



## PROTECTED SPECIES OF MACROFUNGI IN MONTENEGRO

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### SYNOPSIS

We give a list of protected species of macrofungi on the territory of Montenegro with the national legislation. This list is based on published scientific papers. The authors' unpublished data were used as well. Complying with recent efforts to catalogize the mycological records and in accordance with the knowledge on rare and threatened species in Europe, it becomes possible to select some species important for protection and conservation in Montenegro. For this purpose the list of protected species of macrofungi in Montenegro has been elaborated. The list is an open working document aimed at offering a definite estimation. A total of 111 species of macrofungi in Montenegro are selected. 98 species belong to the division of *Basidiomycotina* and 13 species to the division of *Ascomycotina*. This is the first list of fully protected macrofungi in Montenegro.

### INTRODUCTION

The institutions of Montenegro started dealing with the issue of fungi protection only by the end of 20<sup>th</sup> century. The plant species including the macrofungi are protected by the present laws: The Law on Environment (1996), The Law on Nature Protection (1977/1989), The Law on Forests (1955/2000).

However, this is the first list of fully protected macrofungi in Montenegro ("Official Gazette of RM", No. 76/06). By now only plants and animals were totally protected in Montenegro (314 animal and 57 plant species have been protected by a special Decision on Protection of Rare, Endemic and Endangered Animal and Plant Species, 1982), because the macrofungi have been studied for a relatively short time period and knowledge about their distribution has been scarce. The list of

mushroom species that could be used for commercial purpose is declaimed by The Law on Forests.

In the last 15 years the study of macrofungi in Montenegro has become more intensive and systematic. The number of identified species in 1997 was 569 (Perić & Perić, 1997). Since this year 351 species (Kasom 2003, 2004; Perić & Perić, 1998, 1999, 2002-2006 and Perić et al. 2000) could be added to this list. In combination with the existing literature data a total of 920 fungi species have been recorded in Montenegro up to now (Tab. 1). A main part of them are rare in other countries as well as in Montenegro. Complying with recent efforts to catalogize the mycological records and in combination with the knowledge on rare and threatened species in Europe, it is possible to make a list of species for protection. The list is an open working document aimed at offering a definite estimation.

**Table 1: Survey of species (division *Ascomycotina* and *Basidiomycotina*) according to taxonomical categories in Montenegro**

Division	Some explored orders	No of species
<i>Ascomycotina</i>		152
<i>Basidiomycotina</i>		768
	<i>Agaricales</i>	368
	<i>Polyporales</i>	221
	<i>Boletales</i>	69
	<i>Russulales</i>	91
<b>Total</b>		<b>920</b>

## MATERIAL AND METHODS

The basic criteria for the categorization of important species as a part of biodiversity are derived from international obligations of the State of Montenegro on one side and national obligations on the other side. International obligations relate to activities to protect and conserve species of global importance. The national obligations are needs of the state to protect biodiversity, the national natural heritage including populations in typical habitats. We used all the published scientific papers concerning Montenegro for preparing the list. The authors' unpublished data were used as well.

The List of protected species of macrofungi in Montenegro has been elaborated according to the following criteria:

- Presence of the species on the European Red List (Ing, 1993), groups A, B, C and D (Ing, 1993), and which are - in addition - rare or endangered in Montenegro;
- Species which are included in ECCF Project “Mapping and Monitoring of Threatened Fungi in Europe”, 50 threatened fungal species (Otto, 2002), including all 33 species candidates for listing in Appendix I of the Bern Convention (Dahlberg & Croneborg, 2003), and which - in addition - are rare or endangered in Montenegro;
- Species which are very rare or rare in Montenegro;
- Species which are very rare or rare in Montenegro, and endangered because of excessive exploitation;
- Species with a locus classicus in Montenegro;
- Species confined to rare or endangered habitats and substrates.

The species categorization according to the IUCN categories could not have been entirely applied for the time being as the region is insufficiently investigated. In our country we can use the same categorization as in the Republic of Macedonia because the situation concerning the knowledge on distribution and ecology of macrofungi is similar (Karadelev, 2000).

The categorization of endangered species is as follows:

- Very rare or rare species in Montenegro - EKSP;
- Species confined to endangered or rare habitats - RV;
- Very rare or rare species in Montenegro endangered because of excessive exploitation - RS.

## RESULTS

A total of 111 protected species of macrofungi in Montenegro are on the List (Tab. 2). The number of species belonging to subsection *Basidiomycotina* is 98 and 13 species are from subsection *Ascomycotina*.

**Table 2: The List of macrofungi species (division *Basidiomycotina* and *Ascomycotina*) protected in Montenegro.**

Species	MNE	ERL	ECCF
<i>Albatrellus ovinus</i> (Schaeff.) Murrill	EKSP	D	
<i>Albatrellus pes-caprae</i> (Pers.) Pouzar	EKSP	D	
<i>Aleurodiscus disciformis</i> (Vill.) Pat.	EKSP	B	
<i>Amanita aspera</i> (Fr.) Gray	EKSP	C	

<i>Amanita caesarea</i> (Scop.) Pers.	RS	D	+
<i>Amanita solitaria</i> (Bull.) Mérat	EKSP		
<i>Amanita vittadinii</i> (Moretti) Vittad.	EKSP		
<i>Boletus aereus</i> Bull.	RS	C	
<i>Boletus appendiculatus</i> Schaeff.	RS	C	
<i>Boletus fechtneri</i> Velen.	RS	B	
<i>Boletus impolitus</i> Fr.	RS	B	
<i>Boletus queletii</i> Schulzer	RS	B	
<i>Boletus radicans</i> Pers.	RS	C	
<i>Boletus regius</i> Krombh.	RS	A	
<i>Boletus rhodoxanthus</i> (Krombh.) Kallenb.	RS	A	
<i>Boletus satanas</i> Lenz	RS	A	
<i>Boletus torosus</i> Fr.	RS	D	
<i>Bovista paludosa</i> Lév.	EKSP	B	BERN
<i>Caloscypha fulgens</i> (Pers.) Boud.	EKSP	C	
<i>Cantharellus cinereus</i> (Pers.) Fr.	RS	C	
<i>Cantharellus friesii</i> Quéł.	RS		
<i>Catathelasma imperiale</i> (Fr.) Singer	EKSP	B	
<i>Clavariadelphus truncates</i> (Quéł.) Donk	EKSP	D	
<i>Coltricia cinnamomea</i> (Jacq.) Murrill.	EKSP	C	
<i>Cortinarius bulliardii</i> (Pers.) Fr.	EKSP	B	
<i>Cortinarius orellanus</i> Fr.	EKSP	C	
<i>Cortinarius praestans</i> (Cordier) Sacc.	EKSP	C	
<i>Cortinarius violaceus</i> (L.) Fr.	EKSP	B	
<i>Cudonia circinans</i> (Pers.) Fr.	EKSP	C	
<i>Ganoderma resinaceum</i> Boud. in Pat.	EKSP	C	
<i>Geastrum fimbriatum</i> Fr.	EKSP		
<i>Geastrum coronatum</i> Pers.	EKSP	C	
<i>Geastrum fornicatum</i> (Huds. ex Pers.) Hook.	EKSP	A	
<i>Geastrum quadrifidum</i> Pers. ex Pers.	EKSP	C	
<i>Geastrum minimum</i> Schwein.	EKSP	C	
<i>Geastrum pectinatum</i> Pers.	EKSP	C	
<i>Geastrum schmidelii</i> Vitt.	EKSP	B	
<i>Geastrum striatum</i> DC.	EKSP	C	

<i>Geoglossum umbratile</i> Sacc.	EKSP	C	
<i>Gomphidius maculatus</i> (Scop.) Fr.	EKSP	C	
<i>Gomphus clavatus</i> (Pers.) Gray	EKSP	A	BERN
<i>Gyroporus cyanescens</i> (Bull. ex Fr.) Quéf.	EKSP		
<i>Gyrodon lividus</i> (Bull.) Fr.	RV		
<i>Gyromitra gigas</i> (Krombh.) Cooke	RS	C	
<i>Gyromitra mcknightii</i> Harmaja	EKSP		
<i>Helvella atra</i> Holmsk.	EKSP		+
<i>Hericium clathroides</i> (Pall.) Pers.	EKSP	C	
<i>Hydnellum aurantiacum</i> (Batsch.) P. Karst.	EKSP	B	
<i>Hydnellum caeruleum</i> (Hornem.) P. Karst.	EKSP	B	
<i>Hydnellum conrescens</i> (Pers.) Banker	EKSP	C	
<i>Hydnellum ferrugineum</i> (Pers.) P. Karst.	EKSP	A	
<i>Hydnellum peckii</i> Banker	EKSP	B	
<i>Hydnellum suaveolens</i> (Scop.) P. Karst.	EKSP		+
<i>Hygrocybe citrinovirens</i> (J. E. Lange) Jul. Schäff.	EKSP		
<i>Hygrocybe intermedia</i> (Pass.) Fayod	EKSP	C	
<i>Hygrocybe obrussea</i> (Fr.) Wünsche	EKSP	C	
<i>Hygrocybe ovina</i> (Bull.) Kühner	EKSP	B	
<i>Hygrocybe punicea</i> (Fr.) P. Kumm.	EKSP	C	
<i>Hygrocybe spadicea</i> (Scop.) P. Karst.	EKSP	A	
<i>Hygrocybe subglobispora</i> (P. D. Orton) M. M. Moser	EKSP	C	
<i>Hygrophorus gliocyclus</i> Fr.	EKSP	C	
<i>Hygrophorus hypothejus</i> (Fr.) Fr.	EKSP	C	
<i>Hygrophorus marzuolus</i> (Fr.) Bres.	EKSP	D	+
<i>Hygrophorus nemoreus</i> (Pers.) Fr.	EKSP	C	
<i>Hygrophorus poetarum</i> R. Heim	EKSP	D	
<i>Hygrophorus russula</i> (Schaeff.) Quéf.	EKSP	B	
<i>Hymenochaete cruenta</i> (Pers.) Fr.	EKSP		+
<i>Lactarius acris</i> (Bolton) Fr.	EKSP	C	
<i>Lactarius controversus</i> (Pers.) Fr.	EKSP	C	
<i>Lactarius mairei</i> Malençon	EKSP	B	
<i>Lactarius musteus</i> Fr.	EKSP	B	
<i>Lentinus adhaerens</i> (Alb. et Schwein.) Fr.	EKSP	C	

<i>Lepiota grangei</i> (Eyre) J. E. Lange	EKSP	C	
<i>Limacella glioderma</i> (Fr.) Maire	EKSP	C	
<i>Limacella guttata</i> (Pers.) Konrad & Maubl.	EKSP	C	
<i>Lycoperdon mammiforme</i> Pers.	RS	C	
<i>Mitrophora semilibera</i> (DC.) Lév.	EKSP		
<i>Morchella rotunda</i> (Pers.) Boud.	RS		
<i>Mutinus caninus</i> (Huds.) Fr.	EKSP	C	
<i>Omphalotus olearius</i> (DC.) Singer	EKSP	C	
<i>Onnia tomentosa</i> (Fr.) P. Karst.	EKSP	B	
<i>Onygena equina</i> (Willd.) Pers.	EKSP	C	
<i>Otidea concinna</i> (Pers.) Sacc.	EKSP	C	
<i>Phellodon niger</i> (Fr.) P. Karst.	EKSP	B	
<i>Phellodon tomentosum</i> (L.) Banker	EKSP	B	
<i>Phylloporus rhodoxanthus</i> (Schwein.) Bres.	EKSP		+
<i>Pisolithus arhizus</i> (Scop.) Rauschert	EKSP	C	+
<i>Polyporus umbellatus</i> (Pers.) Fr.	EKSP	B	
<i>Porphyrellus porphyrosporus</i> (Fr.) J.-E. Gilbert	EKSP	C	
<i>Porphyrellus pseudoscaber</i> (Secr.) Singer	EKSP	C	
<i>Ramaria botrytis</i> (Fr.) Ricken	EKSP	C	
<i>Ramaria formosa</i> (Pers.) Quél.	EKSP	C	
<i>Sarcodon imbricatus</i> (L.) P. Karst.	EKSP	C	
<i>Sarcodon joeides</i> (Pass.) Bat.	EKSP	D	
<i>Sarcodon leucopus</i> (Pers.) Maas Geest. & Nannf.	EKSP	C	
<i>Sarcodon scabrosus</i> (Fr.) P. Karst.	EKSP	B	
<i>Sarcosphaera coronaria</i> (Jacq.) J. Schröt.	EKSP		BERN
<i>Sparassis laminosa</i> Fr.	EKSP	C	
<i>Strobilomyces strobilaceus</i> (Scop.) Berk.	EKSP	C	+
<i>Suillus luteus</i> (L.) Gray	RS		
<i>Suillus sibiricus</i> Singer subsp. <i>helveticus</i> Singer	EKSP		BERN
<i>Trametes suaveolens</i> (L.) Fr.	EKSP	C	
<i>Trichoglossum hirsutum</i> (Pers.) Boud.	EKSP	C	
<i>Tricholoma acerbum</i> (Bull.) Quél.	EKSP	B	
<i>Tricholoma aurantium</i> (Schaeff.) Ricken	EKSP	B	
<i>Tricholoma sejunctum</i> (Sowerby) Quél.	EKSP	C	

<i>Tricholoma squarrulosum</i> Bres.	EKSP	B	
<i>Tulostoma brumale</i> Pers.	EKSP	C	
<i>Tulostoma fimbriatum</i> Fr.	EKSP	C	
<i>Verpa conica</i> (O. F. Müll.) Sw.	RS	C	
<i>Volvariella bombycina</i> (Schaeff.) Singer	EKSP	C	

MNE (Montenegro): **EKSP**: very rare or rare species in Montenegro; **RV**: species confined to endangered or rare habitats in Montenegro; **RS**: very rare or rare species in Montenegro endangered because of excessive exploitation;

**ERL** - species from European Red List (Ing, 1993) groups A, B, C, D;

**ECCF**: (+) = species from ECCF Project "Mapping and monitoring of threaten fungi in Europe" (Otto, 2002);

**BERN**: candidates for listing in Appendix I of the Bern Convention (Dahlberg & Croneborg, 2003).

## DISCUSSION AND CONCLUSION

A total of 111 species of macrofungi have been protected in Montenegro. A number of protected species has international importance.

The present list of protected species in Montenegro has the following background:

- 94 species are from the European Red List.
- 12 species are from the List of the ECCF Project "Mapping and Monitoring of Threatened Fungi in Europe" in Montenegro, from which four species (*Bovista paludosa*, *Gomphus clavatus*, *Sarcosphaera coronaria*, *Suillus sibiricus* subsp. *helveticus*) are candidates for listing in Appendix I of the Bern Convention.
- Additional species are protected because their loci classici are in Montenegro (*Gyromitra mcknightii*), or that species are very rare or rare in Montenegro and species which exist in endangered or rare habitats.

In some cases some species have been proposed because of more than one reason.

The number of species within the mentioned categories is the following:

- 92 are very rare or rare species in Montenegro (EKSP);
- 1 species is confined to endangered or rare habitats (RV);
- 18 are very rare or rare species in Montenegro endangered because of excessive exploitation (RS).

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