

# 33 threatened fungi in Europe

Complementary and revised information on candidates for listing in Appendix I of the Bern Convention

August 2003



*A document compiled for EU DG Environment and the Bern Convention by Anders Dahlberg and Hjalmar Croneborg at the Swedish Species Information Centre on behalf of the Swedish Environmental Protection Agency (EPA) and the European Council for Conservation of Fungi (ECCF).*

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Tryckjouren i Uppsala AB, 2003 

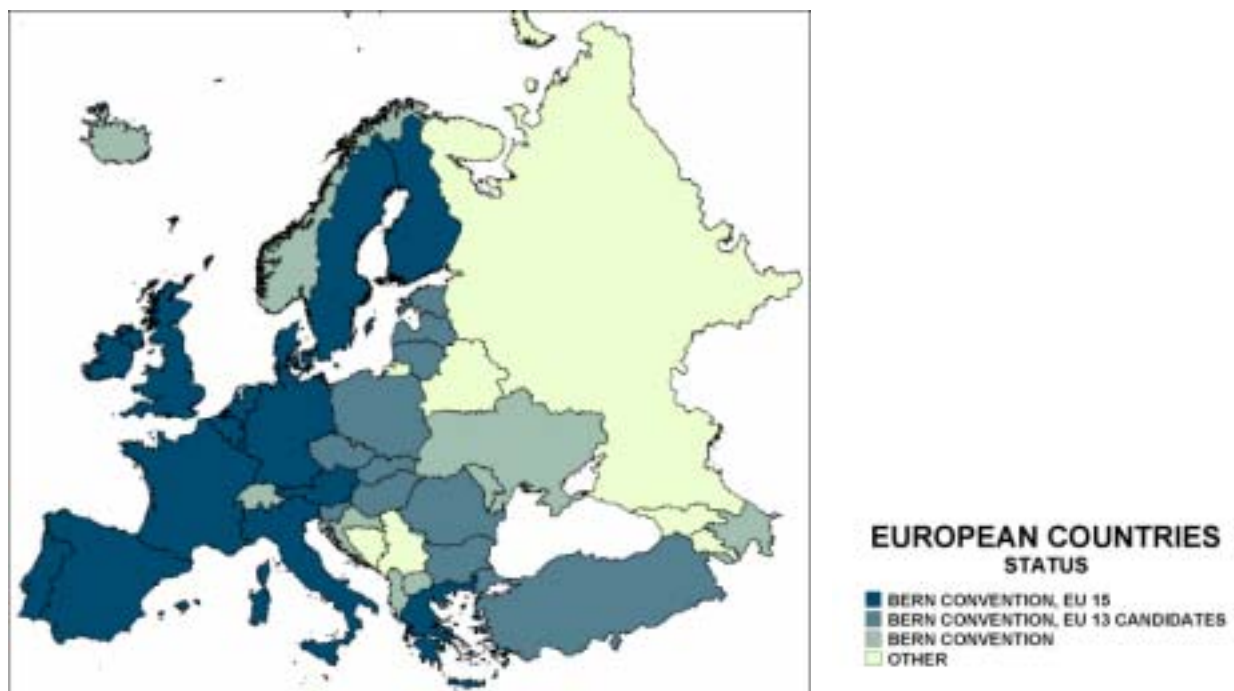
Cover: *Sarcosphaera coronaria* © A. Bollmann Stuttgart – Germany.

## Summary

No fungal species are represented in the Appendices of the Bern Convention (BC) or the Habitat Directive 92/43/EEC. Fungi have high species richness, are involved in many biological interactions and are crucial to several ecosystem processes. Yet nature conservation actions have largely neglected fungi due to insufficient knowledge of their ecology, distribution and status. However, over recent decades our scientific knowledge has been significantly increased, as has an awareness of declining fungal populations in Europe, which is mainly caused by loss and degradation of habitats due to changed land use. Today more than 35 European countries have some form of Red Lists for fungi.

This report summarizes recent additional information together with that presented in document T-PVS (2001) 34 where 33 fungal species were proposed for inclusion in the Bern Convention in order to recognize the need for conservation of fungi and their habitats. All the proposed fungi are rare throughout Europe and red-listed in several countries. Five are unique to Europe. The endemic fungus *Tulostoma niveum* has the most restricted distribution being recorded at less than 20 localities in only three countries. By contrast the most widely distributed fungus within the proposal, *Gomphus clavatus*, is recorded from 25 countries. They are both red-listed; *T. niveum* in all three countries and *G. clavatus* in 17 countries. Twenty of the species are recorded from less than 16 countries and have each less than 200 known localities in the whole of Europe. Detailed information is presented concerning the number of localities, habitat types and - from 24 countries - an estimated proportion of known localities occurring within protected areas and Natura 2000 areas. The data is presented for EU15 countries and EU13/ remaining BC countries. At the European level, an estimated 40 % of the known localities are situated within these areas. The possibility of including the species in the Habitat Directive Appendices is expressed by a proposal of possible Appendices affiliation.

The information has been compiled from 40 countries, including 36 countries that have ratified the Bern Convention, all 15 EU member countries and 11 of the 13 EU candidate countries. The data was researched and rigorously compiled during the spring 2003 by more than 100 mycologists in these countries.



**Fig 1.** Countries covered by the Bern Convention (BC), members of EU ( EU15) and EU candidates (EU13) (Unfortunately, Cyprus is missing in this and all following maps).

## Background

European mycologists have through the European Council for Conservation of Fungi, (ECCF, [www.wsl.ch/eccf/](http://www.wsl.ch/eccf/)), been preparing a list of fungi for possible inclusion in the Bern Convention since 1991. At the 19<sup>th</sup> meeting of the Bern Convention, a document on threatened mushrooms was presented [document T-PVS (99) 39]. At the 21<sup>th</sup> meeting, the document T-PVS (2001) 34 was informally introduced ([www.nature.coe.int/CP21/tpvs34e.htm](http://www.nature.coe.int/CP21/tpvs34e.htm)). The list is based on our present knowledge of the conservation status, ecology and distribution of fungal species. These 33 species represent only a small fraction of all threatened fungal species within the region, but by including them in the Convention Appendix, the need for conservation of fungi and their habitats would be formally recognized. In total, 20 % of the about 8000 European fungi are regarded as threatened, mainly due to loss and degradation of their habitats. In order to facilitate the process for their proposal, Torsten Larsson at the Swedish EPA and Anders Bohlin, the president of ECCF, initiated a compilation of additional and updated information concerning the proposed fungi. The mycologists Hjalmar Croneborg and Anders Dahlberg at the Swedish Species Information Centre coordinated this task.

## Compilation of information

During February – June 2003, contacts and questionnaires were emailed to appropriate mycologists in as many of the countries that have ratified the Bern Convention as possible (Fig 1). The request was met by an overwhelming and immediate interest, and resulted in a high response. More than 100 European professional mycologists carefully and rigorously compiled up to date information, particularly in respect of the distribution and number of recent (post 1980) localities for each species, and an estimate of what proportion of these localities are within protected or Natura 2000 areas (Table 3).

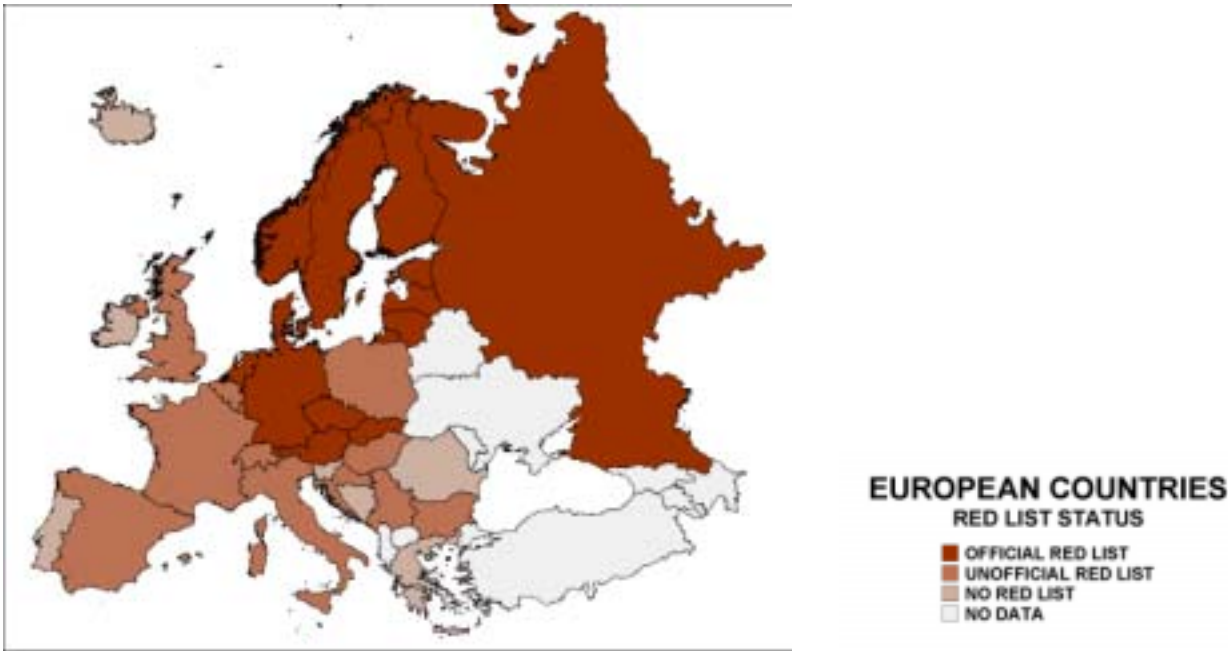
Country	Answered questionnaires	Info based on literature	Country	Answered questionnaires	Info based on literature
<b>EU15 countries</b>			Hungary	x	
Austria	x		Iceland	x	
Belgium	x		Latvia	x	
Denmark	x		Liechtenstein	-	-
Finland	x		Lithuania	x	
France	x		Malta	x	
Germany	x		Moldova	-	x
Greece	x		Poland	x	
Ireland	x		Romania	x	
Italy	x		Slovakia	x	
Luxembourg	x		Slovenia	x	
Netherlands	x		Turkey	-	-
Portugal	x		<b>Remaining BC countries</b>		
Spain	x		Croatia	x	
Sweden	x		Norway	x	
United Kingdom	x		Switzerland	x	
<b>EU13 countries</b>			Ukraine	x	
<b>Bulgaria</b>			<b>Other reported countries</b>		
Cyprus	-		Armenia	-	x
Czech Republic	x		Bosnia and Herzegovina	x	
Bulgaria	x		Serbia and Montenegro	x	
Estonia	x		Russia	x	

**Table 1.** Source of information for the 33 ECCF fungi from each Bern Convention country, EU15 and the EU13 candidate countries are indicated.

By June 18<sup>th</sup>, information had been gathered from 36 countries that have ratified the Bern Convention, including all EU15 countries and 11 of the EU13 countries (Table 1, Fig 2). This report summarizes this recent additional information with that presented from document T-PVS (2001) 34. Fourteen of these countries have an official Red List for fungi and 12 have unofficial Red Lists (Fig 3, Table 4).



**Fig 2.** Information for the 33 ECCF fungi was obtained from 36 countries. Data 2003 refers to answered questionnaires during February – June 2003 and Data 2001 refers to data extracted from T-PVS (2001) 34.



**Fig 3.** Countries with official and unofficial Red Lists.

## Distribution and status of the 33 ECCF fungi

All 33 proposed fungi are rare throughout Europe. In most cases they have only been recorded from relatively few locations throughout the 40 countries. Five of the proposed ECCF fungi have not been recorded outside Europe (Table 3). The 33 ECCF fungi are distributed throughout Europe. There are no major differences in the number of fungi per country between Southern, Central and Northern Europe (Fig 4). Ten species are recorded in less than 10 countries and 20 species in less than 16 countries (Fig 5: table 2). France and Italy have the highest numbers of ECCF fungi; 25-27. There are a slightly higher number of ECCF fungi that are red-listed in Central Europe and Fennoscandia (Fig 4). All ECCF fungi are red-listed in several of the countries (Table 2). Seven countries have protected fungal species (Table 2).

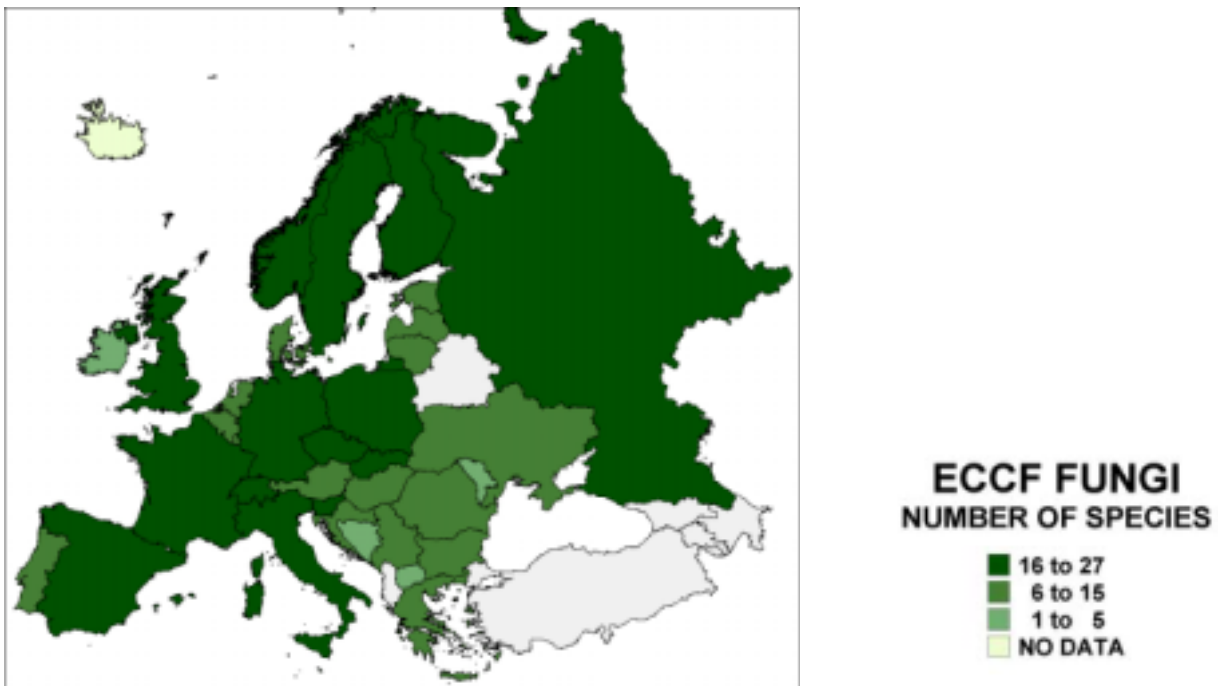


Fig 4. The number of ECCF fungal species recorded from individual BC countries.

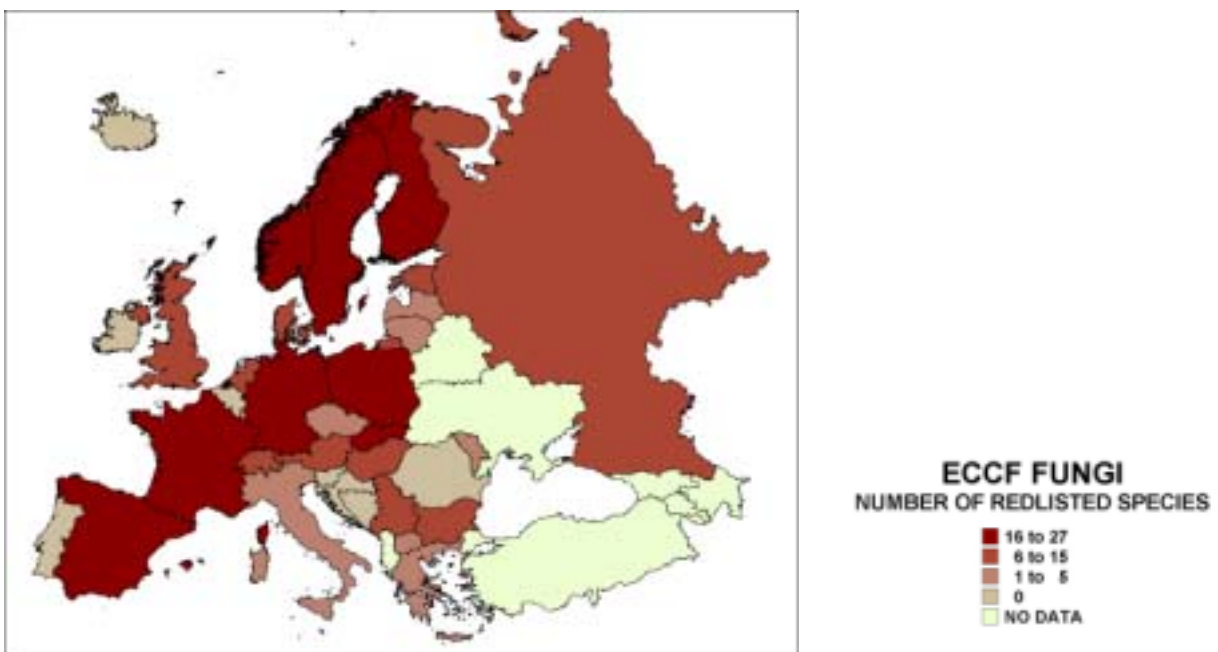


Fig 5. The number of red-listed or protected ECCF fungi in different countries.

Twenty of the species have less than 200 known localities in the whole of Europe (Table 3). The total number of known localities in each country and the number of recent localities (after 1980) are shown in Table 3 and also presented separately for each species. In 29 of the fungi, more than 90 % of the known localities are situated within EU15. Four of the species (including two endemics) have records only within EU15.

We attempted, but did not succeed in making a sufficiently reliable estimate of the total number of localities. Hence, we only report the number of currently known localities, a figure that is likely to rise in most cases as our knowledge increases. In well-studied countries, almost all existing localities are known, whereas in less well-investigated areas the total number of localities may be up to ten times higher than the number of known ones.

The most important Natura 2000 habitats are indicated for each ECCF fungi in Table 4. A more detailed presentation of the distribution, number of known/estimated localities and habitats within each country is given separately for each species.

**Table 2** Number of ECCF fungi recorded in each country post 1980, numbers which are red-listed and within paranthesis protected numbers (1 = no data available, 2 = no national Red List exist).

Country	No. of ECCF fungi	No. of red -listed species	Total number of localities	% in protected/ Natura 2000 areas	Country	No. of ECCF fungi	No. of red -listed species	Total number of localities	% in protected/ Natura 2000 areas
<b>EU15 countries</b>					Hungary	9	9	28	-
Austria	15	14	91	32%	Iceland <sup>2</sup>	0	-	0	-
Belgium	13-14	-	64	77%	Latvia	5	3 (5)	47	57%
Denmark	12	13	59	14%	Liechtenstein <sup>1</sup>	-	-	-	-
Finland	20	19	897	70%	Lithuania	9	4	4	25%
France	27	27	2030	30%	Malta	2	1	2	100%
Germany	25	23	668	44%	Moldova	1	1	-	-
Greece <sup>2</sup>	14	-	69	-	Poland	20	17	114	11%
Ireland <sup>2</sup>	5	-	11	64%	Romania <sup>2</sup>	11	-	66	24%
Italy	27	3	168	19%	Slovakia	20	19 (11)	>99	-
Luxembourg	6	3	18	-	Slovenia	21	(8)	82	-
Netherlands	10	10	131	56%	Turkey <sup>1</sup>	-	-	-	-
Portugal <sup>2</sup>	10	-	17	35%	<b>Remaining BC countries</b>				
Spain	20	20	727	66%	Croatia	14	(8)	74	32
Sweden	24	24 (5)	3602	19%	Norway	21	19	249	-
United Kingdom	17	13	872	12%	Switzerland	21	14 (4)	507	-
<b>EU13 countries</b>					Ukraine <sup>2?</sup>	15	-	-	-
Bulgaria	12	7	27	18%	<b>Other reported countries</b>				
Cyprus <sup>1</sup>	-	-	-	-	Armenia	>2	-	-	-
Czech Republic	18	5 (3)	217	-	Bosnia and Herzegovina	>3	-	2	-
Bulgaria	15	8	72	42%	Serbia and Montenegro	9	6	14-	-
Estonia	15	8	72	42%	Russia	21	6	-	-

## Fungi within protected areas

We also tried to produce estimates of the number of ECCF fungal localities within protected areas, within Natura 2000 areas and outside these areas. Such estimates are difficult and time-consuming to conduct. Many records lack sufficiently detailed geographic information (coordinates) to link observations with boundary information on protected areas. Nevertheless, 24 countries made efforts to make such estimates (see explanation at page 15). The general European trend is that at least 40 % of the localities are found within areas enjoying some kind of protection (Fig 6). Of course these estimates are very uncertain and vary amongst species and countries. However better estimates cannot be achieved within the fixed timescale, and not without considerable further effort. Nevertheless, this information will be useful as a starting point of discussions about the need for protection of land to secure viable populations of these fungi.



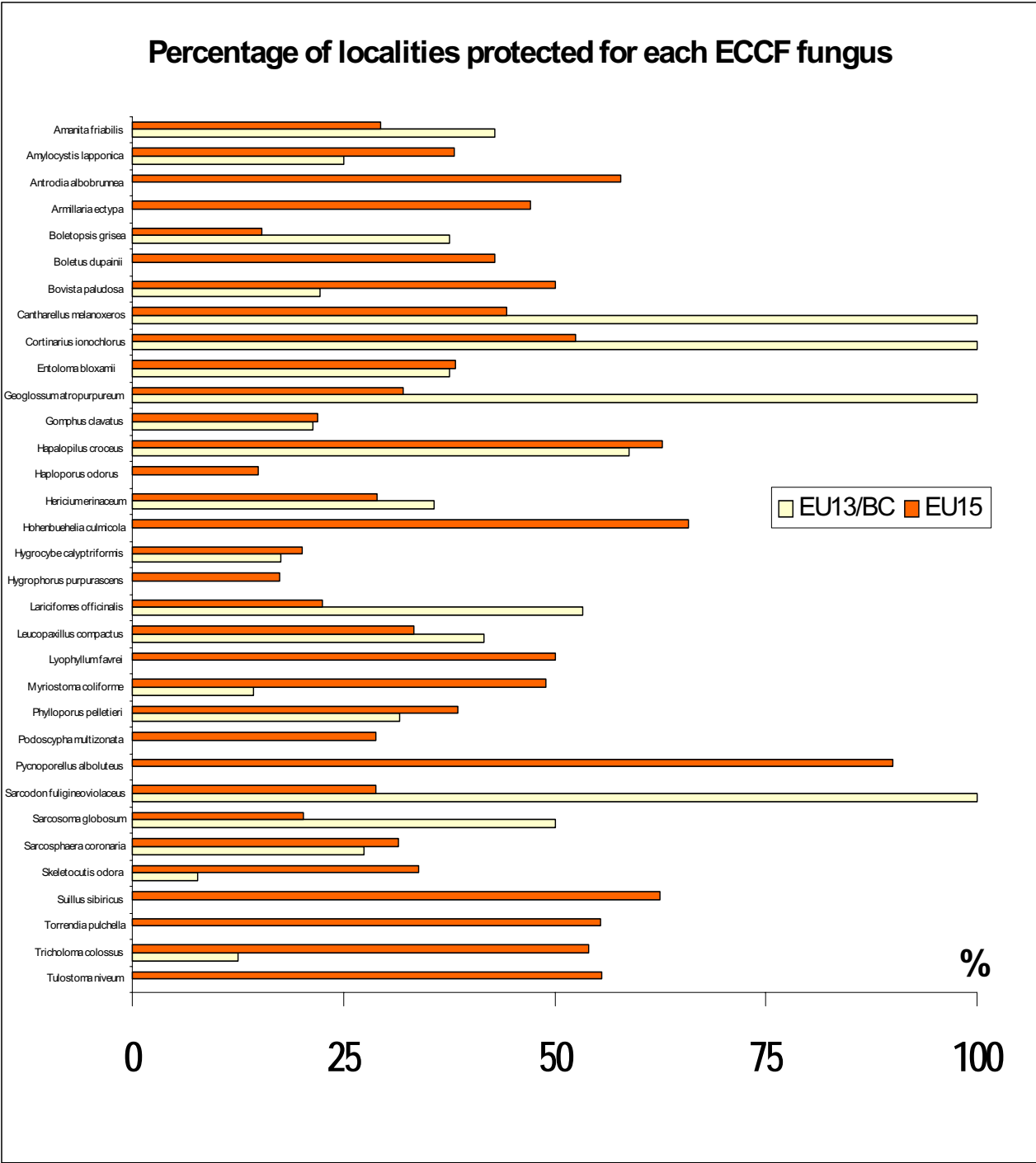
*Haploporus odorus*

## Fungal monitoring

Monitoring of fungi may appear more problematic than for other groups of organisms due to the large species richness, and sometimes identification difficulties or as yet unsolved taxonomical problems. The proposed species are all conspicuous and fairly easily identified. Fungi are strongly dependent upon annual climatic conditions for fruiting. Hence, sporocarps does not appear annually despite their mycelia constantly being present, a fact that necessitates long-term monitoring. Despite this, they are very useful as sensitive indicators of habitat qualities.

## Fungal localities

Localities are pragmatically defined as discrete and separate areas, normally located more than 1 km<sup>2</sup> from each other. In fungal species growing on, or within, discrete substrates such as wood, each unit of substrate is commonly considered to constitute at least one genotype. Genotypes in soil-dwelling species are by contrast considered to commonly occupy about 100 m<sup>2</sup> for mycorrhizal fungi and about 10 m<sup>2</sup> for saprotrophic fungi. Typically, few fungal individuals occupy each locality.



**Fig 6.** Estimates of the percentage of localities for individual fungal species already located within protected/ Natura 2000 areas in EU15 countries and EU13 and remaining BC countries, respectively. Note, the number of localities for individual species range from 9 – 1586 (cf. Table 3).

**Table 3.** A summary of the status of the ECCF fungi within the Bern Convention and EU15 countries; endemism, occurrence, estimated number of localities, percentage of known localities located within protected and Natura 2000 areas, number of countries where they are red-listed and most frequent Natura 2000 habitat.

Species	Endemic to Europe	Present in no. of countries (post 1980)	Number of localities (post 1980)	% of localities in protected areas	Red-listed in no. of countries	Present in no. of EU15 countries (post 1980)	Most frequent Natura 2000 habitat
<i>Amanita friabilis</i>	yes	16	124	30	11	11	Alluvial forest with <i>Alnus</i> (91EO)
<i>Amylocystis lapponica</i>		8	1045	38	7	3	Western taiga (9010)
<i>Antrodia albobrunnea</i>		3	397	58	5	3	Western taiga (9010), Coniferous forests on, or connected to glaciofluvial eskers (9060)
<i>Armillaria ectypa</i>		9	57	46	10	9	Alkaline fens (7230), Active raised bogs (7110)
<i>Boletopsis grisea</i>		11	254	16	5	6	Western taiga (9010)
<i>Boletus dupainii</i>		10	96	41	8	6	Medio-European limestone beech forests (9150)
<i>Bovista paludosa</i>		9	190	49	13	6	Alkaline Fen (7230)
<i>Cantharellus melanoxeros</i>	yes	17	398	44	9	12	Asperulo-fagetum beech-forests (9130)
<i>Cortinarius ionochlorus</i>	?	6	181	53	3	6	<i>Quercus ilex</i> forests (9340)
<i>Entoloma bloxamii</i>		19	292	38	15	13	Seminatural dry grasslands and scrubland facies on calcareous substrates (6210)
<i>Geoglossum atropurpureum</i>		11	122	34	9	9	Seminatural dry grasslands and scrubland facies on calcareous substrates (6210)
<i>Gomphus clavatus</i>		19	955	22	18	11	Acidophilous <i>Picea</i> forests of the montane to alpine levels (Vaccinio – Piceetea) (9410) + (9110 and 9130)
<i>Hapalopilus croceus</i>		17	120	61	13	9	Sub-atlantic and medio-European oak or oak-hornbeam forests (9160)
<i>Haploporus odoratus</i>		3	1586	15	3	2	Western taiga (9010)
<i>Hericium erinaceum</i>		18	435	29	15	13	Luzulo-Fagetum beech forests (9110), medio-european oak and oak-hornbeam forest (9160)
<i>Hohenbuehelia culmicola</i>	yes	6	40	66	4	6	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (2120)
<i>Hygrocybe calyptriformis</i>		17	639	20	12	10	Semi-natural dry grasslands and scrubland facies on calcareous substrates (6210)
<i>Hygrophorus purpurascens</i>		7	42	17	7	4	Acidophilous <i>Picea</i> forests of the montane to alpine levels (Vaccinio-Piceetea) (9410)
<i>Laricifomes officinalis</i>		7	84	30	7	3	Alpine <i>Larix decidua</i> – <i>Pinus cembra</i> forests (9420)
<i>Leucopaxillus compactus</i>		17	161	34	13	9	Asperulo-Fagetum beech forests (9130), Fennoscandia hemiboreal natural old broad-leaved deciduous forest (9020)
<i>Lyophyllum favrei</i>		7	25	50	3	6	Asperulo-Fagetum beech forests (9130)
<i>Myriostoma coliforme</i>		13	155	46	13	9	Riparian mixed forests along the great rivers (91FO), <i>Salix alba</i> and <i>Populus alba</i> galleries (92AO)
<i>Phylloporus pelletieri</i>		18	926	38	13	12	Luzulo-Fagetum (9110), Asperulo-Fagetum (9130), Carpinion betuli (9160)
<i>Podoscypha multizonata</i>		8	116	29	3	5	Asperulo-fagetum beech forests (9130)
<i>Pycnoporellus alboluteus</i>		3	11	82	5	2	Fennoscandian herb-rich forests with <i>Picea abies</i> (9050)
<i>Sarcodon fuligineoviolaceus</i>		10	48	32	6	7	Western taiga (9010)
<i>Sarcosoma globosum</i>		4	135	22	10	2	Western taiga (9010)
<i>Sarcosphaera coronaria</i>		20	691	31	14	12	Asperulo-fagetum beech forests (9130), Medio-European limestone beech (9150)
<i>Skeletocutis odora</i>		6	654	33	5	3	Fennoscandian herb-rich forests with <i>Picea abies</i> (9050)
<i>Suillus sibiricus</i> Singer ssp. <i>helveticus</i>	yes	6	63	38	7	4	Alpine <i>Larix decidua</i> - <i>Pinus cembra</i> forests (9420)
<i>Torrencia pulchella</i>		3	110	55	3	3	<i>Q suber</i> forests (9330), Galicio-Portuguese oak woods with <i>Quercus robur</i> and <i>Quercus pyrenaica</i> (9230)
<i>Tricholoma colossus</i>	?	14	218	52	14	9	Mediterranean pine forests with endemic mesogeian pines (9540), western taiga (9010)
<i>Tulostoma niveum</i>	yes	3	9	56	3	3	Rupicolous calcareous or basiphilic grasslands of the alyso-sedionalbi (6110), Nordic alvar and precambrian calcareous flatrocks (6280)

## Possible affiliation in the Habitat Directive Appendices of the 33 suggested fungi for the Bern Convention.

The proposal below is intended to serve as a basis for the discussion. It has been prepared by Mora Aronsson at the SWG of the Habitat Directive and the mycologists at the Swedish Species Information Centre.

**All 33 species** are suggested for inclusion in **Appendix II**. They are all rare, commonly red-listed within EU15 and require management or conservation of their habitats to secure their long-term survival. The most pervasive and overriding threat to these fungi is habitat loss and degradation due to agricultural and forestry activities and development. Sporocarp collection does not impose a threat to most of these species, as the longevity of mycelia of at least soil dwelling species range from decades to potentially centuries. In Switzerland and USA, long-term research on the harvesting of edible mushrooms has shown no measurable influence on fruitbody production. The selected fungi are useful as indicators of specific habitat qualities even if their sporocarps may not appear at all some years due to adverse weather conditions.

**Nine of these species** are suggested to be given a **priority within Appendix II (\*II)**. These species are extremely rare. They all have very limited distribution and are only known from few localities in Europe and in the world. It can therefore be argued that a higher proportion of the localities of these fungi need to be protected and managed to secure their long term survival. With few exceptions, they are red-listed and highly threatened throughout their distribution, and they have their main distribution within EU15.

**Four of the species** are suggested to be included in **Appendix IVb**. For *Hapalopilus croceus* and *Laricifomes officinalis* growing on old trees, collection of their perennial sporocarps and above all cutting and incorrect management of their host trees can be devastating. For the same reasons, protection of *Pycnoporellus alboluteus*, growing on thick logs with remarkable, conspicuous sporocarps would enhance its existence. The fourth soil-dwelling species, *Sarcosoma globosum*, has its major global distribution within Sweden. All four species are already protected by law, in 4, 2, 1 and 3 countries, respectively.

Species	Possible Appendix	Species	Possible Appendix
<i>Amanita friabilis</i>	II	<i>Hygrophorus purpurascens</i>	*II
<i>Amylocystis lapponica</i>	II	<i>Laricifomes officinalis</i>	*II IVb
<i>Antrodia albobrunnea</i>	II	<i>Leucopaxillus compactus</i>	II
<i>Armillaria ectypa</i>	*II	<i>Lyophyllum favrei</i>	*II
<i>Boletopsis grisea</i>	II	<i>Myriostoma coliforme</i>	II
<i>Boletus dupainii</i>	*II	<i>Phylloporus pelletieri</i>	II
<i>Bovista paludosa</i>	II	<i>Podoscypha multizonata</i>	II
<i>Cantharellus melanoxeros</i>	II	<i>Pycnoporellus alboluteus</i>	*II IVb
<i>Cortinarius ionochlorus</i>	II	<i>Sarcodon fulgineoviolaceus</i>	*II
<i>Entoloma bloxamii</i>	II	<i>Sarcosoma globosum</i>	II IVb
<i>Geoglossum atropurpureum</i>	II	<i>Sarcosphaera coronaria</i>	II
<i>Gomphus clavatus</i>	II	<i>Skeletocutis odora</i>	II
<i>Hapalopilus croceus</i>	II IVb	<i>Suillus sibiricus</i>	II
<i>Haploporus odoratus</i>	II	<i>Torrendia pulchella</i>	II
<i>Hericium erinaceum</i>	II	<i>Tricholoma colossus</i>	II
<i>Hohenbuehelia culmicola</i>	*II	<i>Tulostoma niveum</i>	*II
<i>Hygrocybe calyptiformis</i>	II		

## References

**Table 4.** References to Red Lists and coordinating mycologists who have compiled the data of this report.

Country	Red List reference	Coordinating person(s)
Austria	<b>Official Red List:</b> Krisai-Greilhuber, I. (1999): 5. Pilze. Rote Liste gefährdeter Großpilze Österreichs, 2. Fassung. In: Niklfeld, H. (Ed.) Rote Listen gefährdeter Pflanzen Österreichs, 2nd Edn, pp. 229-266.	Irmgard Krisai-Greilhuber, Institut für Botanik und Botanischer Garten der Universität Wien, Rennweg 14, A-1030 Wien. AUSTRIA Email: irmgard.greilhuber@univie.ac.at Herman Voglmayr Email: hermann.voglmayr@univie.ac.at Supported by U. Peintner & R. Kuhnert-Finkernagel
Belgium	<b>Unofficial Red List</b> , regionally for Flanders : Walley R. & Verbeken A. (2000) Een gedocumenteerde Rode Lijst van enkele groepen paddestoelen (macro-fungi) van Vlaanderen. Meded. Instituut voor Natuurbehoud 7: i-x, 1-84. Walley R & Vandeven R. 2003. Inventaris en status in Vlaanderen en het Brussels Hoofdstedelijk Gewest van de bedreigde paddestoelen voorgesteld ter opname in bijlage 1 van de Conventie van Bern. <i>I.s.m.</i> Brussels Instituut voor Milieubeheer (BIM) Rapport IBW, Bb R 2003.008	André Fraiture, Jardin Botanique National de Belgique/Domaine de Bouchout B-1860 Meise, BELGIUM Email: andre.fraiture@br.fgov.be Ruben Walley, Instituut voor Bosbouw en Wildbeheer, Gaverstraat 4, B-9500 Geraardsbergen, BELGIUM Email: ruben.walley@lin.vlaanderen.be
Bosnia and Herzegovina	<b>No Red List</b>	Boris Ivancevic, Natural History Museum, Njegosova 51, P.O. Box 401, YU-11000 Belgrade, BOSNIA AND HERZEGOVINA Email: i.boris@beotel.yu
Bulgaria	<b>Unofficial Red List:</b> Gyosheva, M., V. Fakirova & C. Denchev 2000. Red List and threat status of Bulgarian macromycetes. <i>Historia naturalis bulgarica</i> 11: 139-145	Melania Gyosheva, Institute of Botany, Bulgarian Academy of Sciences, Acad G Bonchev Str bl 23, 1113 Sofia, BULGARIA Email: gyosheva@biofac.uni-sofia.bg
Croatia	<b>Unofficial fungal Red List</b> and official list for protection of fungi: Rule Book on Protection of Fungi (2002), Narodne novine 34/02 in which 130 species are protected by law. Based on an unofficial red list (Tkalcic, Z., Matocec, N., Mesic, A. & Tortic, M. (1998). Endangerment of Fungi Analysis and Directions for Strategy and Action Plan of their Conservation. State Directorate for the Protection of Nature and Environment.	Laboratory of Biocoenotical Research, Rudjer Boskovic Institute, Bijenicka cesta 54, 10000 Zagreb, CROATIA. Email: Zdenko Tkalcic (zdenko.tkalcic@zg.tel.hr), Armin Mesic (armin.mesic@zg.hinet.hr), Neven Matocec (discomycetes@inet.hr) Mycological Society, Sveti Duh 63/1, 10000 Zagreb, CROATIA Email: hmd-zg@zg.hinet.hr
Czech Republic	<b>Official Red List:</b> Kotlaba F. & al., 1995: Ľervená kniha ohrozených a vzácných druhov rastlín a živočíchov SR a ĽR. Vol. 4. (Red book of threatened and rare species of the Slovak and Czech Republics. Vol. 4). - Bratislava, 221 pp.	Jan Holec, National Museum, Mycological Department, Václavské nám. 68, 115 79 Praha 1, CZECH REPUBLIC. Email: jan.holec@nm.cz Vladimír Antonín, Moravian Museum, Department of Botany, Zelný trh 6, 659 37 Brno, CZECH REPUBLIC; Miroslav Beran, Museum of South Bohemia, Dukelská 1, 370 51 Ľeské BúdĽovice, CZECH REPUBLIC; Zuzana Bieberová, Agency for Nature and Landscape Protection, branch Brno, Lidická 25/27, 657 20 Brno, CZECH REPUBLIC.
Denmark	<b>Official Red List:</b> Stoltze & Pihl (eds.) 1998. Rodliste 1997 over planter og dyr i Danmark. Miljø- och Energiministeriet, Danmarks miljøundersogelser og Skov- och Naturstyrelsen.	Jan Vesterholt, Danish Mycological Society Lagelinie 37 st.tv, 7100 Vejle, DENMARK. Email: myco@vip.cybercity.dk
Estonia	<b>Official Red List:</b> Eesti punane raamat. Tallinn, 1999. 150 p. (Estonian Red Data Book. In Estonian, with a summary in English. Published by the Commission for Nature Protection of the Estonian Academy of Sciences.)	Erast Parmasto, Institute of Zoology and Botany of the Estonian Agricultural University, 181 Riia St., 51014 Tartu, ESTONIA. Email: e.parmasto@zbi.ee
Finland	<b>Official Red List:</b> The II Committee for the Monitoring of Threatened Species in Finland; Rassi, P. (chairman), Alanen, A., Kanerva, T. & Mannerkoski, I. (eds.) 2001: The 2000 Red List of Finnish species. – 432 pp. Ministry of Environment, Finnish Environment Institute, Helsinki.	Tea von Bonsdorff Kasvimuseo/sieniosasto, Hämeentie 153 B PL 47, 00014 Helsingin yliopisto, FINLAND. Email: tbonsdor@mappi.helsinki.fi Supported by Heikki Kotiranta, Maarit Kaukonen and Esteri Ohenoja.
France	<b>Unofficial fungal Red List</b> : But one is prepared to be published in 2003. Courtecuisse, 2003 (in prep.)	Regis Courtecuisse Departement de Botanique 3, rue du Professeur Laguesse - B.P. 83 F-59006 Lille Cedex, FRANCE. Email: rcourtec@phare.univ-lille2.fr Supported by Gilles Corriol, Pierre-Arthur Moreau
Germany	<b>Official Red List:</b> Benkert, D. et al. (1992): Rote Liste der gefährdeten Großpilze in Deutschland. Deutsche Gesellschaft für Mykologie e.V., Naturschutzbund Deutschland e.V. IHW-Verlag, Eching. (Reprinted 1996) Regarding regional red lists, see please see Bern Convention document	Peter Otto, University of Leipzig, Institute of Botany, Johannisallee 21, D - 04103 Leipzig, GERMANY. Email: otto@uni-leipzig.de on behalf of the German Mycological Society (DGfM) with contributions from: D. Benkert, P. Dobbitsch, G. Hirsch, L. Kriegelsteiner, T.R. Lohmeyer, M. Lüderitz, G. Schmidt-Stohn, J.A. Schmitt, U. Täglic, W. Winterhoff, K. Wöldecke.
Great Britain	<b>Unofficial Red List used as an official document:</b> Ing, B. 1992 : A provisional Red Data List of British Fungi. <i>Mycologist</i> 6: 124–128. British Mycological Society. Evans, S., Ing, B., Henrici, A., Rotheroe, M. 2003 : Red Data List of threatened British fungi. (in preparation)	Shelley Evans, Conservation Officer, British Mycological Society, Joseph Banks Building, Royal Botanic Gardens, Kew, Surrey TW9 3AE. GREAT BRITAIN. Email: shelley-evans@myco-services.freeserve.co.uk

Country	Red List reference	Coordinating person(s)
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Hungary	<b>Unofficial Red List:</b> Rimóczi, I., Siller, I., Vasas, G., Albert, L., Vetter, J., Bratek, Z. (1999): Magyarország nagygyombáinak javasolt Vörös Listája. (The draft of the Red List of Hungarian Macrofungi). Mikológiai Közlemények Clusiana 38/1-3:107-132.	Livia Fodor Ministry of Environment and Water Authority for Nature Conservation Budapest – 1121, Költő u.21. HUNGARY Email: fodor@mail2.ktm.hu
Iceland	No Red List	Gudrídur Gyda Eyjolfssdóttir, Icelandic Institute of Natural History, Akureyri Division, Hafnarstræti 97, P.O. Box 180 IS-602 Akureyri, ICELAND. Email: gge@ni.is
Italy	<b>Unofficial Red List:</b> Venturella et al., 1997 – Towards a Red Data List of fungi for Italy. <i>Bocconea</i> 5 (2):867-872.	Claudia Perini, Department of Environmental Sciences. G. Sarfatti", via P.A. Mattioli 4, 53100 Siena, ITALY. Email: perini@unisi.it Eugenio Dupre', Direzione Conservazione della Natura Ministero dell'Ambiente e della Tutela del Territorio, ITALY Email: dupre.eugenio@minambiente.it
Latvia	<b>Official Red List:</b> 1. Andrušaitis G. (ed.) 1996. Latvijas Sarkanā Grāmata. Retās un izzūdošās augu un dzīvnieku sugas, 1. sējums - Red Data Book of Latvia. Rare and endangered species of plants and animals, Vol.1, Rīga 2. MK Noteikumi Nr.396 (14/10/2000) Par īpaši aizsargājamo sugu un ierobežoti izmantojamo īpaši aizsargājamo sugu sarakstu – Regulations of Government No 396 (14/10/2000) Lists of Specially Protected and Limitedly Exploitable Specially Protected Species	Inguna Krastina, Latvian Environment Agency, Straumes str. 2, LV-2015, Jurmala, LATVIA. Email: Inguna.Krastina@iva.gov.lv Supported by Diāna Meiere, Inita Dāniele
Lithuania	<b>Official Red List:</b> Lygis D., 2000: Lietuvos respublikos Aplinkos ministro isakymas del i Lietuvos raudonosios knygos irasytu saugomu gyvunu, augalu ir grybu rusiu saraso patvirtinimo. – Valstybes zinius, 66-1998: 76-94.	Ernestas Kutorga, Vilnius University, Department of Botany and Genetics, Ciurlionio 21/27, LT-2009, Vilnius, LITHUANIA. Email: Ernestas.Kutorga@gf.vu.lt Reda Irsenaite, Institute of Botany, Laboratory of Mycology, Zaliuju ezeru 49, LT-2049 Vilnius, LITHUANIA. Email: reda@botanika.lt
Luxembourg	<b>Unofficial Red List:</b> under preparation and unpublished	Marie-Therese Tholl 31,rue du Village L-9647 Doncols, LUXEMBURG Email: mttholl@pt.lu Ben Schulltheis maison 20 L-3311 Abweiler, LUXEMBURG
Malta	<b>Official Red List:</b> Schembri PJ and Sultana J 1989. Red Data Book for the Maltese Islands. Department of information. Malta.	Malta Mycological Society, Michael Briffa, Durham house, 20 Creche street, Slierna SLM09, MALTA. Email: brimic@vol.net.mt
Netherlands	<b>Official Red List:</b> Arnolds & Kuyper, 1996. Bedreigde en kwetsbare paddestoelen in Nederland.	Marijke M. Nauta National Herbarium of the Netherlands, University Leiden branch, P.O. Box 9514 NL-2300 RA Leiden NETHERLANDS Email: nauta@nhn.leidenuniv.nl
Norway	<b>Official Red List:</b> Nasjonal rødliste for truede arter i Norge 1998 (Norwegian Red List 1998) - DN-rapport 1999-3.	Gro Gulden, Natural History Museum, University of Oslo, p.b. 1172 Blindern, N-0318 Oslo, NORWAY Email: Gro.gulden@nhm.uio.no Supported by Egil Bendiksen
Poland	<b>Unofficial Red List:</b> Wojewoda, W. & Eawrynowicz, M. 1992. Red list of threatened macrofungi in Poland. In: Zarzycki, K., Wojewoda, W. & Heinrich, H. (eds.), List of threatened plants in Poland. 2 ed. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków, pp. 27–56.	Anna Ronikier & Marcin Piatek, W. Szafer Institute of Botany, Polish Academy of Sciences, ul. Lubicz 46, PL–31–512 Kraków, POLAND. Email: A.Ronikier@ib-pan.krakow.pl mpiatek@ib-pan.krakow.pl Supported by Maria Lawrynowicz, Wladyslaw Wojewoda and Izabela Kalucka
Portugal	No Red List	J. L. Baptista-Ferreira, Centro de Micologia da Universidade de Lisboa, Rua da Escola Politécnica 58, 1250-102 Lisbon, PORTUGAL. Email: joao.ferreira@fc.ul.pt Supported by Ireneia Melo and Fátima Pinho-Almeida.
Republic of Ireland	No Red List	Hubert T. Fuller, Department of Botany, University College Dublin, National University of Ireland Dublin, Belfield, Dublin 4 REPUBLIC OF IRELAND Email: hubert.fuller@ucd.ie Howard Fox, National Botanic Gardens, Glasnevin Dublin 9, REPUBLIC OF IRELAND hfox@duchas.ie
Romania	No Red List	Catalin TANASE, 'Al. I. Cuza' University of Iasi, Faculty of Biology, 20 A Carol I Bd., 6600 – Iasi, ROMANIA. Email: tanase@uaic.ro Adriana POP, Institute of Biological Research Cluj, Po-Box 229, 48 Republicii Street, 3400 Cluj – Napoca, ROMANIA.

Country	Red List reference	Coordinating person(s)
Russia	<b>Official Red List:</b> Kotiranta, H., P. Uotila, S. Sulkava & S.-L. Peltonen (eds.). 1998. Red Data Book of East Fennoscandia. Ministry of the Environment, Finnish Environment Institute & Botanical Museum, Finnish Museum of Natural History. Helsinki. 351 pp. Kovalenko, A.E. (ed.). 2001. Fungi and Slime Molds. In: Red Data Book of Nature of the Leningrad Region. Vol. 2. Plants and Fungi: 495-652. World and Family, Saint Petersburg. Taskaev A.I. (ed.). 1998. Red Data Book of the Komi Republic. Rare and endangered species of plants and animals. DIK, Moscow. 528 pp. (in Russian).	Alexander Kovalenko, V.L. Komarov Botanical Institute, 2 Prof. Popov St., 197376 - St. Petersburg. RUSSIA Email: alkov@AK3010.spb.edu
Serbia and Montenegro	<b>Unofficial Red List:</b> Ivancevic, B. (1998): A preliminary Red List of the macromycetes of Yugoslavia. In: C. Perini (ed.), Conservation of fungi in Europe, Proceedings of the 4 <sup>th</sup> meeting of the European Council for Conservation of Fungi: 57-61. Università degli Studi di Siena, Dipartimento Biologia Ambientale, Siena, Italy.	Boris Ivancevic, Natural History Museum, Njegoseva 51, P.O. Box 401, YU-11000 Belgrade, SERBIA AND MONTENEGRO Email: i.boris@beotel.yu With contributions from: M. Davidovic, I. Hadzic, N. Lukic, B. Peric, S. Radic
Slovakia	<b>Official Red List:</b> Lizor, P. 2001. Ľervený zoznam húb Slovenska. 3. verzia (december 2001). In: D. Baláž, K. Urban, & P. Urban, Ľervený zoznam rastlín a živočíchov Slovenska. Ochrana prírody, suppl. 20: 6-12. [on-line at www.sopsr.sk/istb/redlist (in Slovak)]	Pavel Lizor (Institute of Botany, Dúbravská 14, SK-845 23 Bratislava, SLOVAKIA. Email: pavel.lizon@savba.sk)
Slovenia	<b>No Red List</b> , but The Red list of Slovenia is to be prepared by the end of 2003.	Tine Grebenc, Slovenia Forestry Institute, Vecna pot 2, SI-1000 Ljubljana, SLOVENIA Email: tine.grebenc@gozdis.si
Spain	<b>Unofficial Red List:</b> Hongos españoles amenazados. Enric Gracia (Ed.). BEMF. 2003. To be published in May 2003.	Enric Gracia. BEMF (Bank of Edible and Medicinal Fungi) Dep. Biologia Vegetal; Fac. Biologia; Universitat de Barcelona; Av. Diagonal, 645; 08028 Barcelona, PORTUGAL Email: egracia@ub.edu Compilation supported by 35 Spanish mycologists.
Sweden	<b>Official Red List:</b> The 2000 Red List of Swedish Species. (2000). ArtDatabanken, SLU, Uppsala	Hjalmar Croneborg and Anders Dahlberg, Hjalmar Croneborg Swedish Species Information Centre, P.O. Box 7026, 750 07 Uppsala, SWEDEN Email: Hjalmar.croneborg@artdata.slu.se Email: Anders.dahlberg@artdata.slu.se
Switzerland	<b>Unofficial Red List:</b> Senn-Irlet, B.; Bieri, Chr. & R. Herzig. 1997. Provisorische Rote Liste der gefährdeten Höheren Pilze der Schweiz. Mycologia Helvetica 9(2): 81-110.	Beatrice Senn-Irlet, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft WSL, Zürcherstr. 111, CH- 8903 Birmensdorf, SWITZERLAND Email: senn-irlet@bluewin.ch
Ukraine		David Minter forwarded the information compiled by Dr Mykola Prydiuk and Dr Yura Tykhonenko of the M.G. Kholodny Institute of Botany, Kiev, UKRAINE Email: d.minter@cabi.org