf	inedible	+		
	<b>Incertae sedis</b>						
2.	* <i>Bisporella citrina</i> (Batsch) Korf & S.E. Carp. 1974	Gs	Sl	inedible	+		+
	<b>Class Pezizomycetes</b>						
	<b>Order Pezizales</b>						
	<b>Family Pezizaceae</b>						
3.	* <i>Peziza badia</i> Pers. 1800	Gs	St	edible			+

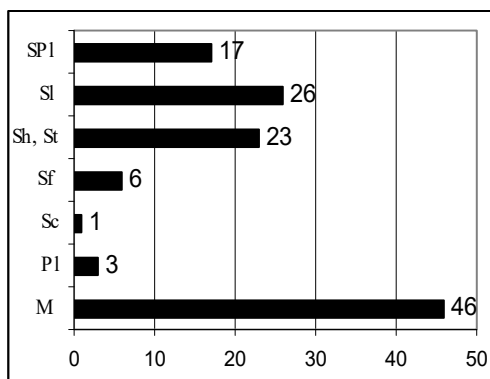
	<b>Family Pyrenomataceae</b>						
4.	* <i>Cheilymenia granulata</i> (Bull.) J. Moravec 1990	Gs	Sc	inedible			+
5.	<i>Humaria hemisphaerica</i> (F.H. Wigg.) Fuckel 1870	Gs	St	inedible			+
6.	<i>Scutellinia scutellata</i> (L.) Lambotte 1887	EPx	Sl	inedible		+	
	<b>Class Sordariomycetes</b>						
	<b>Order Xylariales</b>						
	<b>Family Xylariaceae</b>						
7.	* <i>Xylaria carpophila</i> (Pers.) Fr. 1849	Gs	Sf	inedible			+
8.	<i>Xylaria polymorpha</i> (Pers.) Grev. 1824	EPx	Sl	medicinal	+	+	+
	<b>Phylum Basidiomycota</b>						
	<b>Class Agaricomycetes</b>						
	<b>Order Agaricales</b>						
	<b>Family Agaricaceae</b>						
1.	<i>Agaricus silvicola</i> (Vittad.) Peck 1872	Gs	St	food			+
2.	<i>Chlorophyllum rhacodes</i> (Vittad.) Vellinga 2002	Gs	St	food			+
3.	<i>Cyathus striatus</i> (Huds.) Willd 1787	EPx-Gs	Sl	inedible, (m)	+	+	+
4.	<i>Echinoderma asperum</i> (Pers.) Bon 1991	Gs	St	poisonous	+		+
5.	<i>Lycoperdon excipuliforme</i> (Scop.) Pers. (1801)	Gs	St	edible, (m)	+	+	+
6.	<i>Lycoperdon perlatum</i> Pers. 1796	Gs	St	edible, (m)	+	+	+
7.	<i>Lycoperdon pyriforme</i> Schaeff. 1774	EPx	Sl	edible, (m)	+	+	+
8.	* <i>Lycoperdon utriforme</i> Bull. 1791	Gs	St	inedible			+
9.	<i>Macrolepiota procera</i> (Scop.) Singer 1948	Gs	St	food			+
	<b>Family Amanitaceae</b>						
10.	<i>Amanita muscaria</i> (L.) Lam. 1783	Gm	M	poisonous, (m)			+
11.	<i>Amanita phalloides</i> (Vaill. ex Fr.) Link 1833	Gm	M	poisonous D	+		+
12.	<i>Amanita rubescens</i> Pers. 1797	Gm	M	food			+
	<b>Family Inocybaceae</b>						
13.	<i>Crepidotus variabilis</i> (Pers.) P. Kumm. 1871	EPx	Sl	inedible			+
	<b>Family Marasmiaceae</b>						
14.	<i>Marasmius rotula</i> (Scop.) Fr. 1838	EPx-Gs	St	inedible	+	+	+
15.	<i>Megacollybia platyphylla</i> (Pers.) Kotl. & Pouzar 1972	EPx	Sl	edible	+	+	
	<b>Family Mycenaceae</b>						
16.	* <i>Mycena acicula</i> (Schaeff.) P. Kumm. 1871	EPx	Sl	inedible		+	
17.	<i>Mycena galericulata</i> (Scop.) Gray 1821	Ex-EPx	SPl	edible	+	+	+
18.	<i>Mycena polygramma</i> (Bull.) Gray 1821	Gs-EPx	St	inedible			+
19.	<i>Mycena pura</i> (Pers.) P. Kumm. 1871	Gs	St	poisonous	+	+	+
20.	<i>Mycena rosea</i> Gramberg 1912	Gs	St	poisonous	+	+	+
21.	<i>Panellus stipticus</i> (Bull.) P. Karst. 1879	EPx-Ex	SPl	inedible, (m)		+	+
	<b>Family Omphalotaceae</b>						
22.	<i>Gymnopus dryophilus</i> (Bull.) Murrill (1916)	Gs	Sf	edible	+	+	+
23.	<i>Gymnopus peronatus</i> (Bolton) Antonín, Halling & Noordel. 1997	Gs	Sf	inedible	+	+	+
24.	<i>Mycetinis alliaceus</i> (Jacq.) Earle ex A.W. Wilson & Desjardin 2005	Gs	Sf	edible	+		+
25.	* <i>Marasmiellus candidus</i> (Fr.) Singer 1946	EPx	Sl	inedible	+		
	<b>Family Physalacriaceae</b>						
26.	<i>Armillaria mellea</i> (Vahl) P. Kumm. 1871	Ex-EPx	SPl	food, (m)			+
27.	* <i>Armillaria ostoyae</i> (Romagn.) Herink 1973	Ex-EPx	SPl	food			+
28.	<i>Hymenopellis radicata</i> (Relhan) R.H. Petersen 2010	EPx	Sl	edible, (m)	+		
	<b>Family Pluteaceae</b>						
29.	<i>Pluteus cervinus</i> (Schaeff.) P. Kumm. 1871	EPx	Sl	edible	+		+
	<b>Family Pleurotaceae</b>						
30.	<i>Pleurotus ostreatus</i> (Jacq.) P. Kumm. 1871	Ex-EPx	SPl	food, (m)	+		
	<b>Family Psathyrellaceae</b>						
31.	<i>Coprinus lagopus</i> (Fr.) Fr. 1838	Th	St	inedible	+		+

32.	<i>Coprinopsis atramentaria</i> (Bull.) Redhead, Vilgalys & Moncalvo 2001	Th	Sh	edible, (m)		+	+
33.	<i>Coprinellus disseminatus</i> (Pers.) J.E. Lange 1938	Th	Sh	edible	+	+	+
34.	<i>Coprinellus micaceus</i> (Bull.) Vilgalys, Hopple & Jacq. Johnson 2001	Th	Sh	edible	+	+	+
35	* <i>Psathyrella candolleana</i> (Fr.) Maire 1913	Gs	St	edible			+
36	* <i>Psathyrella corrugis</i> (Pers.) Konrad & Maubl. 1948	Gs	St	inedible		+	
37	* <i>Psathyrella spadiceogrisea</i> (Schaeff.) Maire 1937	Ex-EPx	SP1	inedible			+
	<b>Family Schizophyllaceae</b>						
38.	<i>Schizophyllum commune</i> Fr. 1815	Ex-EPx	SP1	inedible, (m)	+		+
	<b>Family Strophariaceae</b>						
39	* <i>Hebeloma radicosum</i> (Bull.) Ricken 1911	Gm	M	inedible	+		
40	<i>Hypholoma fasciculare</i> (Huds.) P. Kumm. 1871	EPx	SI	poisonous	+	+	+
41.	<i>Hypholoma capnoides</i> (Fr.) P. Kumm. 1871	EPx	SI	edible	+	+	+
42.	<i>Hypholoma lateritium</i> (Schaeff.) P. Kumm. 1871	EPx	SI	poisonous		+	+
43.	* <i>Pholiota adiposa</i> (Batsch) P. Kumm. 1871	EPx	SI	edible	+	+	+
44	* <i>Pholiota aurivella</i> (Batsch) P. Kumm. 1871	Ex-EPx	SP1	edible	+	+	+
45	* <i>Pholiota squarrosa</i> (Vahl) P. Kumm. 1871	Ex	PI	inedible	+	+	+
46	<i>Pholiota gummosa</i> (Lasch) Singer 1951	Ex-EPx	SP1	edible			+
	<b>Family Tricholomataceae</b>						
47	<i>Clitocybe gibba</i> (Pers.) P. Kumm. 1871	Gs	Sf	edible			+
48	<i>Lepista flaccida</i> (Sowerby) Pat. 1887	Gs	St	edible	+	+	+
49	<i>Resupinatus applicatus</i> (Batsch) Gray 1821	EPx	SI	inedible			+
50	<i>Tricholoma terreum</i> (Schaeff.) P. Kumm. 1871	Gm	M	food	+	+	+
	<b>Incertae sedis</b>						
51	<i>Panaeolus papilionaceus</i> (Bull.) Quél. 1872	Th	St	poisonous			+
	<b>Order Boletales</b>						
	<b>Family Hygrophoropsidaceae</b>						
52	* <i>Hygrophoropsis aurantiaca</i> (Wulfen) Maire 1921	EPx	SI	edible			+
	<b>Family Boletaceae</b>						
53	<i>Boletus erythropus</i> Pers. 1796	Gm	M	food	+		+
54	<i>Strobilomyces strobilaceus</i> (Scop.) Berk. 1851	Gm	M	edible	+		
55	<i>Xerocomellus chrysenteron</i> (Bull.) Šutara 2008	Gm	M	edible	+	+	+
	<b>Order Cantharellales</b>						
	<b>Family Clavulinaceae</b>						
56	<i>Clavulina cinerea</i> (Bull.) J. Schröt. 1888	Gs	St	edible	+		+
	<b>Order Hymenochaetales</b>						
	<b>Family Hymenochaetaceae</b>						
57	* <i>Mensularia radiata</i> (Sowerby) Lázaro Ibiza 1916	Ex-EPx	SP1	inedible			+
58	* <i>Pseudoinonotus dryadeus</i> (Pers.) T. Wagner & M. Fisch 1908	Ex	PI	inedible			+
59	<i>Phellinus hartigii</i> (Allesch. & Schnabl) Pat. 1903	Ex-EPx	SP1	medicinal		+	
60	* <i>Phellinus igniarius</i> (L.) Quél. 1886	Ex	PI	inedible, (m)	+	+	+
	<b>Order Phallales</b>						
	<b>Family Phallaceae</b>						
61	<i>Mutinus caninus</i> (Huds.) Fr. 1849	Gs	St	inedible			+
	<b>Order Polyporales</b>						
	<b>Family Ganodermataceae</b>						
62	<i>Ganoderma applanatum</i> (Pers.) Pat. 1887	Ex-EPx	SP1	inedible, (m)	+	+	+
63	<i>Ganoderma lucidum</i> (Curtis) P. Karst. 1881	Ex-EPx	SP1	inedible, (m)			+
	<b>Family Fomitopsidaceae</b>						
64	<i>Fomitopsis pinicola</i> (Sw.) P. Karst. 1881	Ex-EPx	SP1	inedible, (m)	+	+	+
65	* <i>Pycnoporellus fulgens</i> (Fr.) Donk 1971	EPx	SI	inedible		+	+
	<b>Family Meruliaceae</b>						

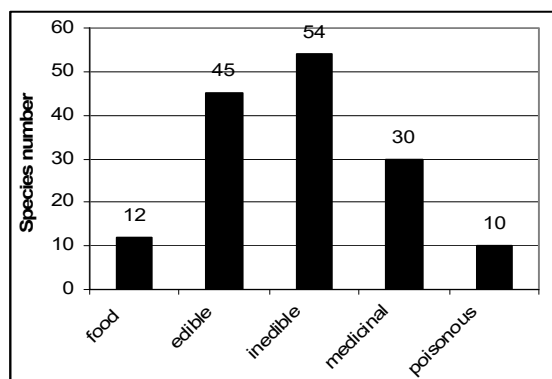
66	<i>Bjerkandera adusta</i> (Willd.) P. Karst. 1879	EPx	SI	inedible (m)		+	
	<b>Family Polyporaceae</b>						
67	<i>Fomes fomentarius</i> (L.) J. Kickx f. 1867	Ex-EPx	SPI	inedible, (m)	+	+	+
68	* <i>Lenzites betulina</i> (L.) Fr. 1838	EPx	SI	inedible, m	+		
69	<i>Trametes gibbosa</i> (Pers.) Fr. 1838	EPx	SI	inedible, (m)	+	+	+
70	<i>Trametes hirsuta</i> (Wulfen) Lloyd 1924	EPx	SI	inedible, (m)	+	+	+
71	<i>Trametes versicolor</i> (L.) Lloyd 1921	EPx	SI	inedible, (m)	+	+	+
72	<i>Trichaptum abietinum</i> (Dicks.) Ryvarden 1972	EPx	SI	inedible, (m)	+		
	<b>Order Trechisporales</b>						
	<b>Family Hydnodontaceae</b>						
73	* <i>Trechispora mollusca</i> (Pers.) Liberta 1974	EPx	SI	inedible		+	
	<b>Order Russulales</b>						
	<b>Family Bondarzewiaceae</b>						
74	<i>Heterobasidion annosum</i> (Fr.) Bref 1888	Ex-EPx	SPI	inedible, (m)	+		
	<b>Family Russulaceae</b>						
75	<i>Lactarius blennius</i> (Fr.) Fr. 1838	Gm	M	poisonous	+		
76	<i>Lactarius circellatus</i> Fr. 1838	Gm	M	inedible	+		
77	* <i>Lactarius glyciosmus</i> (Fr.) Fr. 1838	Gm	M	edible	+		+
78	* <i>Lactarius lignyotus</i> Fr. 1857	Gm	M	edible	+		
79	* <i>Lactarius pergamenus</i> (Sw.) Fr. 1838	Gm	M	inedible		+	+
80	<i>Lactarius subdulcis</i> (Pers.) Gray 1821	Gm	M	edible			+
81	<i>Russula aeruginea</i> Lindbl. ex Fr. 1863	Gm	M	edible			+
82	<i>Russula alutacea</i> (Fr.) Fr. 1838	Gm	M	edible			+
83	* <i>Russula caerulea</i> Fr. 1838	Gm	M	edible	+		
84	<i>Russula cyanoxantha</i> (Schaeff.) Fr 1863	Gm	M	food		+	+
85	<i>Russula delica</i> Fr. 1838	Gm	M	food, (m)			+
86	<i>Russula fellea</i> (Fr.) Fr. 1838	Gm	M	inedible	+		+
87	<i>Russula foetens</i> Pers. 1796	Gm	M	inedible			+
88	<i>Russula grata</i> Britzelm. 1898	Gm	M	inedible		+	
89	<i>Russula grisea</i> Fr. 1838	Gm	M	edible	+		
90	<i>Russula heterophylla</i> (Fr.) Fr. 1838	Gm	M	food	+		
91	<i>Russula integra</i> (L.) Fr. 1838	Gm	M	edible			+
92	<i>Russula ochroleuca</i> Fr. 1838	Gm	M	edible			+
93	<i>Russula olivacea</i> (Schaeff.) Fr. 1838	Gm	M	edible			+
94	<i>Russula lutea</i> (Vent.) Sacc. 1887	Gm	M	edible			+
95	* <i>Russula maculata</i> Quél. 1877	Gm	M	inedible	+		
96	* <i>Russula mustelina</i> Fr. 1838	Gm	M	edible	+		+
97	<i>Russula nauseosa</i> (Pers.) Fr. 1838	Gm	M	inedible	+		
98	<i>Russula nigricans</i> (Bull.) Fr. 1838	Gm	M	inedible	+		
99	<i>Russula nobilis</i> Velen. 1920	Gm	M	poisonous	+		+
100	<i>Russula pectinatoides</i> Peck 1907	Gm	M	inedible	+		
101	<i>Russula puellaris</i> Fr. 1838	Gm	M	edible	+		
102	<i>Russula risigallina</i> (Batsch) Sacc. 1915	Gm	M	edible	+		+
103	<i>Russula versicolor</i> Jul. Schäff. 1931	Gm	M	inedible	+	+	
104	<i>Russula vesca</i> Fr. 1836	Gm	M	edible			+
105	<i>Russula vinosa</i> Lindblad 1901	Gm	M	edible	+		
106	* <i>Russula violacea</i> Quél.	Gm	M	edible	+		
107	* <i>Russula viscida</i> Kudřna 1928	Gm	M	edible	+		+
108	<i>Russula virescens</i> (Schaeff.) Fr. 1836	Gm	M	food, (m)	+	+	+
109	<i>Russula violeipes</i> Quél. 1898	Gm	M	edible	+		
110	<i>Russula xerampelina</i> (Schaeff.) Fr. 1838	Gm	M	edible, (m)	+		+
	<b>Family Stereaceae</b>						
111	<i>Stereum hirsutum</i> (Willd.) Pers. 1800	Ex-EPx	SPI	inedible, (m)	+	+	+
	<b>Order Thelephorales</b>						

	<b>Family Thelephoraceae</b>						
112	* <i>Thelephora caryophyllea</i> (Schaeff.) Pers. 1801	Gm	M	inedible		+	
113	* <i>Thelephora terrestris</i> Ehrh. 1787	Gm	M	inedible		+	
	<b>Class Dacrymycetes</b>						
	<b>Order Dacrymycetales</b>						
	<b>Family Dacrymycetaceae</b>						
114	<i>Calocera viscosa</i> (Pers.) Fr. 1821	EPx	Sl	inedible, (m)	+		
<b>Total numbers of species - 122</b>					<b>72</b>	<b>47</b>	<b>87</b>

<b>Legend:</b>			
<b>Biological forms</b>	<b>Species number</b>	<b>Ecological category</b>	<b>Species number</b>
EPx - mycetoepixilophyta	24	M - ectomycorrhizal fungi	46
Ex - mycetoedoxilophyta	3	Pl - parasitic fungi on wood	3
EPx - Ex - mycetoepixilophyta - mycetoedoxilophyta	1	Sc - coprophilous fungi	1
EPx-Gs - mycetoepixilophyta - mycetogeophyta saprophytica	2	Sf - saprotrophic fungi on litter	6
	16	Sh, St - saprotrophic fungi on soil or humus	23
Ex-EPx - mycetoedoxilophyta - mycetoepixilophyta			
Gm - mycetogeophyta mycorrhiza	46	Sl - saprotrophic fungi on dead wood	26
Gs - mycetogeophyta saprophytica	24	SPl - saproparasitic fungi on wood	17
Gs -EPx - mycetogeophyta saprophytica - mycetoepixilophyta	1		
Th - mycetootherophyta	5		
<b>Categories of economic importance of fungi</b>			
<b>Food</b> - eatable, very good or good	12	<b>Medicinal (m)</b> - used as medicine or with medicinal properties	30
<b>Edible</b> - eatable, a low food value	45	<b>Poisonous D</b> - lethally poisonous	1
<b>Inedible</b> - do not eat	53	<b>Poisonous</b> - do not eat; mushrooms which cause intoxications	9
<b>Places: Beleu forest (PB), Coconaş forest (PC), Pralea-Ursoaia Mare forest (PUM)</b>			
<b>Date of observations:</b> 22-23.06.2011, 21.07.2011, 19.08.2011, 7.10.2011, 12.07.2012, 12.09.2012, 27.09.2012.			
* - Species recorded for the first time from area.			



**Fig. 3 - The spectrum of ecological categories**



**Fig. 4 - The spectrum of economic importance categories**

### Conclusions

The mycological research was conducted in the superior basin of the Pralea brook during June 2011 – October 2012.

The paper includes the systematical conspect of macromycetes and it represents the second contribution to the knowledge of macromycetes diversity in this region.

The species of macrofungi identified belong to: 1 kingdom (Fungi), 2 phylums (Ascomycota – 8 species and Basidiomycota – 114 species), 5 classes, 13 orders, 30 families, 63 genera.

The present communication reports that thirty-five macrofungi species were new to the mycobiota of the area.

### Rezumat

Studiul cuprinde rezultatele cercetărilor micologice desfășurate în bazinul superior al pârâului Pralea, în perioada iunie 2010 - octombrie 2012, în păduri de fag și de amestec. Conspectul sistematic al macromicetelor include 122 de specii, speciile identificate aparțin la: 2 încregături (Ascomycota – 8 specii, Basidiomycota - 114 specii), 5 clase, 13 ordine, 30 familii și 63 genuri. Macromicetele aparțin la 9 forme biologice și 7 categorii ecologice. Din punct de vedere al importanței economice, cele mai numeroase macromicete identificate au fost speciile necomestibile – 53, urmate de comestibile – 45 specii, medicinale – 30, comestibile (foarte bune și bune) -12 specii și 10 specii otrăvitoare.

Un număr de 35 de taxoni sunt menționați pentru prima dată din zona studiată.

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