



**European Council  
for the Conservation  
of Fungi**

<p>Chairman Anders Bohlin Halltorpsgatan 14 SE 461 41 Trollhättan, Sweden Phone: (46)[0]520.35040 Fax: (46)[0]520.35040 E-mail: anders.bohlin@telia.com</p>	<p>Secretary Beatrice Senn-Irlet Swiss Federal Research Institute WSL Zürcherstr. 111 CH- 8903 Birmensdorf, Switzerland Fax (41) 01 739 22 15 Tel. (41) 01 739 22 43 e-mail: beatrice.senn@wsl.ch</p>
<p>Executive Committee: Shelley Evans, United Kingdom Alexander Kovalenko, Russia André Fraiture, Belgium (European Mapping Group) Heikki Kotiranta, Finland (IUCN Criteria Group) Anders Dahlberg, Sweden (European Redlist-Group) Claudia Perini, Italy (Planta Europa-Representative) Régis Courtecuisse, France</p> <p><a href="http://www.eccf.info">www.eccf.info</a></p>	

**Newsletter 14 – February 2006**

Contents

**Country reports for the period 2000-2005:** Armenia, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Iceland, Italy, Montenegro, The Netherlands, Norway, Poland, Romania, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Ukraine, United Kingdom

**News from Planta Europa concerning mycological activities**

**Resolutions from the 7 th Meeting in Cordoba, 9-12 November 2005**

Since 2003 ECCF (European Council for the Conservation of Fungi) is a committee of EMA (European Mycological Association), see <http://www.euromould.org/>

# 1. Endangered macrofungi and a Red Book in Armenia

**Siranush G. Nanagulyan**

Armenian Mycological Society "Ecofung", ARMENIA

E-Mail: snanagulyan@ysu.am

After the XIV Congress of European Mycologists in Ukraine, the professional mycologists from Armenia decided to establish the Mycological Society. In 2004 the first Armenian Mycological NGO under the name "Ecofung", the Armenian Mycological Society, was founded. The main goals of our organization are: to support mycological scientific and education activities connected with Armenia; to maintain and develop a mycological herbarium; to promote fungal conservation; to create a computer Database for separate taxonomical groups of fungi; to exchange information on species research results and status; to share experience on species and its habitat conservation activities; to publish the scientific and popular illustrated books/brochures; to publish of national and regional fungal Red Data Lists; to promote international and regional cooperation in monitoring, mapping, research programmes; to facilitate development of long term action plan on species and its habitat conservation throughout the Armenia and Caucasus region; to promote multi-national cooperation.

In Armenia there is no specific legislation for the conservation of rare and threatened species of plants and mushrooms. Commission for the Monitoring of Threatened Plants working within the Ministry of Nature Protection is preparing a new second edition of the Red Book of Armenia. No one fungus species was included in the first edition, which was published more than ten years ago. Nowadays the experts from Armenian Mycological Society and department of Botany of Yerevan State University has been given the mandate by the Armenian government and Ministry of Nature Protection to propose the inclusion of a number of fungi species into the new edition of Red Book of Armenia. Therefore we propose that a total number of 35 macroscopic fungi species be included in the Red Book. These are: *Agaricus tabularis* Pk, *Agaricus xanthodermus* Gen., *Amanita gemmata* (Fr.)Bert., *Amanita muscaria* (L.)Pers., *Amanita phalloides* (Fr.:Fr.)Link, *Asterophora lycoperdoides* (Bull.:Fr.)Dittm., *Astraeus hygrometricus* (Pers.: Pers.)Morg., *Bankera fuligineoalba* (Schmidt:Fr.)Pouzar, *Batarraea phalloides* (Dicks.)Pers., *Boletopsis leucomelaena* (Pers.)Fay., *Boletus edulis* Bull.:Fr., *Boletus satanas* Lenz, *Clavariadelphus pistillaris* (Fr.: Fr.)Donk, *Collybia cookei* (Bres.)J.D.Arnold, *Cystoderma amianthinum* (Scop.:Fr.) Fay., *Dictiophora duplicata* (Bosc)E.Fish., *Hapalopilus croceus* (Pers.:Fr.)Donk, *Haploporus odoratus* (Sommerf.:Fr.)Bondartsev & Sing., *Helvella atra* Holmskj.:Fr., *Hericium coralloides* (Scop.:Fr.)Pers., *Hericium erinaceum* (Bull.:Fr.)Pers., *Leucoagaricus macrorhizus* Locq.: Horak, *Macrolepiota puellaris* (Fr.)M.Moser, *Montagnea radiosa* (Pallas) S.Rauschert, *Mutinus caninus* (Huds.:Pers.)Fr., *Myriostoma coliforme* (Dicks.:Pers.)Cda, *Phallus impudicus* L.:Pers., *Phyllotopsis subnidulans* (Overh.)Sing., *Pleurotus eryngii* (DC:Fr.)Quél., *Podaxis pistillaris* L.:Fr., *Rhodotus palmatus* (Bull.:Fr.)R.Mre, *Sarcosoma globosum* (Schmiedel) Casp., *Strobilomyces strobilaceus* (Scop.:Fr.)Berk., *Suillus grevillei* (Klotzsch:Fr.)Sing., *Tuber aestivum* Vitt.

In the project "Mapping of threatened Fungi in Europe" for mapping were proposed the rare and extremely rare species of macromycetes in Europe. Out of the 50 European target species, in Armenia were found 10 fungal species (*Bankera fuligineoalba*, *Batarraea phalloides*, *Hapalopilus croceus*, *Haploporus odoratus*, *Helvella atra*, *Hericium erinaceum*, *Montagnea radiosa*, *Myriostoma coliforme*, *Sarcosoma globosum*, *Strobilomyces strobilaceus*). All necessary information concerning selected species was sent to Peter Otto for inclusion in European mapping project.

## 2. A short report on protection, mapping and monitoring of fungi in Austria (2005)

Irmgard Krisai-Greilhuber

Institute of Botany, University of Vienna, Rennweg 14, 1040 WIEN, Austria  
irmgard.greilhuber@univie.ac.at

### Legal protection of fungi

There is no law of nature conservation which is valid for the whole state. Each of the nine federal state has own regulations. Many federal state laws do not explicitly include fungi. The separate laws for national parks mostly do not allow picking of fungi.

Only in Carinthia, Salzburg and Tyrol there are "Pilzschutzverordnungen" within the law of nature conservation. In Tyrol it is forbidden to destroy wild growing fungi, picking is limited to two kg per person and day from 7.00 to 19.00, mechanical tools, such as rakes and hoes are not allowed, and organised mushroom forays are forbidden. In Carinthia it is forbidden to destroy wild growing fungi, to bring out natural or artificial fertilizers, pesticides or fungicides in the free countryside, to collect fully protected fungi and semiprotected fungi in nature protected areas and in the centre of the national park, to organise forays for semiprotected fungi. 35 fungi are fully protected the whole year round in the whole country. 46 fungi are semiprotected the whole year round, that means the mycelium is fully protected and only two kg fruitbodies may be picked between June, 15, and September, 30. Special regulations for mushroom enterprises are possible. In Salzburg it is forbidden to destroy or collect inedible fungi or of fungi unknown by the collector, to use collecting tools; to organise, perform or participate in forays, to pick in several special regions, and to collect before 7.00 and after 19.00, from October 1, after 17.00. Picking for commercial purposes in most cases needs a written allowance.

In the nature conservation law of Upper Austria seven fungi are fully protected. In Vorarlberg it is only allowed to pick 2 kg edible mushrooms from 8.00-17.00. In Lower Austria protection is very generally, it is forbidden to destroy wild growing fungi. Burgenland, Styria and Vienna do not mention fungi in their laws.

### Red list

The second edition of a national Red List appeared in 1999 (Krisai-Greilhuber 1999). It is largely based on data of East Austria and still incomplete due to the widely known difficulties in compiling such lists for fungi, e.g., difficult and incomplete observations (white spots for many areas), lack of a sound database, taxonomical problems, only few mycologists, unclear interpretation of old records, lack of time and money for keyboarding, etc. The categories used follow slightly adapted IUCN criteria. It comprises altogether 593 species, 5 EX, 14 CR, 137 EN, 338 VU, 99 SU. 250 species are mycorrhizal, 74 saprotrophic on wood, 255 saprotrophic on other substrata, only 26 biotrophic. The majority of species occurs in deciduous and mixed woods and forests, 114 species in poor pastures, dry meadows and dry grassland, 64 in bogs, 55 in riverine woods.

### Mapping project

To alter the inconvenient situation concerning knowledge about fungi in Austria which is far behind that of higher plants, the Austrian Mycological society started in 1997 to run a database of digital distribution data. It began with a small work shop on databases and developed slowly over the years. 2003 a clear concept was written and fund raising took place by the project leader W. Dämon. In 2004 the new software BioOffice could be acquired by funding through the nature conservation departments of five federal states (Lower Austria, Salzburg, Tyrol, Upper Austria, Vienna) and the UBA (Umweltbundesamt). Data are from literature, from specimens in public herbaria (WU, W, IB, GZU, LI) and from field records and private data collections. More than 13000 observation data gathered and digitized by A. Hausknecht together with members of the Austrian Mycological Society during the past 25 years are the fundament of the actual

database. 2005 it had more than 172000 data of 5630 taxa. For active contributors the database is available online. Thanks to H. Rainer the herbarium data of WU are also online (<http://herbarium.botanik.univie.ac.at/database/collections.htm>). Slowly the number of voluntary and professional contributors to the database increases but funding for keyboarding a lot of data waiting in herbaria and literature is needed.

Regional mapping projects exist in Styria and Vorarlberg.

A summary of floristic data from Austria for the *Cortinariaceae* was published by Keller & Moser (2001). Floristics, coenology and ecology of corticioid fungi in the province of Salzburg were presented by Dämon (2001). Other fungal groups or distribution data relevant for Austria are presented in articles in the Austrian Journal of Mycology, e. g. *Lepiota* by Hausknecht & Pidlich-Aigner (2005), for further citations see the contents of the journal at the homepage of the Austrian Mycological Society at <http://www.botanik.univie.ac.at/mycology/omg/>

### Monitoring project

A small monitoring project dealing with temporal changes in macromycete biodiversity is underway (submitted to the Austrian ministry of Science). It plans to survey macromycetes in several selected habitats for the next five years (and longer) in the first step mainly in East Austria (inclusion of other regions planned). Species numbers will be recorded per plot at least three times per year, abundance and populational development will be estimated with a logarithmic scale of fruitbody numbers. The project will be performed by volunteers and professional mycologists. Data will be keyboarded and sent to the Austrian monitoring centre.

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## 3. Recording, mapping and protection of fungi in Belgium (2001-2005)

**André Fraiture**

Jardin Botanique National de Belgique, Domaine de Bouchout, B-1860 Meise, BELGIUM  
E-Mail: [fraiture@br.fgov.be](mailto:fraiture@br.fgov.be)

Preliminary note : In Belgium, nature protection is no longer in the hands of the national (= federal) government but is now ruled by the three administrative Regions of the country : Flemish Region (northern part of the country), Walloon Region (southern part of the country) and Brussels Region.

### Actual status of a national Red List

Up to now, no national Red List for Fungi has been produced in Belgium and nothing is planned for the next future. A regional Red List (Walleyne & Verbeken 2000) has been published by the Flemish Region. Only some groups of macrofungi have been taken into account. They belong to the Ascomycetes (Geoglossaceae s.l., *Poronia* and many fleshy Pezizales) and Basidiomycetes (*Amanitaceae*, *Hygrophoraceae*, *Tricholoma*,

Collybia s.l., Marasmius s.l., Russulaceae, Boletales, Pleurotaceae, Cantharellaceae, hydroid fungi and epigeous Gasteromycetes).

The frequency of the species is calculated for the periods "up to 1985" and "1986-1997" and corrected according to the number of visited squares in both periods. On the 552 studied species, 43 are considered as "extinct in the area", 46 as "critically endangered", 66 as "endangered", 118 as "vulnerable", 35 as "susceptible" (rare), 26 as "indeterminate" (probably endangered), 6 as "near-threatened", 187 as "safe" and 25 as "insufficiently known" (recently described species or taxonomically problematic taxa).

The changes in the mycoflora in Flanders show great similarities with the evolution observed in other European countries. More particularly, the area has a large number of endangered species and biotopes in common with the Netherlands. This is not surprising since biotopes, climate, soils and agricultural practices are very similar in Flanders and in The Netherlands.

### **Actual status of a national monitoring of mapping project**

Some distribution maps have been published during the last five years. The main contribution is the fasc. 3 of the "Distributiones Fungorum Belgii and Luxemburgi" (Fraiture & Walley 2005), presenting a commented distribution in Belgium and the Grand-Duchy of Luxemburg of the 50 species (51 with *Poronia erici*) studied at the European level by the ECCF. Other national distribution maps have been published (see e.g. Fraiture 2001 and Ghyselinck 2002). Other publications contain distribution maps restricted to the northern part of the country (Flemish and Brussels Regions): e.g. Walley (2004), Vanaelst et al. (2004) and Volders (2002). A local distribution atlas of the fungi in the province Limburg has also been published, based on ca. 75.000 observations of 1500 species of macrofungi (Lenaerts et al. 2004). An atlas of the fungi of the region of Leuven is in preparation and will be printed in 2005 or 2006.

In 1996-2001, the Brussels Region realized a study on the fungal biodiversity of its territory (Vanholen et al. 2001). A list of 1334 observed species has been compiled, partly by consulting literature, herbaria and several unpublished manuscripts. Field work has also been performed, with periodical "relevés" in permanent plots. Several mycological societies cooperated by organizing forays in the studied territory.

Despite the lack of a national distribution atlas of the fungi of Belgium, we can say that the Belgian mycoflora is rather well known. Partly due to the high density of the population, (mainly amateur) mycologists are numerous and the amount of published and unpublished data on Belgian mycoflora is very high. Many of those data are still not computerized but the size of the databases is rapidly growing. At present, the biggest Belgian mycological data banks are FUNBEL (KAMK, Antwerpen, 450.000 data) and BR mycological herbarium (National Botanic Garden of Belgium, Meise, 160.000 data but only 40.000 concerning Belgium). If we add some smaller databases, we can assume that the total number of computerized data concerning the Belgian mycoflora averages now 550.000.

Belgium has no national checklist. A first critical checklist (documented presence/absence) of macrofungi of northern Belgium will be published in 2006. A national checklist of Uredinales is also in preparation.

Monitoring of forest reserves has been started in 2003 in Flanders (dutch methodology, up to now, only 12 transects involved in project) and in 2004 in Wallonia (3 sites).

### **Actual awareness of authorities and local population of conservation of fungi**

Up to recently, fungi have been almost totally ignored by the nature protection policy in Belgium. The first Belgian natural reserve devoted to mushrooms has been recently created (by Flemish Region): it is the richest waxcap grassland of the country with about 30 *Hygrocybe* / *Hygrophorus* species and 12 clavarioid species.

Collecting plants, animals and mushrooms is now totally prohibited in domanial forests in the Flemish Region ("Bosdecreet"). Since this year, mushroom picking is strictly restricted and controlled in the Brussels Region. In Walloon Region, there is an

interdiction of circulating outside of the roads and paths and a restriction of the amounts of mushrooms collected.

A booklet on mushroom-friendly forest management (adapted from Keizer 2003) will be published and distributed to all foresters of the Flanders department of Forestry.

### **Specific problems or success stories**

Specific problems: at present, no species is protected by law in Belgium, neither at a national nor regional level. The fact that nature protection is now a regional matter makes difficult the compilation of a national Red List and a national check-list.

Success stories: the recent creation of a natural reserve devoted to the protection of fungi (see above). In northern Belgium, a network of (rather small) forest reserves has been created in 1995 and consisted, in 2004, of about 1500 ha strict (= unmanaged) reserves, which is favourable for wood inhabiting fungi.

### **Scientific studies in relation to conservation of fungi**

A list of indicator species of important sites for wood inhabiting fungi on *Fagus* in Belgium and the Netherlands has been proposed (Walleyne & Veerkamp 2005). It has been adapted from European, Danish and British systems (Christensen et al. 2005, Ainsworth 2004).

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## **4. Conservation of Fungi in Bulgaria, 2000-2005**

**Cvetomir M. Denchev & Melaniya M. Gyosheva**

Institute of Botany, Bulgarian Academy of Sciences, 23 Acad. G. Bonchev St., 1113 Sofia, BULGARIA. E-mails: cmdenchev@yahoo.co.uk; gyosheva@biofac.uni-sofia.bg

### **Red List of macrofungi**

A first, preliminary Red List of macrofungi in Bulgaria has been published in 2000 (Gyosheva *et al.*, 2000). The list includes 19 ascomycetes and 106 basidiomycetes. In that list five threat categories were applied – extinct, endangered, vulnerable, rare, and indeterminate. The main purpose of that preliminary list was to initiate important research in fungal conservation and to accelerate proposals for legal measures to conserve fungal diversity.

Within the framework of the project *Red lists of plants and fungi in Bulgaria* (2003-2005), assigned by the Ministry of Environment and Water of Republic of Bulgaria, a

contemporary *Red list of fungi in Bulgaria* was prepared (Gyosheva *et al.*, 2006). In that list, current IUCN Red Data Book Categories (IUCN 2001, 2003a, b) were put into practice for the fungi. The list includes 215 species of ascomycetes and basidiomycetes, as follows: 37 Critically Endangered (CR), 105 Endangered (EN), 40 Vulnerable (VU), 14 Near Threatened (NT), and 19 Data Deficient (DD). Establishment of a new and contemporary *Red list of fungi in Bulgaria* is an extremely important and promising step for fungal conservation in Bulgaria.

Thirteen from the total of 33 species, which are candidates for listing in Appendix 1 of the *Bern Convention*, have been found in Bulgaria. These species are included in the *Red list of fungi in Bulgaria*.

Work has begun on a *Red Data Book of Republic of Bulgaria. Vol. 1. Plants and fungi* (2004-2007). It will help legitimize conservation of fungal diversity in Bulgaria.

### **Legal protection of fungi**

Picking of fungi is not regulated by national or supranational laws in Bulgaria. In that country lacks a specific document (law or decree) regulating the collection, purchase, sale, and export of wild fungi. The absence of such a document, which should serve as a normative base for future conservation of fungi, is a serious problem. Collecting of fungi in Bulgaria is thus absolutely free and uncontrolled, and has greatly escalated since 1990 (Drumeva-Dimcheva & Gyosheva-Bogoeva, 1993; Fakirova *et al.*, 2000; Gyosheva & Denchev, 2000; Gyosheva, 2001; Denchev & Bakalova, 2002; Denchev *et al.*, 2005). Fungi were omitted from the *Biodiversity Act*, published in 2002, and are not treated as part of Bulgaria's biodiversity because they do not fit in the terminology in common use, i.e. they are not a component of the terms *plants*, *flora*, *animals*, and *fauna*. In the whole document, there is no place where the words *fungi* and *fungal diversity* are used. There are no fungal species in the appendixes to the *Act*, which include lists of protected species and/or species restricted to a regulated regime of use (Denchev, 2005a; Denchev, *et al.*, 2005).

In May 2004, a *Workshop on current problems of investigation and conservation of the biodiversity in Bulgaria* was held in Sofia. Mycologists from the Bulgarian Mycological Society took a part in that symposium with an oral presentation entitled *Fungal diversity in Bulgaria – current status of the investigation, conservation, and rational utilization* (Denchev *et al.*, 2005). During that workshop the new *National Biodiversity Conservation Plan* (2005-2010) was discussed. The Bulgarian Mycological Society proposed that this *Action Plan* should aim for: (1) amendments and supplements to the *Biodiversity Act* which to correct omissions about fungi, and (2) development of a *Regulation on the wild fungi* for the *Biodiversity Act*. Later both proposals were accepted in the new NBCP. They will be tasks of great importance for Bulgarian mycologists.

### **Conservation of fungi in practice**

Surveys for macrofungi were carried out in some protected areas: Central Balkan National Park (Fakirova *et al.*, 2000, 2002), Rila National Park (Gyosheva & Denchev, 2000), Rila Monastery Nature Park (Gyosheva, 2003), Pirin National Park (Fakirova *et al.*, unpubl.), and Mantaritsa Reserve in the Rhodopes (Gyosheva *et al.*, unpubl.), as well as in the Bulgarian wetlands (Denchev, in press; Gyosheva, in press).

### **Mapping of macrofungi**

One Bulgarian mycologist participates in a project of ECCF, leading by Peter Otto, for *Mapping and monitoring of threatened fungi in Europe* (50 threatened fungal species, including all 33 species candidates for listing in Appendix 1 of the *Bern Convention*).

### **Development of a Fungal Biodiversity Monitoring System**

A *Framework for development of a National Biodiversity and Protected Areas Monitoring System in Bulgaria* was created and published (Gospodinov *et al.* 2005). For the first time, fungi will be included by the Ministry of Environment and Water in a

monitoring system at national level. For that purpose, a set of methods were discussed and proposed by Denchev (2005b).

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## 5. Conservation of fungi in Croatia, 2000-2005

**Armin Mesic & Zdenko Tkalcec**

Croatian Mycological Society; Sveti Duh 63/1; HR-10000 Zagreb; CROATIA

E-mail: armin.mesic@zg.htnet.hr

Conservation of fungi in Croatia started in 1998 with first edition of "Rule Book on Protection of Fungi". The Rule Book regulates the way of mushroom picking and protects 130 species of fungi from picking. "Rule Book on Protection of Fungi" was revised in 2002. Croatian Mycological Society in cooperation with State Institute for Nature Protection produced a first official "Red List of Croatian Fungi" in spring of 2005 (<http://www.dzpz.hr/publikacije/Crveni%20popis%20gljive.pdf>). The Red List comprises 349 species, 55 of which are considered Critically Endangered (CR), 77

Endangered (EN), 119 Vulnerable (VU), 35 Near Threatened (NT), and 63 Data Deficient (DD), according to IUCN categories. Third revision of "Rule Book on Protection of Fungi" in conformation with "Red List of Croatian Fungi" will be published this year. Preparation of "Red Book of Croatian Fungi" has started in summer of 2005 and will be finished in 2007. In autumn of 1999 the Croatian Mycological Society started the long-term scientific project called "

Recording and Mapping of Croatian Fungi". Data collected within this project constitute the basis for an evaluation of the threat status of fungal species. In Croatia we have good cooperation between mycologists and authorities on level of bringing regulations, but we should improve the implementation of protection measures on the field and establish new protected areas. We have a lot of work to do with local mushroom hunters who are used to pick all edible mushrooms and do not pay any attention to protection measures. In Croatia we have very good cooperation between mycologists and employees of public institutions responsible for protected areas. For those public institutions we carried out few scientific and conservation projects which resulted in proposition of measures for conservation of fungi and their habitats in protected areas.

Within "Natura 2000" project we made analysis and survey of 52 important localities for fungi in Croatia.

## **6. Conservation of fungi in the Czech Republic: Situation to the Year 2005**

**Rostislav Fellner**

St. John's College & Centre for Ecological Research and Education,  
Svaty Jan pod Skalou 1, CZ-266 01 p.o. Beroun, CZECH REPUBLIC  
e-mail: rfellner@svatojanskakolej.cz

### **Mapping of macrofungi**

Though data on the distribution and habitat of fungi form the basis for their conservation, there is no permanent mapping programme for specific species of fungi in the Czech Republic. It does not mean, however, that there is no effort to map macrofungi in our country. The National Agency for Nature Conservation in the Czech Republic, directories of some National Parks and administrations of some Protected Landscape Areas accepted in last years macrofungi as a possible part of their mapping programmes.

For example in 2001-2003 the mycological research organized by the Czech Scientific Society for Mycology on the basis of order from the Directory of the National Park "Česko-saske Svycarsko" was organized on the mapping grid system used for all other elements of flora and fauna in the national park. Similarly for example the administration of the Protected Landscape Area "Bohemian Karst" began in 2004 to localize macrofungi as a part of their mapping programme and in other Protected Landscape Areas and National Parks they are in a similar phases or they plan to accept macrofungi in their mapping programmes. There is another supporting fact that fungi were accepted as a part of the IPA (Important Plat Areas) Programme in the Czech Republic and responsible authorities in nature conservation in the Czech Republic had to accept them as a part of preparing materials and relevant data for this programme (Fellner 2003).

From the character of the programmes mentioned above it is clear that mainly areas having a status of nature conservation from the law can be the matter of interest in these mapping activities. It means that all other territories are unfortunately mostly out of the interest in this kind of mapping in our country.

### **Macrofungi in Long Term Ecological Research**

Macrofungi are not very often included in a long term ecological research (LTER) projects in our country. Though there was an attempt to retain some permanent plots in oak, beech, spruce and other types of forests from preceding research projects from the former Czechoslovakia to become a part of continuing LTER projects in the Czech

Republic, at the end only permanent plots in *spruce* forests in the Giant Mts. National Park rode up to 2005 (cf. data from Fellner 1983, 1987, 2000, 2003-2005; Fellner & Landa 2001, 2003; Fellner et al. 1991-1993, 1991-1995). From the promising project of monitoring macromycetes in European *oak* forests (cf. Perini et al. 2000) only 2 plots in the Central Bohemia were a part of the forest monitoring project in the last years (Landa 2002-2004, internal reports; cf. Peskova 2005); in 2005 the oak monitoring project was unfortunately stopped. In the LTER projects in the Czech Republic the research and monitoring of macrofungi was mostly organized in basic plots of 1000 m<sup>2</sup> and in minimareal plots of 2500 m<sup>2</sup>.

Results of this kind of mycological monitoring confirmed a partial recovery of many mycorrhizae-forming fungi since the second half of the 90s years, that is for example macrofungi which were not registered in the Giant Mts. for a long period (Fellner & Landa 2001, 2003).

### **Red List and Red Data Book**

A first material for preparing a red list of macrofungi in Czechoslovakia was prepared in 1986 as an effort to collect relevant data for decision which species of macrofungi are to be included in the Red Data Book of Czechoslovakia (Sebek 1985). Red Data Book including 119 representatives of endangered species was later published (Kotlaba et al. 1993) but the work on preparing a red list of fungi stopped at that time in the Czech Republic;<sup>1</sup>. The only continuing activity concerned establishing the Register of highly endangered species of macrofungi in the Czech Republic (Fellner 1996); it included about 60 species of macrofungi.

Only in 2003 thanks to the activity of Jan Holec and Miroslav Beran the work on the red list of macrofungi of the Czech Republic are revived and it seems that could be closed in 2006 by editing the Red List of Fungi officially (Holec & Beran 2006). This Red List will cover more than 1000 species of macrofungi. The criteria for selecting fungal species to be included in the Red List are in accordance with the most recent version of the IUCN criteria (2001).

### **Legal Protection of Fungi and conservation of fungi in practice**

From 1995 46 species of fungi is protected by law in the Czech Republic (cf. Antonin & Bieberova 1995)<sup>2</sup>. This list of fungi protected by regulation in the Czech Republic was later proposed for a revision in 2000 but it was only slightly modified in 2002 (for details see Holec and Beran 2004). The amendment of the law was discussed again in spring 2005 and its substantial revision was proposed. On the basis of large discussion the list includes now 95 species in 3 categories of their endangering (see Annex 1). There is a hope that the amendment will be accepted and published before the end of 2005.

From practical point of view the list of fungi protected by the law mostly does not prevent from picking up fruit-bodies of endangered fungi though it is declared in this law that any part of the organism is not allowed to be damaged or destroyed etc. and so on. But the list can be largely used for legal protection of their localities and habitats.

### **Conclusive remarks**

It seems that recent development including fungi in IPA strategy and projects could help the position of fungi in the sphere of nature conservation and in funding their monitoring as well. This change seems to be partly recognizable in about last three-five years in more willingness to include the research of macrofungi into inventory research projects in protected natural areas and at least partial financing of this research. Personal and financial covering of mycological research stays notwithstandingly the key problem for using IPA strategy in next ecological projects and also in planing of management and conservation of nature within natural reserves, national parks and other protected areas.

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<sup>2</sup> And from 1999 52 species of fungi is protected by law in the Slovak Republic (cf. Lizon 2001).

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### Annexe 1

Proposal for the amendment of the list of fungi protected by the law in the Czech Republic (2005)

Latin name	Category of threat		
<i>Armillaria ectypa</i>	KO	<i>Amanita friabilis</i>	KO
<i>Boletus rhodopurpureus</i>	KO	<i>Boletus regius</i>	KO
<i>Bovista paludosa</i>	KO	<i>Hydnellum aurantiacum</i>	KO
<i>Catathelasma imperiale</i>	KO	<i>Hydnellum caeruleum</i>	KO
<i>Floccularia straminea</i>	KO	<i>Hydnellum suaveolens</i>	KO
<i>Gomphus clavatus</i>	KO	<i>Leucopaxillus lepistoides</i>	KO
<i>Inonotus andersonii</i>	KO	<i>Ramariopsis subarctica</i>	KO
<i>Pholiota henningsii</i>	KO	<i>Rhodocybe obscura</i>	KO
<i>Trichoglossum hirsutum</i>	KO	<i>Rubinoboletus rubinus</i>	KO
<i>Tricholoma nauseosum</i>	KO	<i>Spathularia flavida</i>	KO

Tricholoma pardalotum	KO	Skeletocutis odora	KO
Bankera fuligineo-alba	KO	Sparassis brevipes	KO
Amanita caesarea	KO	Suillus flavidus	KO
Amanita ovoidea	KO	Tricholoma colossus	KO
Amanita vittadinii	KO	Microstoma protracta	KO
Amylocystis lapponica	KO	Boletus fechtneri	KO
Boletus moravicus	KO	Boletus satanas	SO
Boletus rhodoxanthus	KO	Agrocybe stepposa	SO
Clitocybe barbularum	KO	Boletopsis grisea	SO
Geastrum hungaricum	KO	Flammulaster limulatus	SO
Aurantioporus croceus	KO	Flammulina ononidis	SO
Chamonixia caespitosa	KO	Geastrum pouzarii	SO
Hericium erinaceus	KO	Gerronema chrysophyllum	SO
Hygrocybe calyptriformis	KO	Gyrodon lividus	SO
Hygrocybe sciophana	KO	Hericium flagellum	SO
Hygrophorus piceae	KO	Hydropus atra mentosus	SO
Montagnea arenaria	KO	Hygrocybe punicea	SO
Myriostoma coliforme	KO	Inocybe acutella	SO
Omphalina discorosea	KO	Lactarius repraesentaneus	SO
Pseudorhizina sphaerospora	KO		
Lactarius spinosulus	SO		
Leucopaxillus compactus	SO		
Marasmiellus carneopallidus	SO		
Microglossum viride	SO		
Phaeocollybia christinae	SO		
Phellodon confluens	SO		
Pseudoplectania vogesiaca	SO		
Rhodotus palmatus	SO		
Russula helodes	SO		
Tricholoma viridilutescens	SO		
Tubaria confragosa	SO		
Tuber aestivum	SO		
Cortinarius praestans	O		
Dermocybe uliginosa	O		
Disciotis venosa	O		
Inocybe jurana	O		
Lentinellus ursinus	O		
Phellinus rhamni	O		
Pycnoporellus fulgens	O		
Ramaria botrytis	O		
Ramaria subbotrytis	O		
Russula alnetorum	O		
Vibrissea truncorum	O		
Xerula melanotricha	O		
Albatrellus pes-caprae	O		
Amanita echinocephala	O		
Camarops tubulina	O		
Cantharellus friesii	O		
Cortinarius nanceiensis	O		
Dermoloma josserandii	O		
Hypholoma myosotis	O		
Phellinus nigrolimitatus	O		
Pluteus aurantiorugosus	O		
Tricholoma orirubens	O		
Urnula craterium	O		
Volvariella caesiointincta	O		

KO = critically endangered  
SO = strongly endangered  
O = endangered

## 7. Conservation of Fungi In Denmark, 2000-2005

**Jacob Heilmann-Clausen**

Skælskørvej 22, DK-4180 Sorø, DENMARK  
e-mail: [jhc@habitatvision.dk](mailto:jhc@habitatvision.dk)

### Mapping of macrofungi

No official mapping project for fungi exists in Denmark. An interactive internet database was however launched in 2005, in occasion of the 100 yrs anniversary of the Danish Mycological Society (<http://www.svampe.dk/mykomarathon/index.htm>). So far (1st Nov. 2005) almost 26.000 records have been added by volunteers, pointing to a large potential for fungal monitoring among skilled amateur mycologist in the society. In addition fungal specimens stored at the Botanical Museum at the University of Copenhagen are increasingly being transferred to a database (<http://130.225.211.158/svampebase/search.htm>), which is searchable via the internet. This database so far contains about 36.000 records.

### Fungi in Ecological Monitoring

No national monitoring programme on fungi is operating in Denmark and fungi are not included in any official programs on habitat assessment etc. However, some projects have been conducted in which macrofungi have been monitored more systematically. Wood-inhabiting fungi have been inventoried in a number of projects; some very detailed (Heilmann-Clausen et al. 2005, Heilmann-Clausen & Christensen 2005) others using a more extensive basis, focussing on selected indicator species (Heilmann-Clausen & Christensen 2000, Strange et al. 2004). The inventories of fungi living on dead beech wood have been linked with similar projects in other European countries, making an extensive comparison of beech forests possible at the continental scale (Ódor et al. 2003, Ainsworth 2004, Christensen et al. 2004, Heilmann-Clausen 2005, Walley & Veerkamp 2005). These comparisons have shown that some unmanaged Danish beech forests are of European importance for wood-inhabiting fungi living on decaying wood (Christensen & Heilmann-Clausen 2003, Heilmann-Clausen & Christensen 2004). More extensive projects have focussed on fungi living in oak scrubs (Vesterholt & Christensen 2002) and fungi inhabiting swamp forests with alder (Heilmann-Clausen & Aude in prep.)

### Red lists

The first Red list of macrofungi in Denmark was published by the Danish Mycological Society in 1990 (Vesterholt & Knudsen 1990) and soon incorporated, with small modifications, in the official Danish red data book published by the Ministry of the Environment in 1991 (Asbirk & Søgaard 1991). A second, updated edition was published in 1998 (Stoltze & Pihl 1998), together with a yellow list comprising species subject to decline, but not yet regarded as threatened (Stoltze 1998). From 1991 to 1998 the number of redlisted fungi declined from 903 to 878, mostly because a number of inconspicuous resupinate corticoid fungi were omitted from the list due to lack of reliable distribution data. A searchable database containing data on all known localities of species listed in the 1997 red-list are available at:

<http://130.225.211.158/mycosoc/Reddata/search.htm>

The first red-data books did not refer strictly to IUCN criteria, but in 2003 a new red-listing program was initiated, using a national manual based on the updated IUCN criteria from 2001 (Wind 2003). The aim of the project is to evaluate the status of all larger

organisms living in Denmark. So far 613 fungal species have been evaluated, of which 207 have been classified as regionally extinct (RE), critically endangered (CR), endangered (EN), vulnerable (VU) or near-threatened (NT) following the new criteria. A further 45 species has been classified as data deficient (DD). About 1100 fungal species are under evaluation this year and are expected to be published online in spring 2006 on <http://redlist.dmu.dk> which is also the place to look for information and status on the species evaluated so far.

Although Danish red-list since 1991 has been official documents they have limited practical consequences for nature policy. The fungi on the list are not protected by law, neither are their habitats. However, data on the distribution of red-listed fungi are increasingly used in VVM assessments, and has in a few cases led to modifications of larger construction projects.

Apart from the national red-lists a regional red-list was issued by the county councils of Storstrøms Amt in South-eastern Denmark, comprising several highly valuable localities for fungi (Hansen & Vesterholt 2002). Apart from a list of species the report includes maps of the most valuable forests with actual growing places indicated and a short description of habitat preferences etc. for each red-listed species recorded in the county. 40 species were classified as regional responsibility species because a major share of the known Danish records were made in the county. The report was distributed to all owners of important localities mentioned in the report and hopefully this has helped owners to take special care of hotspots for fungi on their lands.

### **Legal protection of fungi**

Picking of fungi is not regulated by national or supranational laws in Denmark. Picking of edible (or non-edible) fungi cannot be regarded as a conservation problem in Denmark, except for a few isolated cases. Most notably *Verpa bohemica* has been collected regularly on its only known growing place in suburban Copenhagen. In the Danish Mycological Society a "code of conduct" is taught on excursions and meetings, with special reference to red-listed species, especially polypores with perennial sporocarps. Almost all serious amateur mycologists understand that picking of rare and threatened species should be avoided and restricted unless necessary for documentation.

Mushroom picking seems to keep a stable level since the 1970'ies but might be becoming somewhat more widespread these years due to increased interest in 'natural food' in general and in exclusive dishes in restaurants. Besides some immigrants, in particular from eastern Europe, introduce their traditions of mushroom collecting. In future this item may therefore become more important and regulation might become desirable.

It would be more urgent to have a legal basis for protection and adequate management of sites with rare and threatened fungi. However, such legislation is lacking and it is not probable that there will be any in view of the general political tendency to reduce regulations.

### **Conservation of fungi in practice**

No official conservation efforts in Denmark are strictly focussed on fungi but several initiatives (and lacking initiatives!) with a broader approach have serious impact on the conservation situation for fungi. Most negatively, the decrease for unmanaged grasslands is continuing, mostly due to lack of grazing, but high nitrogen loads from an increasing number of pig farms are also a concern. High nitrogen loads are also a problem for ectomycorrhizal species associated with nutrient poor soils, and the decline of several species has been documented in parts of the country receiving more than 15 kg N/ha/yr (Vesterholt et al. 2000). Also other groups of open land fungi, e.g. those associated with Sphagnum bogs are most likely subject to decline, but no systematic data are available to document this.

For most other forest fungi future prospects are more positive. Since 1994 the area with strictly unmanaged forests has increased from about 400 ha to 6500 ha, due to a national strategy for natural forests. It is the intention to increase this area further in the following decades. These initiatives are without doubt beneficial for fungi associated with

decaying wood, although some of the most valuable sites for this group of fungi are still not protected. In addition some wood-decaying species now have so low population numbers that a regional extinction is still too be frightened. Terrestrial saprophytes are in general also expected to benefit from the increasing area with unmanaged forest, while the prospects for ectomycorrhizal fungi associated with rich or calcareous soils are more uncertain.

Another positive change is an increasing focus on near-natural forestry in Denmark, which most likely will increase the share of native tree species compared to exotics. The State Forests (c. 25 % of all forests in Denmark) has recently decided to apply near-natural forestry on all their areas. This include guidelines on less draining and to increase amounts of dead wood and veteran trees by leaving ten trees per ha for prolonged growth and subsequent natural decomposition in each forest cycle. Finally, it is worth mentioning that a plan to design one or more National Parks is in progress. Fungi have only been included accidentally in the pilot phase of this project, but several of the possible areas are highly valuable for fungi.

Though several positive changes for nature conservation are obvious in Denmark, it should be added that the political climate seems to be changing in disfavour of nature conservation. Since 2000 the amount of money used by the government in the nature sector has decreased dramatically. There is a strong tendency to reduce governmental efforts in the field to the minimum that is required under national and international regulations. Since fungi are neither included in national laws, nor in EEC regulations, such as Bern convention and Natura 2000 programmes, it is highly uncertain if fungi will be put higher on the conservation agenda in the coming years.

### **Role of the Danish Mycological Society**

The Danish Mycological Society plays a central role in all activities concerning conservation of fungi, especially facilitated through a conservation committee. This committee is partly filled by professional mycologists working with fungal taxonomy and ecology, partly by amateur biologists with many years of mycological field experience. The committee deals with individual cases, e.g. valuable fungal localities known to be threatened, as well as with more general conservation efforts, e.g. mapping and monitoring of fungi, red-lists and conservation politics.

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## 8. A New Estonian Nature Conservation Act

**Erast Parmasto**

Institute of Zoology and Botany, Tartu, Estonia  
E-Mail: e.parmasto@zbi.ee

A new Estonia Nature Conservation Act was approved by the Estonian Parliament 21 Apr 2004. More attention than in the previous Act was paid to the protection of species in this Law. Until recently, 30 species of fungi were protected in Estonia (24 in the list of species of II Category, 6 in I Category). Mycologists of the Institute of Zoology and Botany of the Estonian Agricultural Academy proposed to include into the new list of protected fungi 16 additional species. This proposal was accepted; however, 9 fungal species are listed in the I Category now. Of the 33 threatened in Europe fungi ("Bern Convention Species"), 14 have been found in Estonia; 13 of these are protected by Law now. The fourteenth, *Gomphus clavatus*, is not really endangered in Estonia; nevertheless, it is a species of the Estonian Red Data Book.

According to the Nature Conservation Act, **all** localities of the species of I category must be protected, not less than 50 % of the localities of the II category species, and not less than 10 % of the localities of the III category species. For this, in addition to the protection in numerous Protected Areas, many new special Species Protection Sites will be organized in 2004 already.

### List of the protected species: I and II categories

Regulation of the Government of the Estonian Republic no. 195, 20 May 2004 based on the Nature Conservation Act (2004) § 10 / 3

#### Fungal species of I Category:

Amylocystis lapponica	Pachykytospora tuberculosa
Grifola frondosa	Rhodotus palmatus
Hapalopilus croceus	Sarcodon fuligineoviolaceus
Inonotopsis subiculosa	Sarcosoma globosum
Leucopaxillus salmonifolius	

#### Fungal species of II Category

Albatrellus syringae	Entoloma bloxamii
Amanita friabilis	Geoglossum arenarium
Boletinus cavipes	Geoglossum atropurpureum
Boletopsis leucomelaena	Hygrophorus chrysodon
Boletus erythropus	Inonotus dryophilus
Boletus fechtneri	Lactarius chrysorrheus
Boletus radicans	Lactarius controversus
Boletus suspectus	Lactarius mairei
Bovista paludosa	Leucopaxillus compactus
Cantharellus melanoxeros	Macrolepiota nympharum
Chamaemyces fracidus	Morchella semilibera

Peziza ammophila  
Polyporus tuberaster  
Sacrosphaera coronaria

Sparassis crispa  
Tricholoma apium

### List of the protected species: III category

Regulation of the Minister of Environment no. 51, 19 May 2004  
based on the Nature Conservation Act (2004) § 10 / 4

Clavulinopsis corniculata  
Junghuhnia pseudozilingiana  
Oxyporus philadelphi  
Phellodon niger  
Bankera fuliginealba

Bankera violascens  
Boletopsis grisea  
Skeletocutis odora  
Sowerbyella imperialis  
Tricholoma colossus

## 9. Finland 2000-2005

**Heikki Kotiranta**

Finnish Environment Institute, Natural and Land use Division, P.O.Box 140; FIN-00251 Helsinki,  
FINLAND. e-mail: heikki.kotiranta@vyh.fi

### Red Lists

"The 2000 Red List" of Finnish species was published in 2001. The evaluation was made according to the IUCN criteria (1994) with some national applications. The different fungal groups were evaluated as well as possible. At that time about 5400 species were known from Finland and 4400 were evaluated (lichens excluded, 1452 species). Only about 50% of the Ascomycetes could be evaluated. However, it was the first time when even provisional check lists of Finnish species were made with the exception of some well known groups like Polyporaceae, Corticiaceae and Myxomycetes.

In this year the Check list of Finnish agarics will be published as well as a book of Finnish polypores (with colour prints). In 2006/7 the Check list of Finnish Aphyllophorales (around 900 species) will be published with notes on the habitats, distribution, commonness, life style and literature. Also a proposal for the new, "right" threat category is given, because the next Finnish Red List will be published first in 2010.

### Monitoring and mapping

The Ministry of Environment gives some special money for the monitoring of threatened species. It is mostly done by "amateurs" and often only the habitats are checked, because the fruiting of several species is not annual. At the moment there are no large mapping projects going on, but distribution data is collected constantly from different parts of Finland and especially the areas of threatened species are mapped. Some years ago started IPA for fungi (Important Plant Areas for fungi). This project is surveying unexamined, "white" areas in Finland, to find areas and habitats (e.g. meadows and grasslands) which are important for fungi but not yet protected.

### Conservation and publicity

The authorities in the Ministry of Environment know naturally the red lists and also the list of *specially protected species*. These *sp*-species are threatened, mostly in the categories CR or EN (not all CR or EN species are automatically specially protected). The status *specially protected* means that you cannot change the habitat (build a road, cut the trees etc.) of these *sp*-species before the harms of the changes are evaluated. If the

evaluation shows, that you cannot, e.g., cut the forest so that it does not affect the population of the *sp*-species, it often leads to problems. Especially in north eastern Finland and Lapland, where are the last large old-growth forests, there has been conflicts with the nature conservationists and paper industry. Paper industry is often supported by politicians, who do not know anything about the ecology of fungi, and nature conservation is only an obstacle to the "economic progress". These "forest fights" are well reported by the newspapers and the public opinion is very black and white – some are strictly for the conservation, some strictly against it.

### Stories

In spite of the opposite opinions of the forest protection, several large areas have been protected in the last years, especially in North Finland. There it is easier than in South Finland, because the forests in the north are mainly owned by the state. Very often the forests are protected because they harbour several threatened species, especially old-growth forest dwelling polypores, which moreover are *sp*-species. Nowadays it is a normal practice, that an area which might be worth protecting, is first investigated by polyporologists and also coleopterologists to find out the value (= number of threatened species) of the area. IPA for fungi has also already led to protection of at least one dry meadow, but we must keep in mind that this project is now only a few years old. However, it is the first, even if small, area protected only because of rare and threatened fungi. Although new nature reserves are formed, there are still too few of them in the southern Finland to ensure the populations of the old-growth forest species. Old National Parks are also expanded by buying young forests around them. These forests, especially if they are pine forests, are often burned to mimic the natural forest fires which create new dead wood and give rise to the natural succession of the forest.

Two years ago started *ex situ* conservation of some threatened Aphyllophoroid fungi. It is carried out by the town of Helsinki. Old park trees, which were dangerous because of they were decayed by threatened polypores, were cut down and brought to an out-of-the-way place, which is a forest park in Helsinki. The trunks lie on the ground and now the polypores fruit on these trunks. Another, similar area is planned to an island, with more trunks and more diverse polypore assemblages.

### Conservation and science

The old protected areas are often valuable also for fungi, even if the original decision of protection was mostly made because of e.g., 1) rare vascular plants, or 2) beautiful landscapes which include the "normal" Finnish nature (forests, bogs, rocky outcrops etc.) and its diversity. The protected areas for vascular plants are often relatively small luxuriant groves, brook-side grass-herb forests or woods with "exotic" trees, like *Quercus robur*, *Corylus avellana*, *Ulmus* spp., *Tilia cordata* etc. In the latter category belong many National Parks and Strict Nature Reserves in particular in the northern part of Finland. Fungi, and especially the wood decaying fungi of these forests have been investigated during the last 20 years, and particularly the old-growth forests have served not only rare and new species to Finland, but also several species new to science. In these protected forests it is also possible to monitor "scientifically" the populations of threatened species. We have got for instance more knowledge of the generation time of some threatened species. This knowledge is needed when evaluating the threat categories of.

### Latest Additions by Esteri Ohenoja and Tea v. Bonsdorff-Salminen, Finland

For the first time all the agarics and boletes of Finland are listed, supplemented with data on their distribution, ecology and Red list status. The work is based on a check list compiled by the authors during the Third National Monitoring of Threatened Species in Finland.

Perti Salo, Tuomo Niemelä, Ulla Nummela-Salo and Esteri Ohenoja (eds.) 2005: Suomen helttasienten ja tattien ekologia, levinneisyys ja uhanalaisuus.

Links to the publication are:

<http://www.ymparisto.fi/download.asp?contentid=43409&lan=fi>

<http://www.ymparisto.fi/download.asp?contentid=43417&lan=fi>

<http://www.ymparisto.fi/download.asp?contentid=43418&lan=fi>

## **10. Mapping and conservation of fungi in Germany – remarks on the current situation**

**Peter Otto**

University of Leipzig, Systematic Botany, Johannisallee 21, D-04103 Leipzig, Germany  
e-mail: otto@uni-leipzig.de

### **Mapping of macrofungi**

Since publishing thousands of uncommented grid maps of macro- and some microfungi by Krieglsteiner (1991-93) the efforts to map fungi have been decreased in West Germany. In the eastern part the tradition to investigate and map only a set of species of selected taxonomic or ecological groups has been continued over the years. The last series on fungi of floodplain forests and willow bushes was printed recently (Otto et al. 2005). Including it for nearly 300 fungal species data on distribution and ecology are available for East Germany (with remarks on global distribution). For rather many of them frequency changes and endangering were evaluated in detail. New series are in preparation. It seems to be noteworthy that activities to map fungi in the whole of Germany have increased for the last years. A first "Pan-German" series with information on fungal ecology was published by Dörfelt & Bresinsky (2003). A second series will be printed in the near future.

### **Data bases for fungal records**

Until now no national data base for fungi exist. There is a large data pool managed by the German Mycological Society (DGfM) but probably the majority of data is stored in regional mapping centres (sometimes in private hand and traditionally on card files). It is of urgent need to standardize data capturing and to summarize millions of records for Germany in one data base. In this respect funds raising is the main problem because the acceptance of field mycology is low at the authorities.

### **Red lists**

On national level the situation for macrofungi has been unchanged for more than a decade. The first and still valid list dates from 1992, reprinted in 1996 (Benkert et al. 1992, 1996). Besides this also preliminary red lists for selected phytoparasitic fungi (Erysiphales, Ustilaginales and Uredinales) and for slime molds (Myxomycetes) were elaborated (Foitzik 1996 and Schnittler et al. 1996). In 2004 the Federal Office for Nature Conservation (BfN) started an initiative to revise all national red lists. The three fungal lists will be updated by expert groups on a honorary basis. IUCN criteria will not be used because of their limited applicability for less investigated and less investigatable groups of organisms such as fungi in comparison to mammals, birds etc. The office plans to publish the new lists in 2008. Furthermore for all states of Germany regional red lists exist and are updated.

### **Legal protection of fungi**

The protection of fungi is regulated by law and generally not by red lists. The aim of the Species Protection Regulation (a supplement to the Nature Conservation Law and valid since 1989) is to prevent or to limit picking of some more or less edible fungi. The habitats of the fungi are not protected. It is forbidden to pick *Albatrellus* spp., *Amanita*

caesarea, *Boletus aereus*, *Boletus appendiculatus*, *B. fechtneri*, *B. regius*, *B. speciosus*, *Gyrodon lividus*, *Hygrocybe spec.* *Hygrophorus marzuolus*, *Tricholoma flavovirens* and *Tuber spp.* (it is unknown who choosed the species). In addition it is not allowed to pick *Boletus edulis*, *Cantharellus spp.*, *Gomphus clavatus*, *Lactarius volemus*, *Leccinum spp.* and *Morchella spp.* for commercial purposes (but nevertheless, it is done). Probably the regulation will not be changed in the next years.

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## 11. The Conservation of Macrofungi in Hungary

**Livia Fodor**

Office for Nature Conservation, Ministry of Environment and Water  
H-1121 Budapest, Kolto u. 21., HUNGARY  
E-mail: [kisne@mail.kvvm.hu](mailto:kisne@mail.kvvm.hu)

### Red Lists of macrofungi

Following the elaboration of several lists of the most threatened macrofungi species (Siller & Vasas 1993, 1995, Rimóczi 1997) the "Draft Red List of Hungarian macrofungi" was published in 1999, which has been worked out during a long conciliation process of Hungarian mycologists (Rimóczi et al 1999). It contains 118 genera, 280 species and 5 subspecies classified into IUCN (1994) categories.

The background information about the selected species of the list of "33 threatened fungi in Europe", which was proposed in 2003, was also collected in Hungary (Siller & Pál-Fám 2003). Hungarian experts provided data for developing the European Red List of fungi, too.

### Legal protection of fungi

After discussion lasting several years, due to the agreement of the Office for Nature Conservation and the presidency of the Hungarian Mycological Society, the elaboration of legal background of macrofungi conservation was launched at the end of 2003. Beside this there are some publications on the theoretical background of the possibilities of the conservation of macrofungi (Benedek et al. 2003).

As a first step the criteria were developed for selecting species which need legal means to achieve conservation. Afterwards detailed background information including description and characterization of species and its habitats, main threats, dataset of occurrences (date, locality etc.) was collected (Siller et al. 2005a). Then an Expert Day was organized for stakeholders and specialists and others being interested in the Ministry of Environment and Water for discussion of outcomes of data analyses and the collected information in 2004. On the basis of the results of the preparation phase the Mycological Society drew up the proposed list of macrofungi species for legal protection (Siller et al.

2005, Albert et al. 2005). According to the scientific proposal the amendment of the Ministerial Decree No. 13/2001 (V. 9.) was published in September 2005. The annexes of decree contain the lists of protected species including 35 macrofungi (see attached list). For summarizing the experiences in the field of legal protection of macrofungi we collected the practice of EU Member States (EU25). The countries were examined through a questionnaire whether they have an official or unofficial red list and/or legal protection of macrofungi. The results have been published in Hungarian with a short summary in English (Bosze & Fodor 2005).

### **Monitoring of macrofungi in the Hungarian Biodiversity Monitoring System**

It is highly intricate to choose the right monitoring methods for fungi on account of their peculiar life-cycle and the accompanying taxonomic problems which also cause great debates among mycologists. Taking these problems into consideration a group of experts has elaborated a method for monitoring fungus communities in the frame of Hungarian Biodiversity Monitoring System (Rimóczi et al. 2000, Fodor & Pál-Fám 1999). According to this method the occurrences of fruiting bodies are recorded over a period of several years using permanent sampling sites. They also put forward a proposal for numerous indexes which would be sensitive to the habitat changes in the given area. Following the pilot studies, the monitoring examinations are carried out in five forest reserves since 2000. The surveys cover parallel sampling in the core areas and buffer zones of forest reserves and a planted forest nearby (Siller et al. 2004). The aim is analysing the effects of forest management activities on the macrofungi communities. The results substantiated that the standard sampling method is applicable, and after the first sampling cycle (3-5 years) the testing of this method can certainly be concluded. The first results of 3-years monitoring will be published at the end of this year.

### **Other activities in connection with the conservation of macrofungi in Hungary**

More and more papers highlight the need of protection of fungi and give scientific background information for nature conservation aspects. Among these studies we can find inventories of macrofungi species in nature conservation areas, comparative analyses of near natural and degraded areas according to their mycological point of view, as well as state estimation of rare fungi species, etc.

As the part of the research program on Forest Reserves started during 1997-1999 in two Forest Reserves not just wood structure, botanical and zoological baseline surveys but also mycological studies were carried out (Siller 1999, Siller et al. 2002). The methods of mycological examinations were included to the methodological manual on Forest Reserves (Siller & Maglóczy 2002).

As a result of the international studies on lignicolous macrofungi of near natural beach forests (Ódor et al. 2004) several species have been proved to be biodiversity indicator in Hungary (Siller 2005).

The evaluation of nature protection areas based on data of macrofungi communities and species was put into practice in line with the draft Red List of Hungarian macrofungi (Rimóczi et al. 1999), (Siller 1999, Tóth 1999, Fodor 2003, Rudolf & Pál-Fám 2001). Comparative mycological studies have started to investigate the natural status and the influences of antropogenous effects on macrofungi communities (Pál-Fám & Rudolf 1999, Rudolf & Pál-Fám 2004). Several paper were published in the last few years on the data and distribution of different rare and threatened macrofungi species and give proposals on classifying categories according to the level of their threats and on the needed measures for their protection (Pál-Fám 1999, Zagyva 2000, Lukács 2002, 2004, Fodor & Pál-Fám 2003, Albert & Dima 2005, Rudolf & Pál-Fám 2005). Urgent need arose for establishing of basic data bank of Hungarian macrofungi species. The first version of which was elaborated in 2004 (Pál-Fám 2004, Pál-Fám et al. 2005).

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## Annexe I.

Ministerial Decree No. 13/2001 (V. 9.) on the protected and highly protected plant and animal species, on the highly protected circle of caves and on the publication of plants and animals that are significant in the European Community in respect of nature conservation

Annex IX. Protected macrofungi

<i>Amanita vittadinii</i>	<i>Hygrocybe calyptriformis</i>
<i>Battarrea phalloides</i>	<i>Hypsizygus ulmarius</i>
<i>Cantharellus melanoxeros</i>	<i>Lactarius helvus</i>
<i>Cortinarius(Phl.) paracephalixus</i>	<i>Leccinum variicolor</i>
<i>Cortinarius (Phl.) praestans</i>	<i>Leucopaxillus macrocephalus</i>
<i>Heridium cirrhatum</i>	<i>Phylloporus pelletieri</i>
<i>Elaphomyces anthracinus</i>	<i>Polyporus umbellatus</i>
<i>Elaphomyces leveillei</i>	<i>Polyporus tuberaster</i>
<i>Elaphomyces maculatus</i>	<i>Rhodotus palmatus</i>
<i>Elaphomyces mutabilis</i>	<i>Russula claroflava</i>
<i>Elaphomyces persooni</i>	<i>Sarcodon scabrosus</i>
<i>Elaphomyces virgatosporus</i>	<i>Scutigera pescaprae</i>
<i>Endoptychum agaricoides</i>	<i>Squamanita schreieri</i>
<i>Gastrum hungaricum</i>	<i>Strobilomyces strobilaceus</i>
<i>Gomphidius roseus</i>	<i>Pseudoboletus parasiticus</i>
<i>Gomphus clavatum</i>	<i>Tulostoma volvulatum</i>
<i>Gyrodon lividus</i>	<i>Volvariella bombycina</i>
<i>Heridium erinaceum</i>	

## 12. Conservation of Fungi in Iceland, 2000-2005

### Guðriður Gyða Eyjólfsdóttir

Icelandic Institute of Natural History, Akureyri Division,  
Borgir við Norðurslóð, P.O. Box 180, IS-602 Akureyri, ICELAND, e-mail: gge@ni.is

In Iceland there are no red-listed fungi and no fungi are protected by law. Fungi were not included in "Válisti 1 Plöntur" [Red list 1. Plants] published in 1996 for vascular plants, lichens, mosses and larger marine algae. This was due to incomplete knowledge of the distribution of most fungi within the country.

In 2002 the Icelandic Institute of Natural History compiled information on vascular plants, lichens and mosses which needed protection. This information was one of the sources used by the Environment and Food Agency in 2003 to draft a Nature Conservation Plan for Iceland for the years 2004-2008 (Anonymous 2003). With this plan a net of protected areas would secure the protection of geological and biological diversity by selecting areas important for birds, plants, rivers and geological formations. Again lack of information on distribution of individual species of fungi caused fungi to be excluded from the proposed list of species needing protection. From this plan the Ministry for the Environment selected 14 areas to be protected before the year 2009 from the 75 areas originally proposed in the Nature Conservation Plan. The Icelandic Parliament Althingi confirmed this in 2004 and the Environment and Food Agency has since been working towards implementing the plan. The habitats for rare plants and some of the areas for birds are also important for fungi, especially native birch forests and areas where vegetation is protected from freezing by thick snowcover from early fall well into summer. In national parks vegetation including

fungi is protected and two of these 14 areas are national park enlargements where birch forests will become part of the parks.

### **Checklist of Icelandic fungi**

In 2004 the first part of a checklist of Icelandic fungi was published (Hallgrímsson & Eyjólfsdóttir 2004) listing 1318 species of microfungi. Publication of the second part listing the "larger" basidiomycetes is planned in the year 2007 and at this time the manuscript lists approximately 550 species (Hallgrímsson & Eyjólfsdóttir in preparation). The checklists have information on known distribution, habitat and an estimate of frequency of each species within its distribution area and thus include basic information for assigning IUCN criteria to Icelandic macrofungi.

In 2004 the number of specimens of each of these 550 species in the AMNH herbarium was sorted according to biogeographic areas used in the checklists and information on frequency from the checklist's manuscript added to a data base. Based on this file each species was considered common, intermediate or rare, and its distribution wide, intermediate or limited.

Species with limited distribution and rare to intermediate frequency are possible candidates for an Icelandic red list and have been presented as such for the last year in reports on nature conservation issues published by the Icelandic Institute of Natural History (e.g. Ottósson & Baldursson 2005).

### **Towards a red list for Icelandic fungi**

The Icelandic Institute of Natural History is responsible for the compilation of red lists in Iceland and has published a red list for plants (Anonymous 1996) and for birds (Anonymous 2000). In 2006-2007 data on distribution and frequency of fungi needed to update the manuscript of the checklist of the "larger" basidiomycetes will also be used as the base for a red list of Icelandic fungi.

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## **13. Fungi conservation: what happened in Italy the past five years, 2000-2005**

**Claudia Perini**

Dipartimento Scienze Ambientali, Via P.A. Mattioli 4 , I-53100 Siena ITALIA  
E-mail: perini@unisi.it

It is not easy to report what happens in the five past years, many things were waiting in the background, some had finally a positive progress and some others are again still-standing. Anyway mycological research spread out more or less through the whole Italian territory; besides taxonomical studies, in progress from a long time and still

running, relation between fungi/environment, mechanism and causes of mycelia productivity, distribution of fungi in space/time and conservation of mycological biodiversity become study topics for numerous mycologists, either professionals or amateurs. Moreover, important studies on mycorrhizal symbiosis and micromycetes were performed; more and more fungi and other organisms are considered together in research programmes. Here only main research activities on macrofungi are summarized:

- mycofloristic investigations in several Italian districts;
- research on the ecology of truffles and their cultivation;
- mycoecology in various types of vegetation, the most constant over the years in Liguria, Sicily and Tuscany;
- mapping of macrofungi in several Italian districts and of selected fungal species through whole Italy;
- monitoring of macrofungal communities in various types of forest ecosystems in Tuscany; proposal of selected target species as bioindicators of fungal communities and environmental health status;
- investigations in nature reserves and proposals for management in order to protect rare and interesting macrofungi;
- cultivation of rare species as an attempt of *ex-situ* conservation in order to protect them in the nature;
- political measures for conservation of fungi at a national and regional level;
- experimental observation on the response of fungal communities to forest management with particular attention to the conservation and increase in production of edible mushrooms (*Boletus edulis* group, Truffles);
- studies on rare and endangered species aiming to create local redlists as a base for an Italian red-list.

The majority of past research topics are still studied; moreover, additional works began in the last years are in progress.

#### **Check-list of Basidiomycetes present in Italy:**

In the past years efforts were concentrated in checking and mapping macromycetes, in order to create a first Italian check-list as a base for actions on macromycetes protection and conservation. A regional inventory was firstly published in Tuscany, more than 1000 species of epigeous macromycetes were mapped after 3 years of observation made by amateurs and professionals from the Tyrrhenian coast up to the montane Apennines (PERINI & al., 1999). At a regional level interesting the check-list of Ligurian macrofungi reporting 1521 macrofungal species, with details about ecology and ecology, recorded in the last thirty years (ZOTTI M. & ORSINO F., 2001). Some other examples are the results of an intensive exploration in the Regional Park of the Madonie in Sicily characterized by high mountains up to 2000 m where more than 600 species in more or less 400 km<sup>2</sup> (Venturella & al., 2000) are cited, or the census in more or less 1.200 km<sup>2</sup> in the province of Varese in Lombardia that reports 1353 species (AMB Varese, 2000). Relatively new are the macrofungal flora of the Province of Siena (Italy) listing more than 1300 species published and unpublished of the past century and the one of the Province of Palermo (Sicily) with 1053 taxa (Perini et al., 2004; Venturella et al., 2005). To remember that various Monographs were published reporting very good informations on the presence of species in Italy. Finally, thanks to an agreement between the Italian Ministry of Environment and the University of Tuscia in Viterbo, than also supported by the Italian Ministry of Instruction University and Research (2000-2004) and with the help of the University of Trieste as center for the databank management, the check-list of Italian Basidiomycetes is now ready (ONOFRI & al., 2005). *Ascomycota*, *Zygomycota*, *Chytridiomycota* will be added in the near future. The checklist includes the presence at a Regional level and is complemented with an essential bibliography citing all references. Of course knowledge is different in the vast and varied territory (Italy covers more than 321.700 km<sup>2</sup>) due to high geographical, climatical, geological,

pedological and biological diversity in Italy and due to the lack of mycological observations. More or less a century after the compilation of Saccardo's *Flora Italica Cryptogama*, we have a new the Check-list of Italian at least *Basidiomycetes* composed of more than 4.300 entities, nearly 3.900 species. **Endemicity** and **Exoticism** are reported for few taxa. The note **Rarity** reports the information about the status of rarity or risk for nearly 300 fungal taxa. The **Legislative data field**, which is filled for only 96 taxa, lists Italian National and Regional laws and rules on harvesting and marketing of species. The checklist will be on-line, will be integrated with more detailed informations on ecology, distribution and so on and linked to a diatheca.

### **Redlisting of the Italian macromycetes at various level**

In 1993 the Working Group for Mycology of the Italian Botanical Society (SBI) proposed a preliminary red-list including 23 Italian macromycetes a first step for stimulate further works on this topic (Venturella et al, 1997). In the following years efforts were concentrated on other topics. Anyway as first result of the Italian network for the checklist of *Basidiomycetes* a proposal of 93 taxa considered as rare and/or endangered in Italy together with fungi species from Tuscany and Sicily to be included in future regional red-list, were presented at the Seminar on the "Harmonisation of Red Lists in Europe", 27/28 November 2002 (Leiden, The Netherlands) (VENTURELLA et al., 2002). Besides preliminary observations on ascomycetes and basidiomycetes mycodiversity from Sicily, the authors demonstrated that several rare or infrequent taxa, are suitable to be included in a preliminary regional red list (SAITTA & VENTURELLA, 2005). In Tuscany the species proposed are principally those strictly linked to endangered habitats or plants or bryophytes or at the limit of their areal. Of course some conclusion are nothing new: if the habitat/host is threatened, so is it also the strictly linked mycoflora (ANTONINI & al., 2002; LAGANÀ & PERINI, 2003; PERINI et al., 2002). The Red-data book for Tuscan macrofungi as a result of compiling all published data and observations of other 10 years, will be published in the next future. The most important anyway is that we have a first candidate from the *Regnum Fungi* redlisted on a global level: recently *Pleurotus nebrodensis* (Inzenga) Quél., a edible endemic species linked to *Cachrys ferulacea*, was included by the IUCN Species Survival Commission as a Critically Endangered (CR) species in the Top 50 Mediterranean Islands Plant project! Morphological, distributive and ecological data with molecular studies through isozyme and RAPD analysis, confirm it at a species level, the remaining populations of white *Pleurotus* species growing on Umbelliferous plants should be considered as variety of *P. eryngii*. In Sicily *P. nebrodensis* show a very punctiform distribution and a high risk of extinction mainly due to the economic value of its basidiomata. During the last 10 years the appearance of this taxon dramatically decreased. The extent of its occurrence is less than 100 km<sup>2</sup> and the number of mature individuals is very low. Notwithstanding is not easy to apply the term "population" to fungi, in the case of *P. nebrodensis* it is evident that this taxon belong to a well characterized population delimited inside the plant association *Cachryetum ferulaceae* Raimondo 1980 (Zervakis et al., 2001; Zervakis & Venturella, 1998).

Other species to be redlisted on the basis of personal experiences and on available data have been listed, but today a lot of work have to be done in order to apply in a standardized way IUCN criteria.

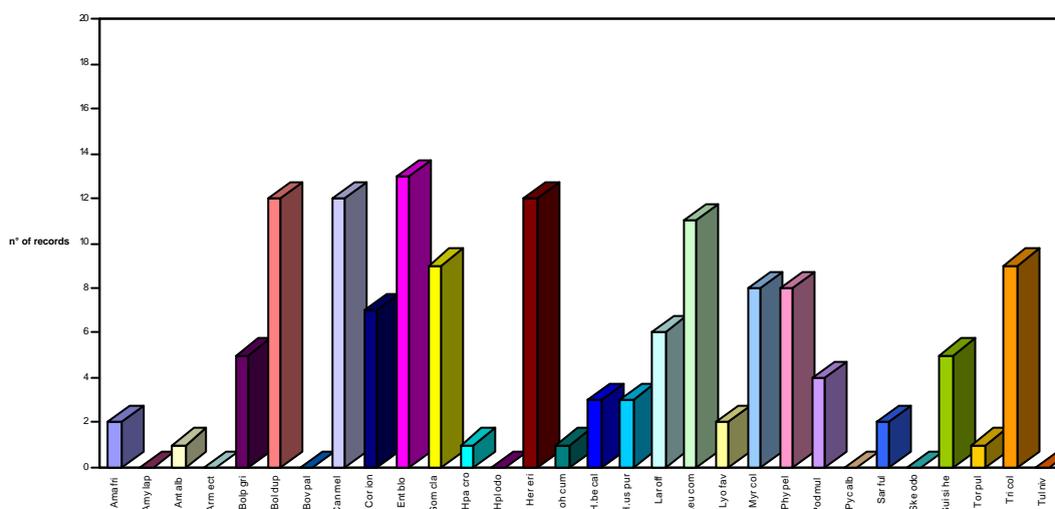
### **Conservation**

Different scientific attempts in identifying hotspots for fungi are underway, but obviously, this means that efforts should be made in order to assure political protection to these areas (PARMASTO & al., 2004). Fungi are in fact preserved in protected areas and in private lands, where the law regulates their harvesting, moreover Regions regulate with their own laws the harvesting and marketing of fresh and spontaneous epigeous fungi. A national law enables the marketing of a list of spontaneous and cultivated fresh Fungi, but regulations on the protection of rare and

threatened taxa are lacking. In fact, taking again the example of *P. nebrodensis* in Sicily, even if the habitat of growth is included in a protected area, the mushroom is submitted to a high level of exploitation.

It was a good opportunity to compare the list of taxa proposed by ECCF to be included in Annex 1 of the Bern Convention with taxa reported in the Italian check-list. Many species listed as threatened in Europe were recorded in several Italian Regions: basing on this fact and following the IPA criteria proposed by the Global and European Strategy for the Plant Conservation, some Italian Region or, in selected cases, Italy as a whole, could be in future considered sites for conservation of threatened European fungi (Perini & Ripa, 2003). More detailed info on distribution must be gathered but here the elaboration at a regional level of the so-called “Bern-fungi” (Fig. 1).

Fig. 5. List of taxa proposed by ECCF to be included in Annex 1 of the Bern Convention compared with taxa reported in the Italian check-list.



Two interesting ex-situ conservation actions must be remembered: the first is activated in Sicily in order to safeguard the natural population of *P. nebrodensis* through its cultivation. Cultivation is conducted in a tunnel, made of metal arches and varying in length from 20 to 30 metres, covered by a black net that provides 90% shade (VENTURELLA & FERRI, 1996; Venturella 1999; ZERVAKIS & VENTURELLA, 2002). Cultivated *Pleurotus* mushrooms retain the same organoleptic qualities as natural ones; this is not the case with champignons and oyster mushrooms, that lose partially the characteristic aroma and flavour of the wild varieties. The results of the cultivation tests permitted also to provide an additional source of income for indigenous farmers, to offer to the local population a product that is more economic than the natural one and, in parallel, to reduce the anthropic pressure on the natural sites of growth.

The second is a long term preservation of valuable fungal cultures done at the *Mycotheca Universitatis Taurinensis* (MUT). 60 isolates of Basidiomycetes belonging to 35 species were tested to compare the efficiency of 3 fungal conservation methods: after 18 months the 99% of isolates under mineral oil, the 25% under distilled water and the 35% lyophilized held their stability, however preservation under mineral water are not so constant in morphological and some physiological features. Due to scarce knowledge of nutritional needs the cultivation is particular problematic, but nowadays more species are tested and cultivated (Varese et al., 2001; 2004). As final news, this summer the Nature Conservation Directorate of the Ministry of the Environment and Protection of the Territory and the Interuniversity research center “Biodiversity, Phytosociology and Landscape Ecology” defined 4 main research programmes as future challenges and one, where fungi are included, is “Important

Plants Areas"; this can be another good step to consider also this organisms in conservation actions.

### Various activities

In order to stimulate a mediterranean network also by means of an eventual financial support some years ago an Expression of interest with 18 mycologists was presented to EU to Brussels by the University of Siena. This action was also underlined by Diamanidis who proposed to include a "conservation of fungal biodiversity in a changing environment" in FP6. The power to go on was not sufficient, but in 2005 Prof. Venturella (Univ. Palermo) did a new attempt proposing a Mediterranean working group inside the new established European Mycological Association. Many things changed in the meantime and maybe this is a good opportunity to fill in the gaps in our area.

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## 14. The Provisory Red List of Endangered Macromycets of Montenegro

**Branislav and Olgica Peric**  
 Montenegrin Mycological Center  
 Email: mdcg@cg.yu

Montenegro is still poorly mycological investigated to be possible make the compilation of its Red list of threatened macromycetes. For difference of European countries with long term mycological tradition, developed institutions and important investment in study and mapping of fungi, we are still in pioneering mission when at least step done, often with enormous effort, can means as a success. Therefore, after a decade of systematical investigations and monitoring some of the valuable localities, it could be possible to prepare this preliminary list which indicates that this selection of some species is out of importance for preservation mycodiversity of Montenegro. It is compiled on the basis of the published papers up to now, as the unpublished data which are results of our research work carried out in the frame of the project *Fungi of Montenegro*. More then 900 species of macromycetes have been reported from the territory of the Montenegro. In consideration of insufficiently of research work of this area, IUSN category system could not have been applied, own categorization adopted to domestic conditions has been used. It includes:

- the species of international importance (the species that have been proposed by ECCF for Bern's convention and mapping, as the species from European Red Lists),
- specially rare or rare species in Montenegro,
- the species bound to types of endangered habitats,
- the species which populations are decreased due to excessive exploration.

The Provisory Red List of Endangered Macromycets of Montenegro

The species which occupy European Red List Ing (1993) groups A, B, C, D.

The species which are in Lizon's List (1995) \*

Specially rare or rare species in Montenegro MN

- |  |  |
|--|--|
| 1. <i>Agrocybe aegerita</i> (V. Brig.) Quél. *                   | 15. <i>Bolbitius variicolor</i> G. F. Atk. MN                          |
| 2. <i>Albatrellus cristatus</i> (Schaeffer) Kotlaba et Pouzar MN | 16. <i>Boletus aereus</i> Bull. *C                                     |
| 3. <i>Albatrellus ovinus</i> (Schaeffer) Kotlaba et Pouzar D     | 17. <i>Boletus albidus</i> Roques *C                                   |
| 4. <i>Albatrellus pes-caprae</i> (Pers.) Pouz. *D                | 18. <i>Boletus appendiculatus</i> Schaeffer *D                         |
| 5. <i>Aleurodiscus amorphus</i> Rabenh. *                        | 19. <i>Boletus fechtneri</i> Velenovsky *B                             |
| 6. <i>Aleurodiscus disciformis</i> (Vill.) Pat. *B               | 20. <i>Boletus impolitus</i> Fr. *B                                    |
| 7. <i>Amanita caesarea</i> (Scopoli) Pers. *D                    | 21. <i>Boletus lupinus</i> Fr. *                                       |
| 8. <i>Amanita decipiens</i> (Trimbach) Jacquetant MN             | 22. <i>Boletus queletii</i> Schulzer B                                 |
| 9. <i>Amanita franchettii</i> (Boudier) Fayod C                  | 23. <i>Boletus regius</i> Krombh. A                                    |
| 10. <i>Amanita ovoidea</i> (Bull.) Link MN                       | 24. <i>Boletus satanas</i> Lenz. *A                                    |
| 11. <i>Amanita solitaria</i> (Bull.) *                           | 25. <i>Boletus subappendiculatus</i> Dermek, Lazebnicek et Veselsky MN |
| 12. <i>Amanita verna</i> (Fr.) *                                 | 26. <i>Bovista paludosa</i> Léveillé A                                 |
| 13. <i>Amanita vittadinii</i> Moretti MN                         | 27. <i>Caloscypha fulgens</i> (Pers.) Boudier C                        |
| 14. <i>Astraeus hygrometricus</i> (Pers.) Morgan *C              | 28. <i>Cantharellus cinereus</i> (Pers.) Fr. *C                        |
|  | 29. <i>Cantharellus lutescens</i> Fr.                                  |

30. *Catathelasma imperiale* (Fr.) Singer \*B
31. *Chalciporus pseudorubinus* (Thirring) Pilát & Dermek MN
32. *Clavariadelphus pistillaris* (L.) Donk \*
33. *Clavariadelphus truncatus* (Quél.) Donk \*D
34. *Coltricia cinnamomea* (Jacquin) Murrill \*C
35. *Collybia hariolorum* (Bull.) Quél. \*
36. *Cortinarius bulliardi* (Pers.) Fr. \*B
37. *Cortinarius orellanus* (Fr.) Fr. C
38. *Cortinarius praestans* (Cordier) Gillet (Cord.) Gill. C
39. *Craterellus cornucopioides* (L.) Pers. \*
40. *Cudonia circinans* (Pers. : Fr.) Fr. C
41. *Cyathus stercoreus* (Schweiniz) De Toni \*
42. *Dichomitus campestris* (Quél.) Doman. et Orlicz C
43. *Ditiola radicata* (Alb. & Schwein.) Fr. \*
44. *Ganoderma resinaceum* Boud. C
45. *Geastrum fornicatus* (Hudson) Hooker A
46. *Geastrum minimum* Schweiniz C
47. *Geastrum nanum* Pers. \*B
48. *Geastrum quadrifidum* DC. \*C
49. *Geastrum sessile* (Sowerby) Pouzar C
50. *Geastrum striatum* DC. \*
51. *Geastrum triplex* Jungh. \*D
52. *Geoglossum barlae* Boudier \*
53. *Geoglossum umbratile* Sacc. C
54. *Gloeophyllum odoratum* (Wulfen) Imazeki \*
55. *Gomphus clavatus* (Pers.) Gray \*A
56. *Guepinopsis buccina* (Pers.) L. L. Kenn. \*
57. *Gyrodon lividus* (Bull.) Fr. \*
58. *Gyromitra gigas* (Krombh.) Cooke \*C
59. *Gyromitra macknightii* Harmaja MN
60. *Gyromytra parma* (J. Breitenb. & Maas Geest.) Kotl. & Pouz. MN
61. *Gyroporus castaneus* (Bull.) Quél MN
62. *Gyroporus cyanescens* (Bull.) Quél. MN
63. *Hericium clathroides* (Pall.) Pers. \*C
64. *Hericium* (Scop.) Gray MN
65. *Hydnum geogenium* Fr. \*
66. *Hydnellum aurantiacum* (Alb. & Schwein.) P. Karst. \*B
67. *Hydnellum caeruleum* (Hornem.) P. Karst. \*B
68. *Hydnellum ferrugineum* (Fr.) P. Karst. \*A
69. *Hydnum rufescens* Fr. : Fr. non Schaeffer \*
70. *Hygrophorus eburneus* (Bull.) Fr. \*C
71. *Hygrophorus gliocyclus* Fr. \*C
72. *Hygrophorus hypothejus* (Fr. : Fr.) Fr. C
73. *Hygrophorus intermedius* Pass. \*C
74. *Hygrophorus marzuolus* (Fr.) Bres. D
75. *Hygrophorus olivaceoalbus* (Fr.) Fr. \*
76. *Hygrophorus poetarum* R. Heim D
77. *Hygrophorus pudorinus* (Fr. : Fr.) Fr. B
78. *Hygrophorus puniceus* (Fr.) C
79. *Hygrophorus russula* (Schaeffer : Fr.) Quélet \*B
80. *Hygrocybe ovina* (Bull.) Kühner B
81. *Hygrocybe spadicea* (Scop.) P. Karst. \*A
82. *Inonotus hispidus* (Bolton) P. Karsten C
83. *Lactarius acris* (Bolton) Gray \*C
84. *Lactarius fuliginosus* Fr. \*
85. *Lactarius mairei* Malençon \*B
86. *Lactarius volemus* Fr. \*
87. *Lentinus adhaerens* (Alb. & Schw.) Fr. \*C
88. *Lenzites warnieri* Durieu et Mont. \*
89. *Lepiota grangei* (Eyre) Kühner C
90. *Leptopodia atra* (J. Kön.) Boud. # BERN
91. *Limacella guttata* (Pers.) Konrad & Maubl. C
92. *Lycoperdon mammiforme* Pers. \*C
93. *Morchella conica* Pers. MN
94. *Morchella elata* Fr. MN
95. *Morchella esculenta* (L.) Pers. MN
96. *Mutinus caninus* (Hudson) Fr. C
97. *Mycenastrum corium* Berk. \*
98. *Omphalia oniscus* (Fr.) Gillet \*
99. *Omphalotus olearius* (DC.) Singer C
100. *Onnia tomentosa* (Fr.) Karst. B
101. *Onygena equina* Pers. \*C
102. *Otidea concinna* (Pers.) Sacc. C
103. *Panellus ringens* (Fr.) Romagn. \*
104. *Peziza domiciliana* Cooke \*
105. *Phellinus tremulae* (Bond.) Bond. & Borisov. D
106. *Phellodon niger* Karsten \*B
107. *Phylloporus rhodoxanthus* (Schwein.) Bres. \*A
108. *Pisolithus arrhizus* (Pers.) Rauschert \*C
109. *Pleurotus eryngii* (DC. : Fr.) Quél. \*
110. *Polyporus frondosus* (Dickson : Fr.) Fr. C
111. *Polyporus umbellatus* (Pers.) Fr. B
112. *Porphyrellus pseudoscaber* (Secr.) Sing. C
113. *Pycnoporus cinnabarinus* (Jacq. , Fr.) P. Karst. \*
114. *Ramaria botrytis* (Pers.) Ricken \*C

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| 115. <i>Ramaria formosa</i> (Pers.) Fr. C                    | 125. <i>Sparassis laminosa</i> Fr. *C                       |
| 116. <i>Rhizopogon vulgaris</i> (Vitt.) M. Lange<br>*        | 126. <i>Strobilomyces floccopus</i> (Vahl) P.<br>Karst. *#C |
| 117. <i>Rozites caperatus</i> (Pers.) P. Karsten<br>*        | 127. <i>Trichoglossum hirsutum</i> (Pers.)<br>Boud. *C      |
| 118. <i>Russula aurata</i> (With.) Fr. MN                    | 128. <i>Tricholoma acerbum</i> (Bull.) Vent.<br>*B          |
| 119. <i>Russula olivacea</i> (Schff. ex Secr.)<br>Fr. *      | 129. <i>Tricholoma caligatum</i> (Viviani)<br>Ricken *      |
| 120. <i>Sarcodon imbricatus</i> (L.) P. Karst.<br>*C         | 130. <i>Tricholoma sejunctum</i> (Sowerby)<br>Quél. *C      |
| 121. <i>Sarcodon joeides</i> (Pass.) Bat. * D                | 131. <i>Tricholoma vaccinum</i> (Pers.) Fr. *               |
| 122. <i>Sarcodon leucopus</i> (Pers.) Maas. G.<br>& Nannf. C | 132. <i>Tulostoma brumale</i> Pers. C                       |
| 123. <i>Sarcodon scabrosus</i> (Fr.) Quél. *B                | 133. <i>Verpa conica</i> (O.F. Müll.) Sw. C                 |
| 124. <i>Sarcosphaera coronaria</i> (Jacq.)<br>Boud. #        | 134. <i>Volvariella bombycina</i> (Schaeff.)<br>Sing. C     |

## 15. Conservation of Fungi in The Netherlands, 2000-2005

**Eef Arnolds**

Holthe 21, NL-9411TN Beilen, THE NETHERLANDS,  
e-mail: eefarnolds@hetnet.nl

### Mapping of macrofungi

Data on the distribution and habitat of fungi form the basis for their conservation. The Netherlands Mycological Society (NMV) maintains a permanent mapping programme since 1980 (Gutter, 2005). The current scale of data collecting is based on the national geographical grid system of km squares, but more detailed geographical data are also allowed within the system. The mapping project is organised and coordinated by a Working group on Mapping within the society. At present all work is done by volunteers without any (financial) support by the government or other organisations. Many members of NMV have adopted the good habit to note down all their field observations and submit them to the working group. These data are recorded in prescribed paper forms or, to an increasing extent, imported with a specific computer programme (SPOT). The data are checked by 14 district coordinators before they are added to the central data base. One volunteer (at the moment A.P van de Berg) is involved in the management of the central data base. The number of new records added to the data base is rather stable around 60,000 a year. At the moment the data base contains about 1,200,000 records. These data are essential for most activities in the field of conservation.

In spite of important contributions by many volunteers it remains a fact that representative and up to date mycological information is available for only a small proportion (estimated less than 10%) of all kilometre squares in the country. This hampers some applications of mycological data, e.g. in legal procedures on planning of land use.

### Fungi in Network Ecological Monitoring

Since 1998 a national monitoring programme on fungi is operating, organised by NMV and financially supported by the Department of Agriculture, Nature conservation and Food quality and by Netherlands Statistics. It is part of the Network Ecological Monitoring (NEM), established by the government for many groups of organisms in order to keep track of the trends of protected species and indicator species for environmental conditions. Macrofungi are part of NEM since they are regarded as good indicator species for acidification and nitrogen load in forests.

In this project sporocarps of 110 selected species are counted each month in permanent plots of 500-1000 m<sup>2</sup>. The project is a great success. At present about 650 plots are monitored all over the country by 350 volunteers, including many naturalists

without special knowledge of fungi. Each year the results are published in a news letter in the journal *Coolia*. A contribution on this project in English has recently been published by Arnolds et al. (2005).

Results of monitoring and mapping of macrofungi suggest a partial recovery of Red-list species that are sensitive for acidification and or nitrogen deposition since about 2000, e.g. of the hydneaceous fungi associated with deciduous trees. However, interpretation of the data is hampered by the strong influence of weather conditions during the fruiting season. Numbers of sporocarps of most species were extremely low in the very dry and warm year 2003 (Veerkamp & Arnolds, 2004)

### **Red lists**

A first, preliminary Red list of macrofungi in The Netherlands has been published in 1989, comprising 944 species (Arnolds, 1989). Species were selected on the basis of expert judgement. This paper was followed in 1996 by an official Red list of macrofungi, edited by the Minister of Agriculture (Arnolds & Van Ommering, 1996), including 1655 species. The latter list was conducted on the basis of a quantitative analysis of the national data base, adopting IUCN criteria in order to assign species to different Red list categories (Arnolds, 1997). Although this list is an official document it does not have practical consequences for nature policy. The fungi on the list are not protected by law, neither are their habitats.

Originally it was the intention of the to revise Red lists with regular intervals of about ten years. However, in 2004 the present minister of agriculture officially re-established all previously published Red lists without revision, in the case of fungi even without notifying the NMV or the authors of the list.

### **Legal protection of fungi.**

Picking of fungi is not regulated by national or supranational laws in The Netherlands. In some municipalities collecting of all fungi is prohibited by local regulations. A survey of such local laws is lacking. These regulations appear to be hardly known among the public and rarely used in practice. However, some large scale harvesting by commercial (foreign) mushroom pickers has recently been prosecuted with fines. In addition collecting of any organisms is generally prohibited in nature reserves and state forests.

According to most mycologists and nature conservationists regulation of mushroom picking has no priority in The Netherlands. There is a general attitude among the population to respect fungi in their natural environment and collecting of (edible) fungi is not popular and occurs on a limited scale only. However, mushroom picking is becoming more widespread due to increased interest in 'natural food' in general and in exclusive dishes in restaurants. Besides some immigrants, in particular from eastern Europe, introduce their traditions of mushroom collecting. In future this item may therefore become more important and regulation might become desirable.

It would be more urgent to have a legal basis for protection and adequate management of sites with rare and threatened fungi. However, such legislation is lacking and it is not probable that there will be any in view of the general political tendency to reduce regulations.

### **Conservation of fungi in practice**

Within the NMV a permanent Committee for Fungi and Nature Conservation is in charge of all aspects of this subject. It deals, among other things, with requests for data on mycological values in particular areas that are subject to changing land use and advises land owners about the management of properties in favour of fungi. Recently a survey was published of the 200 most important mycological areas (the so-called 'crown-jewels') in The Netherlands, based on weighted numbers of Red list species present (Jalink, 1999). It is an important tool to draw the attention of land owners to the mycological qualities of their areas and to persuade them to take measures in favour of fungi. More detailed descriptions of 'crown-jewels' were published in subsequent issues of *Coolia*.

It has always been a problem to bridge the gap between mycologists on one hand and managers of nature areas on the other. An important initiative was therefore the publication of a booklet with practical advises for management of nature and rural areas in favour of fungi, also suited for 'green' workers with only very little knowledge of fungi (Keizer, 2003). The booklet has been received very well, but it is not yet clear what the impact is in nature conservation practice.

Since 1990 a network of 60 strict forest reserves has been erected, representative of the forest types in The Netherlands. In these reserves no management will be carried out anymore, which will be favourable for several groups of organisms, including wood inhabiting fungi. The mycological starting-point in 39 reserves was studied by Veerkamp (2005).

### **Conclusive remarks**

The Netherlands Mycological Society plays a central role in all activities concerning conservation of fungi, including collecting of distributional and ecological data. Until recently these activities were supported by research by professional mycologists, in particular on the Biological Station at Wijster of Wageningen University. Since the closing of this institute in 1999 there is only one permanent position left for research on macrofungi in The Netherlands. This position at the State herbarium at Leiden is devoted to taxonomy. Consequently, most work on fungal conservation is carried out nowadays by amateur mycologists and retired professionals. The durability of these activities is therefore at risk.

Another unfavourable development is the changing political climate in The Netherlands since 2002, with low priority for nature conservation in general. There is a strong tendency to reduce governmental efforts in this field to the minimum that is required under national and international regulations. Since fungi are neither included in national laws, nor in EEC regulations, such as Bern convention and Natura 2000 programmes, funding of projects on fungi has become extremely difficult.

The NMV has been very active in promoting a more prominent place of fungi in nature conservation, with changing success. Attempts to cooperate with land owners and nature conservationists necessarily depend on voluntary engagements since there is no legal basis for the protection of any fungal species, neither national nor international. However, many land owners and foresters are willing to take into account mycological values when well informed. Examples of practical results are mowing of grassy road sides with old trees and local maintenance of valuable pine stands in windblown sand-dunes. Informal contacts between local groups of mycologists and nature managers are crucial in this process.

A very important development in favour of numerous fungi is the gradual decrease of environmental pollution, also under pressure of EEC regulations.

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## 16. Protection of fungi in Norway

**Egil Bendiksen**

Norwegian Institute for Nature Research (NINA), P.O. Box 736 Sentrum,  
NO-0105 Oslo, NORWAY. E-mail: egil.bendiksen@nina.no

### **Red lists**

The last Norwegian red list was published by DN (1999a); the fungal part adopted from Bendiksen et al. (1998). Our first red list including fungi was published in 1992 (DN 1992).

Of the total of 763 red listed species, 7 are supposed to be extinct, 87 endangered, 148 vulnerable, 188 conservation demanding, and 333 rare. A great number of species grow in forest; 324 in coniferous forest and 182 in temperate deciduous forest. The numbers are 170 and 137, respectively, for species only found in these types.

Revision of the last red list has been delayed, waiting for the establishment of the Norwegian Species Data Bank in 2005. However, the work has now started for all actual groups of organisms, and planned for publication in the end of this year. This will be the first Norwegian red list based on the IUCN-criteria. After this the next red list is planned for 2010, and then for every fifth year.

### **Monitoring and mapping**

A lot of the new information is achieved from amateurs in different parts of the country. A project called "Mapping of macrofungi in Norway" was established in 1995 (Timmermann 1995). Information on fungal occurrences and ecology from the whole country becomes currently included in the mycological database. Among groups especially emphasized are red listed or "nearly" red listed species.

In a research project called "Mapping and monitoring of red listed species" a large number of hotspot localities are mapped, and there has also been a focus on development of methods for general monitoring of red listed species (Aarrestad et al. 2005). The aim of the mapping has been to identify hotspot areas which can be included in a monitoring network in different nature types. 236 localities for red listed fungi have been studied till now, and 1800 species occurrences have been identified. In addition, a lot of new occurrences have been reported in connection with inventories concerning forest conservation plans, woodland key biotopes etc.

### **Conservation and other environmental actions**

The focussing on endangered species has strongly increased during the period after the last red list was published. The debates concerning effects of forestry are continuously going on, and important participants are both biologists, forest owners and their organizations and nature conservationists. Different measures have been used for taking care of endangered species and their habitats:

Forest conservation. A little more than one per cent of our productive forest area is now protected as nature reserves. A biological evaluation of forest conservation in Norway (Framstad et al. 2002) concluded that at least 4.5% (i.e., about 3360 km<sup>2</sup>) of productive forest should be protected all together. Highest priority in the short term should be given to protection of the remaining, intact large areas with natural dynamics, especially the ones with at least 50-100 km<sup>2</sup> of forest, as well as remaining, intact areas of coastal forest and richer forest types like broad-leaved deciduous forest, calcareous forest, low herb forest, tall herb forest and rich swamp forest.

Protection of large and important assemblages of red listed species is also of high priority.

A large struggle is going on in South Norway concerning conservation proposal of Trillemarka, about 200 km<sup>2</sup> and larger than any other earlier protected forest area (Hofton 2003, 2006, Bendiksen 2004). 61 red listed fungal species (and 23 red list candidates) have been observed inside this area, most of them belonging to the boreal taiga element. The dominating strategy nowadays are, however, protection under the arrangement "Voluntary forest conservation", partly concerning forests owned by the state, partly by private owners, offering biologically interesting areas for protection through the forest organizations (a.o. Heggland et al. 2005)

Much debate has also taken place concerning management of hotspot localities or localities with high biological values on a smaller scale. Since 1993, a lot of key biotopes were established (see, e.g. Oslo kommune 1993, Bendiksen 1994a, Bredesen et al. 1994, Lindblad 1996, Løvdaal et al. 2002), in the first phase especially on larger forest properties. Both red listed species, indicator species for different biological values and forest structural elements are important for selection of such areas. To a large degree registration of key biotopes has in the later years been substituted by identification of "Mis-biotopes" (environmental registrations in forest), mostly based on structural elements and being part of the standard periodical forestry inventories for the whole country (Gjerde & Baumann 2002). Protection of important biotopes and also other rules and restrictions for forestry is based on a set of standards agreed on in the project "Levende skog" (Living Forest) (Levende skog 1998). Parallel to this there has been a mapping of nature types, biological important areas in Norwegian municipalities (DN 1999b). In that project also the cultural landscape is an important type, and especially in Central Norway a large number of grassland localities rich in red listed fungi have been reported (Jordal 1997, and several later reports). Farmers are encouraged to manage such areas in the way taking best care of ecologically specialized fungi and plants by special economical measures.

In the 1990s most of the environmental focus was on the wood-inhabiting fungi related to supposed requirement for continuity concerning special parameters for dead wood (a.o. Bendiksen 1994b). In the later years there has also been increased consciousness about the risk of destroying habitats for ectomycorrhizal fungi by clearcutting. Alternative ways of cutting may here be an alternative to strict protection.

All this activity and with the red list of 1998 as an important trigger for the amateurs, new finds of red listed and other rare fungal species have enormously increased in the later years. No fungi have yet been protected by law in Norway, but red listed fungi have been the main reason for establishment of many forest reserves, a lot of key biotopes etc. and have even in rare cases been the deciding factor in staking out new roads.

The increased consciousness about endangered species in society has initiated several research projects. For fungi most of them have been related to forestry (a.o. Høiland & Bendiksen 1997, Stokland et al. 1997, Lindblad 1998, Stokland 2001, Kauserud 2002, Sverdrup-Thygeson & Lindenmayer 2003, Kauserud & Schumacher 2002, 2003, Rolstad et al. 2004, Stokland & Kauserud 2004).

The majority of herbarium collections and other registrations of Norwegian fungi (Herb O and BG), (and with special symbols for red listed fungi) are available on internet as labels and distribution maps ([www.nhm.uio.no/botanisk/sopp](http://www.nhm.uio.no/botanisk/sopp))

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## 17. Short report on mushroom conservation in Poland

**Maria Lawrynowicz**

Institute of Ecology and Nature Conservation, ul. Banacha 12/16, PL-90-237 Lodz; POLAND  
Email: miklaw@biol.uni.lodz.pl

The activity of Polish mycologists was focused on several points concerning fungal conservation on international and national level. The most important event was the participation in the workshop on red lists for Balic countries using new criteria of

threat organized by Anders Dalberg in Uppsala (2003) and working on preparing distribution maps in cooperation with Peter Otto (2004). A team of young mycologists – Izabela Kalucka and Janusz Luszczynski, under the supervision of Maria Lawrynowicz, gathered and processed the data concerning occurrence and distribution of rare and threatened fungi from among 50 species listed by Otto.

They were supported also by a group from Kraków – Anna Roniker and Marcin Piatek, under the supervision of Wladyslaw Wojewoda, who elaborated the species listed in the Bern Convention. All the data and maps were sent to Leipzig.

All these species are also included in the List of Protected Fungi in Poland and published as official document (Decree) of Ministry of Environment 2004. In present version the List is extended to 52 species protected by law in Poland.

Some positions of literature are worth notifying, e.g. "Check-list of the Polish Basidiomycetes" including 2200 species was published by W. Wojewoda in 2004.

A survey of mycological studies in Poland – 1952-2002 was published by M.

Lawrynowicz, A. Bujakiewicz and W. Mullenko in 2004. The list of 623 mycosociological publications, spanning over 50 years offers information which plant communities were investigated mycologically and how thoroughly.

Atlas of the geographical distribution of Fungi in Poland will be subsequently edited by W. Wojewoda with special emphasis on threatened species.

New edition of the red list of threatened fungi in Poland using new IUCN criteria is in course of preparation.

Other remarks. As in official documents still only flora and fauna exist, it is an urgent need to find a proper place also for the kingdom of Fungi. It is very important in terms of conservation matters. Our task is to change the attitude of nature scientists and conservationists.

## **18. Achievements and perspectives in the preservation of macromycetes' diversity in Romania**

**Catalin Tanase**

'Alexandru Ioan Cuza' University of Iasi, Faculty of Biology; 20A, Bd. Carol I, 700505 – IASI, ROMANIA. E-Mail: tanase@uaic.ro

In Romania, preservation of macromycetes' diversity does not represent an objective in itself, being considered, on a larger scale, against the larger background of natural habitats' protection. The main steps involved in the conservation of macromycetes' diversity are the following:

- elaboration of a national inventory, including all species known, for the realization of a complete data base;
- evaluation of the conservation stage, at national level, for the endangered species;
- substantiation of some ecological measures regarding both the process of conservation and sustainable utilization of the macromycetes;
- development of education, communication and public information programs on the knowledge and conservation of macromycetes;
- creation of a national network for the implementation of the process of macromycetes diversity conservation.

If taking into consideration the special conditions Romania is actually facing (i.e., reduction of the number of specialists in mycology, generally, and macromycetes, especially, the absence of specialized programs for training and forming young specialists in the field of taxonomy, the general state-of-art of scientific research in the period of transition towards a free economy), a thorough synthetization of the existing information, for the realization of the necessary data base, is quite difficult to

accomplish. However, specific information concerning the necessity of the data base's realization, with special reference to the rare or endangered – at both national and European level – species of macromycetes, have been published.

The Mycological Society of Romania assured the logistic support necessary for transferring the information towards the target groups and participated to the establishment of a national network of socio-ecological complexes for subsequent activities of research and integrated monitoring for the conservation of macromycetes' diversity.

Also, a complete report devoted to the implementation of the strategy of macromycetes' conservation has been elaborated, aiming at politically supporting a special legislation on the exploitation and marketing of the spontaneously-growing macromycetes. The report has been analyzed by a specialized governmental commission, however, up to now, no law stipulating special regulations for the exploitation and commercialization of macromycetes has been officially elaborated.

Between the years 2000-2004, on the basis of the up-dated chorological information available, the most representative areas of macromycetes' importance in various habitats of Romania have been established. Such areas do not refer exclusively to a habitat for fungi, constituting only a particular representation of the interest manifested for the preservation of biodiversity. The regions of importance for macromycetes have been evaluated according to the presence of the species considered either rare or endangered at national and European level, and also according to their abundance and mycological importance of the habitat under investigation.

Also between 2002-2004, the 'IPAs (Important Plant Areas) in Romania' project has been developed, on the basis of the contract officially sanctioned between Plantlife International and the Association of the Botanical Gardens of Romania. At a national level, 279 areas of importance for plant protection and conservation, occupying a surface of 330000 ha – have been established. Here included are also 25 areas of importance for macromycetes, occupying a surface of 48000 ha. In most cases, these areas are included in reservations of the Biosphere, national parks, natural reservations, although, sometimes, they occur in unprotected zones, characterized nevertheless by a high value of biodiversity – which requires an immediate protective status. In the areas thus identified, there occur 33% of the total number of macromycetes species, endangered at European level (the Aii Criterion).

In the year 2003, the Guide for the Identification of the Important Areas of Plant Protection and Conservation in Romania – making mention of the macromycetes species included in the Aii Criterion, as well – has been issued.

Also, the red list of the macromycetes species of Romania, including 179 species evaluated according to the IUCN criteria, 12 of which being considered endangered, is in print. 26 macromycetes species included in the red list have been classified on the basis of the information provided by the existing literature of the field, on considering, too, the specimens occurring in internationally-renown mycological collections and, equally, the most recent results of the investigations developed in the open.

The difficulties to be faced in the conservation of the macromycetes species of Romania include:  
the low number of specialists in the field of macromycetes taxonomy and ecology;  
chorological information viewed as unreliable, once uncorroborated by investigations developed in the open;  
technical problems related to monitoring of the species viewed as endangered at national level;

pollution and the global climatic modifications;  
the human pressure on the species occurring in restrictive habitats (the peat bogs in the Carpathians and the sand dunes areas in the Danube Delta);  
gathering, commercialization and abusive exportation of the edible macromycetes species;  
the absence of an official law for macromycetes' protection, commercialization and exportation.

Considering all the above information, it is the author's intention to elaborate a handbook presenting relevant case studies and suggesting efficient modalities for the conservation of macromycetes' diversity in situ. In our opinion, solving of the existing problems requires promotion and financing of some national programs for the formation and training of taxonomists in the field of mycology, along with the development of a network of volunteers involved in the process of conservation and monitoring. Absolutely necessary is an efficient exchange of information among specialists and the public, local and governmental authorities for the understanding and solving of the specific problems on macromycetes' conservation and sustainable utilization

## **19. Review of the Fungi Conservation in Serbia**

**Boris Ivancevic**

Natural History Museum, Njegoseva 51, P. O. box 401, 11000 Belgrade  
Serbia and Montenegro. E-mail: i.boris@beotel.yu

Since the ECCF meeting in Oulanka, Finland, the name of the country Yugoslavia changed into "Serbia and Montenegro". Although officially comprising one state, republics of Serbia and Montenegro are administratively quite separate and pursue separate policies of nature conservation.

### **Red List status**

In early nineties, it was established that numerous fungi species were threatened by anthropogenic activities and that the number of some species decreased dramatically. The first candidates for our Red List were selected in 1993, and in 1997 a Red List was published containing around hundred endangered species for the territory of S-M, where around 650-700 macromycete species had been found by that time. An amended and enlarged Red List prepared in 1999 was accepted by Serbian Environmental Ministry and formal proceedings were initiated to adopt a law protecting the species encompassed by the Red List. This was cancelled due to the air strikes that took place that year and the proceedings were never finalized. A draft new law on conservation of nature including the fungi from the Red List is still before the Environmental Ministry of Serbia, but other issues seem to have priority.

### **NGO efforts**

In the course of 2000 and 2001, the non-governmental organizations have taken over the initiative in conserving fungi, chiefly owing to the donations from abroad. However, the programmes of these organizations were largely amateurish, aiming mainly at involving the public and cultivating awareness of the need for conservation of nature, and basically did not include scientific work. However, some of these projects partly have involved scientific institutions, and some small-scale investigations have been published as a result, such as the census of fungi along the watercourses through which the toxic wave of cyanide swept after the catastrophe in the mine in Romania.

### **Inventorying of species**

The project of Serbian Mycological Society: Inventorying and Mapping of Macromycetes in Serbia is going on the voluntary basis, with no funds at all. As result, around 1300 macromycete species has been recorded from the territory of Serbia, comparing to less than 700 species in the 1997 on whole S-M territory, the time when it started.

### **In situ conservation**

One area has been nominated a protected area because it is a habitat of species *Myriostoma coliforme*. This is the first case in Serbia & Montenegro that certain territory has been protected only due to the fungi which inhabit, and one of rare cases in Europe. It is an area around 1.5 x 0.5km big, on the river isle of Ada Ciganlija near Belgrade. Myriostoma has been found only on four sites in Serbia and in the last 40 years it was found only at Ada Ciganlija. This site also boasts a number of interesting fungi species due to the specific sandy substrate and high humidity, a number of Geastrum, Tulostoma and other species. A study on conservation drawn up by governmental agency for nature conservation has not come into force yet, but this is expected very soon. The conservation entails a ban on building buildings or sport fields, ban on felling trees, and other measures aimed at preserving the habitat, ban on picking mushrooms and partly limited access.

## **20. Brief report on the conservation of fungi in Slovakia**

**Pavel Lizon**

Institute of Botany and Slovak Mycological Society  
Dúbravská 14, SK-845 23 Bratislava, Slovakia; botumyko@savba.sk

### **Threatened species, biodiversity**

Field research on the biodiversity of fungi was directed to build the distribution database (see also Adamčík & al., 2003). Special emphasis was paid to distribution of endangered species. Discoveries of previously not reported species annually contributed to the checklist of Slovak fungi. Actual red list of fungi (3<sup>rd</sup> draft) is available online at [www.soprs.sk/webs/redlist](http://www.soprs.sk/webs/redlist) (in Slovak).

### **Bern Convention species**

New data on distribution of species proposed for Bern Convention, such as *Boletopsis grisea*, *Boletus dupainii*, *Gomphus clavatus*, *Hericium erinaceus* and *Podoscypha multizonata*, were collected (Lizon, 2006, Kautmanová, 2005, see also Adamčík & Ripková, 2003). *Sarcodon fuligineoviolaceus* was rediscovered in Slovakia (Lizon, 2006) after 130 years (it was described from Northern Slovakia by Kalchbrenner in Fries, 1874). Even focused field research in old-grow Norway Spruce forests has not resulted in recent records of *Sarcosoma globosum*. The species was collected only in 1956 and it is probably extinct in Slovakia now.

### **Legal affairs**

Conservation of nature and landscape is governed by law No. 543/2002 ([www.enviro.gov.sk/minis/legislativa/543\\_2002.pdf](http://www.enviro.gov.sk/minis/legislativa/543_2002.pdf), in Slovak). It was recently supplement by law No. 15/2005 which regulates the trade and handling of protected animals and plants ([www.enviro.gov.sk/minis/legislativa/15\\_2005.pdf](http://www.enviro.gov.sk/minis/legislativa/15_2005.pdf), in Slovak). Protected plants and animals are governed by the regulation No. 24/2003 of the Ministry of the environment ([www.enviro.gov.sk/minis/legislativa/24\\_2003.pdf](http://www.enviro.gov.sk/minis/legislativa/24_2003.pdf); protected fungi are listed in appendix 4 [http://www.enviro.gov.sk/minis/legislativa/24\\_2003\\_b.pdf](http://www.enviro.gov.sk/minis/legislativa/24_2003_b.pdf) and appendix 5 [www.enviro.gov.sk/minis/legislativa/24\\_2003\\_c.pdf](http://www.enviro.gov.sk/minis/legislativa/24_2003_c.pdf), all in Slovak). New law on conservation of nature and new regulation on protected species is being prepared. Our

updated list proposed for new regulation has 89 taxa of fungi (21 new taxa, 13 taxa removed from actual list that has 94 taxa).

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## 21. Conservation of Fungi in Slovenia

**Tine Grebenc**

Slovenian Forestry Institute, Vecna pot 2, SI-1000 Ljubljana, Slovenia  
and  
Slovenian Mycological Society, Trstenjakova 2, SI-1000 Ljubljana, Slovenia  
E-Mail: [tine.grebenc@gozdis.si](mailto:tine.grebenc@gozdis.si)

### History

The fungi are not unknown kingdom from the area of Slovenia. Several notes so as icones exist for higher fungi from the area of today's country starting as early as with Pietro Andrea Mattioli and Ioannis Antonii Scopoli with his *Flora Carniolica*. The data on occurrence of higher fungi became more frequent after 1952, with records mainly collected in the archives Slovenian Mycological Society in form of notes of members and their private herbaria.

Recently (in last few decades) several mapping projects were initiated and mainly focused on specific type of forests e.g. dinaric (virgin) forests in Kocevje and Trnovski gozd region (Hocevar et al. 1995), pre-dinaric montaneous virgin forests (Hocevar et al. 1985) and others. Further on in 1998 the fungi of the alpine spruce forest were comprehensively mapped on research plot of Slovenian Forestry Institute (Piltaver 2000) and a few years latter also fungi from dead and decomposing beech trunks and logs (Piltaver et al. 2002).

### Mapping of higher fungi

In year 2002 a small project (in financial terms) was initiated by archives Slovenian Mycological Society, Slovenian Forestry Institute and Institute for Systematics of Higher Fungi named "List of species and distribution of fungi in Slovenia with analysis of endangerment". The aims of the project were:

To prepare a list of fungi appearing in Slovenia together with distribution and endangerment degree of fungi in Slovenia on the basis of internationally comparable criteria with the use of current databases and other recent sources of knowledge.

To establish a system of data collecting for the list of species in a way to include complete data set of Mycological Society of Slovenia, which must be checked by experts, to define the data geografically and to include them in current taxonomical databases. To establish a connection to CHM (Clearing House Mechanism), in frame of Ministry of the Environment and Spatial Planning and to assure a publicity of the data.

To make a system of fungi mapping in Slovenia and to begin sistematic collection of data and herbarium samples of fungi from all the territory of Slovenia. Established sistematic collection of data and samples should be continued after the end of the project.

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<sup>3</sup> *Catathelasma* is available online at [www.cybertruffle.org.uk/cyberliber](http://www.cybertruffle.org.uk/cyberliber).

To make a proposal of Red list of fungi and its incorporation into the proposition of ordinance act about protection of fungi (the results should be used for completion of protected species list and for developing appropriate measurements for protection of fungi). Results would be prepared in a form that could be useful for future informative and promotional materials.

analyse also the occurrence of commercially important fungi in Slovenia with purpose to develop a system for tracking source and quality of defined macrofungi for nourishment of people

The project successfully passed main tasks from the first three aims. The data for different species and their distribution on the area of Slovenia were gathered, based on data from archive of Mycological Society of Slovenia, from personal archives of members of the society and their private herbaria. A smaller part was also provided from available collections and known published sources. The main part of project was a computer programme named *Boletus informaticus*. The programme was written for a systematic input and storage of data on mapping of fungi, their exact positioning, distribution and habitat. It gives possibility to analyse the data and present the data on maps, plotted on UTM and/or middle Europe floristic grid. The coordinates, if known, are not public available except upon the request at the database holder. Currently there is 114618 records, most of them (111579) for the group of basidiomycetes. All records comprise of 2451 different species with know determinant of entry, time and place of collection (complete data). An output as a distribution map is available for all species with more than three records in the database. The nomenclature in the programme follows the Index Fungorum database (CABI). Synonyms were removed from the list by the curator manually. More details about the project and its outputs, including distribution maps are available at: <http://www.gozdis.si/departments/forestprotection/boletus/arealnekarte/eng/bi.htm>. Further step is the publication of all records obtained so far. The book will be published within weeks (Jurc D., Piltaver A., Ogris N.(ur.), 2005. Glive Slovenije: vrste in razširjenost. Ljubljana, Silva Slovenica, Studia Forestalia Slovenica 124, *in slovene*)

Slovenia also contributed available data to the 33 threatened fungi in Europe (Complementary and revised information on candidates for listing in Appendix I of the Bern Convention) in year 2003 (based on personal communication with a range of specialists and highly experienced amateurs).

implementation of current data into RED list preparation.

The RED list covering the area of Slovenia is not yet available. It will be compiled based on the gathered data in *Boletus informaticus*, current conservation status of different habitats of interest and available information on other parameters followed the IUCN criteria and as agreed with ECCF and EMA.

### **Legal protection of fungi and acts under preparation**

Current legislation covers the protection of fungi through the Act which was prepared by the Ministry of the Environment and Spatial Planning. The Act deals with protection of fungi in natural habitats and is valid from 1998 (Uredba o varstvu samoniklih gliv, UL RS 57/1998 – Act on the conservation of wild growing fungi). The protection and management of wild growing fungi in terms of maintenance of biodiversity and balance within natural system is given including a list of strictly protected species and genera (a kind of RED list but not based on any scientific criteria). The Act prohibits collecting and trading with those species and limits collection and trading for others. It was criticized many times since the list of species is not proper, the control as proposed is hardly possible in neither the commercial exploration of certain species and genera is well arranged. In 2004 a new Act was proposed divided into 2 parts – fungal conservation issues and commercial exploitation part. The Ministry of the Environment and Spatial Planning covered the conservation part of the Act while the part dealing with commercial exploitation was assigned to the Ministry of Agriculture,

Forestry and Food. Currently the proposal is under evaluation of representatives from both Ministries and an acceptance is expected in year 2006.

Beside the Act there are no systematic measurement taken for conservation of fungi except legal protection of certain areas (national park, regional parks). The fungi are not yet systematically implemented into any conservation strategy neither as an object of protection or as a parameter(s) for describing the quality and status of certain area. Thought at least some species/groups of fungi are included into various research actions as mycobioremediation for heavy metal pollution (Kraigher et al. 1996, Al Sayegh Petkovšek et al. 2002, Al Sayegh Petkovšek 2005) or an influence of different forest management systems to ectomycorrhizal fungi (Trošt Sedej et al. 1999, Vilhar et al. 2004, Pucko et al 2004, Grebenc 2005) and saprophytic fungi (Piltaver et al. 2002).

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## 22. Report from Sweden

**Anders Bohlin**

Halltorpsgatan 14; S-461 41 Trollhättan SWEDEN. E-mail: Anders.Bohlin@telia.com

The Swedish Redlist contains all kinds of organisms; animals, plants and fungi and is revised every 5 years.

The IUCN-criteria are implemented in the assessment 2000 as well as 2005.

The Swedish Redlist is an official red-list, accepted by the Swedish Environmental Protection Agency as a tool in the nature conservation work in Sweden.

At a rough estimate we have 12'000 fungal species in Sweden, including 2000 lichens. The Red list of 2000 had 609 species of fungi and the number of assessed macromycetes was 3595.

In the work with the red list of 2005, more than 4'800 macromycetes were assessed and 632 were red-listed.

The knowledge of the situation of threat is continuously increasing. For most red-listed fungi, the situation is largely unaltered since 2000. The majority of the fungi grow in woodland environments, and almost 3000 species are associated with wood. Of the red-listed species, 90% occur in forests and 60% are restricted to forests. 30% of the red-listed species grow on wood and 30% are mycorrhizal fungi. The continuous clearing of the small remaining areas of primeval forests constitutes a threat to

several red-listed fungi. Various types of grassland are also important environments for many fungi, and approximately 80 of the red-listed ground-living species belong in these habitats. The former decrease in the area of grazed land in Sweden has been turned to a slight increase thanks to restorations.

In most cases, indirect statistical methods have been used in the assessment of the population trends of individual species. Based on knowledge of the specific environmental requirements of the species concerned, assessments were made of how given species would be affected by the changes we are aware of. Such factors may include changes in the area of the quality of habitat or the amount of substrate, e.g. the area of primeval forests or the area of grazed unfertilised grassland. The current level of knowledge concerning the life span of fungi, their degree of fragmentation and their potential for distribution and establishment is higher than it was 2000, and we have been able to take these factors in consideration.

The knowledge of the Swedish fungi is comparatively good, thanks to a long mycological tradition. There has, however, been a decrease in the number of professional, taxonomically inclined mycologists, and today there are very few. The Swedish Mycological Society (SMF) and other people interested in fungi have contributed important information.

The assessment of the fungi was made by the Expert Committee for Fungi; Anders Bohlin (chairman), Hjalmar Croneborg, Anders Dahlberg (in collaboration with the person formerly responsible for the organisms group at the Swedish Species Information Centre), Stig Jacobsson, Klas Jaederfeldt, Mikael Jeppson, Tommy Knutsson, Sonja Kuljok, Nils Lundqvist, Johan Nitare, Stellan Sunhede, Sigvard Svensson and Jan-Olof Tedebrand.

## **23. Conservation and Mapping of Fungi in Switzerland, 2000-2005**

**Beatrice Senn-Irlet**

Swiss Federal Research Institute WSL, Section Biodiversity, Zürcherstrasse 101,  
CH- 8903 Birmensdorf, SWITZERLAND. E-mail [beatrice.senn@wsl.ch](mailto:beatrice.senn@wsl.ch)

### **Mapping of macrofungi**

Authorities and amateur mycologists ask for a sound data base on the distribution and habitat of fungi as the prerequisite for their conservation. The national mapping program initiated by the national authorities gains therefore much attention ([www.swissfungi.ch](http://www.swissfungi.ch)). At present the data base contains 300'000 records from 5130 species. 86% of all records are from volunteers. 14% originate from a sampling at randomly selected plots at grid-points of the national forestry inventory by biologists.

Most of the work done by volunteers is without any financial support, however two cantons (=countries) started to pay expenses to local mycological groups for inventorying local nature reserves.

In the third survey of the national forest inventory from 2004-2006, ten species of easily recognizable polypores will be looked for and recorded at each 1km-grid-point, giving the wood-inhabiting fungi more attention, especially among foresters. These data will be used for calibration of the accidental findings.

Fungal records are transferred either on an Excel-sheet, as a dbase-file or with a special program ("Pilzindex") for registering fungi, based on a Filemaker-runtime-version, and distributed freely. The last possibility is preferred as the fungal names, habitat and substrate lists are already stored and the geographical coordinates are checked automatically if they fall within Switzerland.

## Biodiversity Monitoring Switzerland

In 2000 the Swiss Agency for the Environment, Forests and Landscape (SAEFL) has launched a program called Biodiversity Monitoring in Switzerland (BDM). In conjunction with the BDM program, experts contracted by the Federal Government will regularly count animals (butterflies, snails, grasshoppers) and plants and mosses in numerous predetermined areas in the field. Whereas numerical qualitative objectives are accepted in most areas of environmental protection (emissions thresholds in air pollution control, for example), there are so far no targets for how biodiversity should change. Biodiversity monitoring helps to define specific targets for nature conservation policy and to establish whether the measures that have been implemented are enabling us to reach these targets. Like the Dow Jones Index, which reflects business development by using market indices, the BDM program shows how biodiversity, our natural capital, is developing. Up to date fungi are not part of this program. The influence of forest management on species richness of aphyllorphoroid wood-inhabiting fungi was studied including a comparison with natural beech forests in Transcarpatia (Küffer & Senn-Irlet 2005 a,b, Küffer, Lovas & Senn-Irlet 2004).

## Red list

A first preliminary Red list of macrofungi in Switzerland has been published in 1996, comprising 215 species (Senn-Irlet et al. 1996) out of 600 evaluated.

In 2006 a Red list according the IUCN criteria will be published. 4900 macrofungi have been evaluated based on spatial predictions of the area of occurrence and the area of occupancy with three different models, a temporal trend analysis based on 5-years observation units and a final judgement by experts taking into account taxonomic uncertainties, difficult sampling conditions and so on. Actual result: 82 CR, 332 EN, 449 VU, 112 NT, 1730 LC, 1988 DD.

In Switzerland with three main European cultures (Italian, French, German) bordering, the actual taxonomic and nomenclatural muddle in many agaric species (e.g. yellow and white *Tricholoma* species, *Amanitopsis* spp, *Cortinarius* spp) leads to big problems in the interpretation of former records especially if the identification literature is not cited. A European check-list of agarics would be highly appreciated.

The intention of the government still is to re-evaluate Red lists once in ten years. Due to budget restrictions this plan has been slowed down already a bit.

## Legal protection of fungi

A decree of a federal law about nature and homeland conservation from 2000 lists together with some plants and animals 12 fungal species (*Sarcodon joeides*, *Tricholoma caligatum*, *Tricholoma colossus*, *Laricifomes officinalis*, *Suillus plorans*, *Pluteus aurantiorugosus*, *Boletus regius*, *Squamanita schreieri*, *Verpa conica*, *Lyophyllum favrei*, *Hygrocybe calyptriformis*, *Clavaria zollingeri*). Picking, selling or destroying of these species is prohibited. Local authorities commit to avenge the delicts. Regional authorities are bound to enlarge the list with regionally or locally threatened species. The criteria for the selection of these 12 species include morphological characteristics such as showy fruit-bodies which are easy and unequivocally to identify, ecological characteristics such as a strict host dependency or presence in highly endangered habitats and political considerations, i.e. a somewhat equal distribution of the localities throughout the country laws. A colourful poster displaying all these 12 species is distributed freely and has been sent to the authorities of each community in Switzerland.

Picking of (edible) fungi is regulated by country laws (see [www.vapko.ch](http://www.vapko.ch), in three languages). Some countries started to follow a more species-based approach instead of maintaining a period (e.g. 7 days) where any picking is prohibited.

A recently press release of a 30-year study (Egli et al, in press) had an enormous echo in all media. If a scientific study shows that picking has no effect on the diversity and abundance of species, the arguments for maintaining picking restrictions are vanishing rapidly. In accordance with a general political trend to eliminate many restrictions, picking regulations, and especially the time restrictions ("conservation week") will

probably disappear within the coming years if no other arguments arise. Weight restrictions (in general 2 kg per persons per day) however will probably find enough social support to stay in force.

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## 24. Country Report on Fungal Conservation: Ukraine (1996-2005)

Vera Hayova

M.G. Kholodny Institute of Botany, 2 Tereshchenkivska Street. MSP-1 Kiev 01601; UKRAINE  
e-mail: veha@ln.ua or veha@symbiosis.kiev.ua

### Actual status of a national Red List (in progress, in revision, in planning ....)

A new edition of the Red Data Book of Ukraine is under preparation (it had to be published in 2005 but now will be delayed until 2007 the earliest). Similarly to previous edition, 2 volumes are planned – Animals, and Plants & Fungi. Ministry for Environment Protection of Ukraine is responsible for the Red Data Book publication.

A previous edition, the 2<sup>nd</sup> edition of the "Red Data Book of Ukraine. Plant Kingdom" (including fungi) was published in 1996. It contains 30 species of fungi: 4 species of Ascomycetes (*Helvella monachella*, *Morchella steppicola*, *M. crassipes*, *Tuber aestivum*) and 26 - of Basidiomycetes (*Agaricus romagnesii*, *A. tabularis*, *Amanita caesarea*, *A. solitaria*, *Boletus regius*, *B. aereus*, *Catathalesma imperiale*, *Clathrus ruber*, *Clavariadelphus pistillaris*, *Dictyophora duplicata*, *Grifola frondosa*, *G. umbellata*, *Hericium coralloides*, *Lactarius sanguifluus*, *L. chrysorrheus*, *Leucoagaricus macrorrhizus*, *Macrolepiota puellaris*, *Mutinus caninus*, *Phaeolepiota aurea*, *Pseudocolus fusiformis*, *Sparassis crispa*, *Strobilomyces strobilaceus*, *Russula turci*, *Tricholoma focale*, *Tylopilus alutarius*). According to IUCN categories, 11 species are regarded as endangered, 2 – vulnerable, 17 – rare. For each species a short description and drawing are given, with some information about distribution, simple map, ecotop(s), bibliographic reference(s) etc. This edition was mostly based on the data from the Red Book of the USSR of 1984.

It is obvious that the list of fungi proposed in 1996 should be enlarged, with more species to be added. New version of national Red List of fungi is currently under discussion. Criteria for selection of the species for the next edition and their applying are discussed and data about fungal occurrence are assessed. Previous number of species was doubled and at present about 60 species of macromycetes are proposed to include in the 3<sup>rd</sup> edition of Red Data Book of Ukraine. Current number of proposed species is not final. Therefore experience and results of compiling Red Lists in other European countries is very valuable.

### Actual status of a national monitoring of mapping project

Electronic distribution maps of Ukrainian fungi, based on over 72.000 computerized records, were prepared with support of the UK Darwin Initiative and Royal Society.

They are available on the internet at:

<http://www.cybertruffle.org.uk/ukramaps/>

A first Checklist of Ukrainian fungi containing more than 48.000 records was published:

Minter, D.W.; Dudka, I.O. (1996). *Fungi of Ukraine. A preliminary checklist*. 361 pp.

UK, Surrey, Egham; International Mycological Institute & Ukraine, Kiev, M.G. Kholodny Institute of Botany [ISBN 0 85199 168 8].

### **Actual awareness of authorities and local population of conservation of fungi**

According to Ukrainian law, all 30 species listed in the Red Data Book are under special state protection within the country. The Ministry for Environment Protection of Ukraine and local authorities of different levels are responsible for the control.

On the other hand, historically there is a strong tradition of collecting mushrooms by local population. Restricted access to certain locations with rare species is therefore very essential. Nature reserves (16 in total), biosphere reserves (4 in total) and other protected areas with various level of restrictions are very important for fungal conservation.

Raising of public awareness of fungal conservation is also necessary long-term task.

### **Specific problems or success stories**

Specific problems.

Despite including fungi in the national Red Data Book there is no regional fungal Red lists. There is well developed network of small reserves of local importance, or so called zakaznyks, equivalent for site of special scientific interest, within the country. For example, there are zoological, landscape, hydrological etc. zakaznyks but there is no mycological one. So at present any rare or endangered species of fungi (except for those listed in the Red Data book) on any area outside state nature/biosphere reserves cannot be proposed as a good reason for establishing reserve of local importance to be protected on regional level.

Basic problems.

Not sufficient (or frequent absence of) financial support for mycological conservation studies and actions.

Success stories.

Despite the basical problem observations and revision go on.

### **Scientific studies in relation to conservation of fungi**

Biosphere reserves and nature reserves are prioritized areas for mycological observations. For some of the reserves lists of fungal species including rare species have been already compiled, some have preliminary data. Still in some recently established reserves fungal diversity has not been studied so far.

### **References**

(References of some related publications in 1996-2005 concerning macromycetes)

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## 25. Fungal Conservation in the UK: 2000-2005

**Shelley Evans**

British Mycological Society Conservation Officer

E-mail: [shelley.evans@myco-services.freereserve.co.uk](mailto:shelley.evans@myco-services.freereserve.co.uk)

Priorities and problems in achieving fungal conservation in the UK remain very much the same as always and are probably common to all ECCF members: recording, research, communication, protection and last but certainly not least funding.

### **Recording**

The first step towards any form of conservation protection for all of us is the recording process. We cannot begin to assess rarity or pinpoint vulnerable sites until we know which species are growing where, how common they are or how isolated their communities.

The most significant development in the recording armoury in the last five years has been the recent publication of the 'Checklist of the British & Irish Basidiomycota'. This is part of a three-year project at the Royal Botanic Gardens, Kew, jointly funded by the relevant national conservation organizations (English Nature, Scottish Natural Heritage, Countryside Council for Wales, Northern Ireland Environment & Heritage Service, and the Heritage Council of Ireland) plus the British Mycological Society and the Fungal Research Trust. The Checklist has been compiled by Nick Legon & Alick Henrici with Peter Roberts, Brian Spooner, and Roy Watling, and is based on a database which will later be made available for searching on the world wide web. The printed version is over 500 A4 pages long, and provides full author and publication references for over 12,000 taxa recorded in the British Isles. Over 5000 of these are recognized as included species, with the rest recorded as synonyms or excluded species. All of the Basidiomycota, including rusts, smuts, and basidiomycetous yeasts, are included. For each accepted species, data are also given on habitat and distribution within the British Isles. The checklist costs £29.00 (approximately 42 euros) and can be obtained via [www.kewbooks.com](http://www.kewbooks.com) (and possibly with less expense via Amazon).

Fungal recording in all our countries lags considerably behind most other species groups. We know very little compared with bird or vascular plant recorders. In the UK the recording process is undertaken 95% on a voluntary basis through a growing network of independent local fungal recording groups most of which are affiliated to the British Mycological Society. This network of recording groups did not exist before 1996 but their popularity, success and professionalism has grown rapidly with 38 such groups now in existence. For most their main objective is recording and each group tends to have a designated recorder to whom all records are sent for keyboarding. Each has a programme of organised forays throughout the year designed to improve the identification skills of its members, raise fungal awareness with the public, liaise with site managers and above all record local finds. All struggle with the same problem of too many demands on their time and limited expertise but all share a passion for fungi. Many of the group leaders attend organised BMS events – forays, microscope workshops, and meetings to cascade expertise down to their own membership through local meetings, workshops and newsletters.

Most groups and many individuals then submit their records electronically to the BMS Fungal Records Database (BMSFRD) which now holds well over one million records. Records of all the herbarium material so far databased at Kew are also input to the BMSFRD but it is estimated a further 150,000 are yet to be keyboarded. As many as 500,000 'paper only' records are thought to exist across the UK in herbaria. A project

proposal (Evans 2000) for their keyboarding has yet to be funded although some funding was received from English Nature for keyboarding Red Data List specimens at RBG Kew.

Electronic recording of fungi was first proposed by David Minter, the system now used developed largely by Jerry Cooper and is now managed on a voluntary basis by Paul Kirk the BMS Database Manager. A limited version of the dataset of these records is available online through the BMS website [www.britmycolsoc.org](http://www.britmycolsoc.org).

Although there are fungal records for most counties in the UK the distribution maps for fungi still reflect the amount of local recording effort. There are data deserts for many areas and the BMS attempts to fill these when choosing locations for the three week long residential forays it holds each year. Amongst groups however there is no centralised organisation of recording. Most local groups do not record methodically by visiting sites in each grid square but according to preference so UK fungal distribution to a certain extent still reflects where mycologists live or go on holiday. The best recorded sites remain Esher in Surrey (Brian Spooner's favourite site), Slapton Ley in Devon (David Hawksworth's) and the Royal Botanic Gardens at Kew. All have species totals in the 3,000 vicinity. A conservative estimate for non lichenised species diversity in the UK is 12,000 although a more realistic estimate may be 20,000. Approximately 20 new species of macrofungi are added to the list each year.

Another important recording development in the last five years has been the advent of funded mycological recording projects. This is the result of UK government directives for biodiversity and the increased need for landowners and site managers to be aware of their important fungi. There are 27 non lichenised fungal species listed as priority species on the UK Biodiversity Action Plan (BAP). Each has a research and management plan managed by the relevant non governmental conservation agency and co-ordinated through the Fungus Conservation Forum (FCF) specialist BAP group. These plans have generated both large scale national and site based local funded survey work undertaken by mycologists including: national 3 year surveys of waxcap grassland fungi (*Hygrocybe*, grassland *Entoloma*, *Clavariaceae* and *Geoglossaceae*) in Scotland, Northern Ireland and Wales, Stipitate hydroid fungi (*Bankera*, *Boletopsis*, *Hydnellum*, *Phellodon*, and *Sarcodon*) in Scotland and Southern England, as well as survey and monitoring of *Tulostoma niveum* and *Hypocreopsis rhododendri*. At a local level there are ongoing funded mycological surveys of many protected nature reserves – again these are usually over a period of 3-5 years, eg Clydach SSSI (Site of Special Scientific Interest) in Monmouthshire, Wales (5 year survey) and Moccas SSSI in Herefordshire, England (3 year survey).

At a local planning level there is an increased need for developers to obtain a general fungal survey and assessment as part of getting planning permission to develop a site. If the habitat is one suitable for a BAP species these local planning surveys may be required to take place over several years eg at Brockworth in Gloucestershire, England, where ancient oak trees were searched for *Piptoporus quercinus* (Peter Roberts).

## Research

Species on the UK BAP list all have research targets which have to met and reported on every five years. This has generated a sudden and steady increase in the number of funded fungal research projects both species and habitat focussed. Initial reports on best sites for fungi have been produced: 'Waxcap-grasslands – an assessment of English sites' (Evans); 'Mycologically important semi-natural grasslands in Wales' (Evans) and 'Important Fungus Areas - a provisional assessment of best sites for fungi in the UK' (Evans).

Taxonomic and molecular work has been funded eg: 'Synonymy between *Battarea phalloides* and *B. stevenii*' (Jeffries & McLain) and 'Population diversity and speciation in *Hydnellum* and *Phellodon*' (Bridge & Panchal).

Vulnerable habitats are being highlighted and specialist management groups convened: eg 'The mycological wildlife value of traditional orchards' (Storey).

Survey work for fungi is lengthy and site managers and nature conservationists need guidance now about best management practice for fungi. So in the last few years the UK has started to develop tools for more rapid assessment of fungal quality using indicator species (eg waxcaps (Rotheroe, Evans and Mitchel) and beech woodland saprotrophs (Ainsworth)) as well as initial suggestions on how to achieve long term site condition monitoring for fungi (Holden). Both these approaches are designed with the non-mycologist in mind so that training in the identification of key species or indicators of site quality can be achieved relatively quickly or indirectly through other non-mycological site features. Some initial work has been undertaken to identify species which may be influenced by global warming as well as to indicate which species are thought to be aliens.

### **Communication**

Promoting the importance of fungi through education and publicity at all levels has also expanded over the last five years. Much of this is due to the convening of the highly successful Fungus Conservation Forum (FCF) attended by key mycologists active in fungal conservation together with representatives from the various agencies responsible for delivery of conservation action and large landowning bodies such as National Trust, Ministry of Defence, Wildlife Trusts, and Forestry Commission. A specialist subgroup (mainly mycologists) dealing with BAP species also meets to update research and survey programmes.

The annual BMS one day Autumn Taxonomy Meeting has a joint conservation and taxonomic theme. Over the past five years it has made available the results of the latest fungal conservation initiatives, survey and research results as well as covering ecology and habitat management to as wide an audience as possible including both mycologists and non-mycologist land managers. It is open to all at no cost. As a result of one such meeting the BMS special volume 'Fungal Conservation – Issues and Solutions' was published (Moore, Evans and Nauta 2001). Regular reports on UK fungal conservation ('Conservation Corner', Evans) also appear in the BMS publication 'Field Mycology'.

A highlight in terms of UK wide fungal publicity was the publication of the list of 'Recommended English names for fungi in the UK' (Holden). This generated a wide range of media coverage including interviews with mycologists on national television news programmes and prime time radio and achieved a very positive public feedback. It recommended the use of an English name for 1,000 commonly found species of fungi together with species of conservation concern to help popularise fungi and reduce the confusion of invented English names being used in field guides and other publications. The list is now available on the BMS website and has been adopted by conservation agencies in their literature, websites etc. The project was steered by a group of mycologists together with funding partners, and consulted a wide range of field mycologists for their opinions before it was finalised. The list will be updated online as additional species become profiled in new conservation drives such as the beech indicator and new Red Data List.

Through the Fungus Conservation Forum the first two of a planned series of leaflets on best management practice for fungi are available: 'Managing your land with fungi in mind' and 'Grassland gems – managing lawns and pastures for fungi'. Public involvement through the Pink Waxcap Survey (a scheme which ran for two years) also proved very successful in publicising the importance of fungi in grasslands and engaged the non-mycological public in the recording process for the first time in the UK.

The BMS now has an education group responsible for promoting fungi to the public through a series of very popular well attended events such as the Chelsea Flower Show. A good range of publicity material including posters, fungal models, and leaflets has been put together for these events. An excellent free booklet 'How the Mushroom got its Spots' (Assinder & Rutter) to help non-mycologists teach children and wildlife groups about fungi is available.

General wildlife guides are now also beginning to reflect the increase in fungal conservation activity in the UK. The acclaimed Collins New Naturalist series has just published its new volume on Fungi (Spooner and Roberts) to replace the 1953 volume by Ramsbottom and now contains a chapter on fungal conservation. The Dorling Kindersley 'Pocket Fungi' guide (Evans & Kibby) alongside common species also includes the 33 species proposed for inclusion on the Bern convention.

### **Protection**

The 1992 provisional Red Data List is now very out of date, having been prepared mainly on the basis of expert opinion and without the current increase in distribution data. It is now being replaced and the new Red Data List (Evans, Henrici & Ing) is nearing its final stages of preparation. It covers England, Scotland, Wales and the Isle of Man and includes some general microfungi as well as plant pathogens but excludes lichenised fungi and myxomycetes. Assessment has been based on new IUCN criteria (2001) and for the majority of species relies on quantitative record data held in the British Mycological Society's Fungal Records Database together with additional information from herbaria and individuals. Assessment of categories has been made on the basis of the number of hectads at which a species has been recorded before and after 1960. Over 800 taxa have been evaluated and the new draft version of the RDL currently includes nearly 400 species. A consultation and amendment process is nearing completion, when it will be reviewed for official adoption by JNCC the overarching conservation agency in the UK.

The UK BAP list is under review and stage one documentation will be submitted by the 20<sup>th</sup> November recommending the inclusion of approximately 80 non lichenised species in comparison with the existing 27 species. New criteria being applied include assessment for international threat, international responsibility and decline in the UK, marked decline in the UK and other factors such as ongoing threat, flagship species for a threatened group, and projected decline.

The list of legally protected species on Schedule 8 of the Wildlife and Countryside Act in Britain remains unchanged: *Battarrea phalloides*, *Boletus regius*, *Hericium erinaceus* and *Piptoporus quercinus*. This protects against intentional picking and destruction unless a licence is obtained from the relevant authority. In practice the only time the law was put to the test it proved to be inadequate. A site for *Battarrea phalloides* was destroyed by a workman building a new fence despite the fact he had been made aware of the site and despite a protective fence around the area.

Fungi have until the last five years received little mention in site protection measures. The sites of special scientific interest (SSSI) in the UK are carefully notified for their interest with a list of notable species or assemblages. Only a handful even mentioned fungi and that only in the most general way eg 'also important for fungi'. Over the last five years this has begun to change and several new SSSI have come into existence directly as a result of their fungal interest (Clydach, Monmouthshire; Roecliffe Manor, Leicestershire; Llanishen Reservoir, Cardiff and a site on the Sennybridge Ranges, Brecon). This is a first step forward in redressing the site protection balance for fungi in the UK. All include grassland habitats because of the increased awareness of the importance of waxcap-grassland fungi which was started by Maurice Rotheroe when he began the BMS Waxcap Grassland Survey (1996), and because of the development of tools for comparing grassland habitat quality for fungi using various scoring systems.

### **Funding**

Inevitably the availability of funding is the main factor which slows down progress and too much conservation and recording effort still relies on volunteers without whom much of the above progress would be impossible. The situation in the UK has gradually improved because of the need to meet the various government conservation targets and a slow trickle of funds is enabling more effective projects. Input is still uneven with more funding flowing into mycology from some countries than others.

As always there are too few expert mycologists having to do far too much on too little funding. Despite high profile government reports into the state of science in the UK highlighting the fact that professional taxonomic mycologists are on the verge of extinction there is still no improvement in the situation. Taxonomists retire and are not replaced. There are currently only two at the Royal Botanic Gardens Kew – they should be Red Listed!

### Summary

So have things improved or deteriorated for fungal conservation in the last five years? Despite the dire situation for professional taxonomic mycology other areas have all shown improvements. There is more recording, more research, better communication, a step forward for protection and some funding. Undoubtedly however the situation cannot be relied upon to continue to improve, and priority for nature conservation activities will always be uncertain. Priority relies on pressure from mycologists to ensure that fungi get equal if not better recognition and funding than other species groups.

## News from Planta Europa

Claudia Perini

Dipartimento Scienze Ambientali, Via P.A. Mattioli 4 , I-53100 Siena ITALIA

E-mail: perini@unisi.it

### 4th Planta Europa Conference (17-20 September 2004 in Valencia, Spain)

More than 250 delegates from 43 different countries attended the 4th Planta Europa Conference, among them there were also various mycologists! Thanks to all!

Starting from Anders Dahlberg with a Master Lesson on "Progress and challenges in the conservation of European Fungi" that was spread out to the whole conference, there were other mycological oral contributes in different thematic workshops:

At "Important Plant Areas" Erast Parmasto, Claudia Perini & Tiina Rahko with "Attempts to introduce fungi into Nature Conservation Activities" and Catalin Tanase with "Important fungus areas in the oligotrophic peat bogs of romanian eastern carpathians mountains."

At "Sustainable development" Mustafa Isiloglu, Hakan Ally, M. Halil Solak & Fadime Yylmaz Ersel with "Lactarius taxa of Turkey", Elena Salerni & Claudia Perini with "Sustainable management of natural resources: Experimental study for increasing productivity of *Boletus edulis* s.l. in Italy", Giuseppe Venturella, Georgios Zervakis & Francesco M. Raimondo with "Mycology in sustainable development: the case of *Pleurotus nebrodensis* (Pleurotaceae) from Sicily (southern Italy).

You can find them and other contributes in

<http://www.nerium.net/plantaeuropa/main.htm>

The second part of the conference was organized as Strategic Workshops, where a **MID-TERM revision** of the European Plant Conservation Strategy was discussed in different groups. Mycologists tried to be present everywhere! The review found that more than 50% of the targets are progressing well; two have in fact already been achieved (target 2.18: Micro-reserve programmes established and operational in least 2 regional pilot areas, by lead organisation Generalitat Valenciana, target 5.08: The European Plant Conservation Strategy included within the Global Strategy, by Planta Europa Secretariat). Delegates recognized, however, a number of key constraints and issues, which resulted in lack of progress in some of the targets and have implications for the successful implementation of the EPCS by 2007. One point recognized was the

inconsistent commitment by the identified lead organizations to implement assigned targets.

The first draft of the document, based on the results of the Conference discussions, was integrated with comments and suggestions received from the workshop facilitators, PE members, PE Steering Committee members and advisors. The document was published in June 2005 and is now available as a PDF document on the PE website:

<http://www.plantaeuropa.org/index.htm>

For us, as ECCF lead organization, still very important are three target:

1.01: by 2007 working list of all known European plant species (including cryptogamic plants and fungi) produced.

**1.02: by 2007 Preliminary European redlist for macrofungi.**

1.08: Planta Europa invite partners to contribute links to the existing webpage for exchanging information on European redlist Projects.

For target 2.13 we just did our steps: it was to promote the inclusion of all relevant threatened species in relevant Bern Convention annexes. By 2004 data sheets for all vascular plants, fungi and eligible cryptogamic plants were completed!

A principal outcome of the Mid Term Review was the Planta Europa Critical Targets (<http://www.plantaeuropa.org/documents/PECriticalTargets.pdf>); 7 'Critical Targets' were identified which are to provide the framework for Planta Europa activities for the next three years:

1. Planta Europa membership increased to at least 100 active member organisations with at least one member from each European country.
2. Capacity of Planta Europa members to efficiently promote and enable the EPCS and the Global Strategy on Plant Conservation at national, regional and international level, increased.
3. 'Wake-up call' for plant conservation designed and launched at the fifth Planta Europa Conference (Romania 2007)
4. Effective platform for information and knowledge exchange on European plant conservation among all interested parties established.
5. Identification and protection of Important Plant Areas (IPAs) further promoted in Europe.
6. The development of a provisional European Plants and Fungi Red List supported
7. Best practice for conservation and sustainable use of medicinal and other socioeconomically important plants identified and promoted to relevant policy makers.

### **Important Plant Areas in Central and Eastern Europe**

In 2001 the Ministry of Agriculture, Nature and Food quality provides funds to identify IPAs in 7 countries in CEE; these are Belarus, Czech Republic, Estonia, Poland, Romania, Slovakia, Slovenia. As you know the IPA programme includes lower plants and fungi in the assessment methodology. These important organisms are neglected in existing nature conservation legislation and Europe has a particular global responsibility to conserve them. .

General results: 796 IPAs identified to date... both on protected and currently unprotected land:

Bryophytes (77 IPAs), **fungi (20 IPAs)**, lichens (24 IPAs) and algae (3 IPAs).

#### **"...Fungi:**

The list of 33 fungi species prepared by the European Committee for the Conservation of Fungi (ECCF) were included in the list for Criterion A. Fungi are recorded as qualifying features in 20 IPAs under Criterion A (3 Czech Rep., 7 Estonia, 10 Romania). There are significant differences in the specialist disciplines and in the conservation needs of plants and fungi, so in each country the mycologists made the decision on whether there was sufficient data and if it was appropriate to identify priority plant and fungi sites together or separately. Again it was also possible to identify sites for fungi conservation using Criterion B and Criterion C. In Estonia

several sites were identified primarily for the importance of their fungi. Lack of data was a significant problem for fungi in this project.

**A European red list for fungi would help to identify priority species for conservation, and specific recognition for fungi in European legislation and policies would also help in their conservation...**

**... Methodology challenges:**

Putting theory into practice is always a challenging experience and much valuable information has been gained in the process of implementing the seven national projects and in other pilot projects. These experiences will be used to refine the methodology and prepare guidance information for new countries. ..." (Anderson S., Kusik T., Radford L., 2005, Important Plant Areas in Central and Eastern Europa, Plantlife International)

Parallely or following, more actions are underway in Europe and other parts of the world. Turkey was the first country anywhere in the world to complete its IPA identification. Researchers at the Finnish Environment Institute have begun work on projects to identify important fungi and plant in "white" not jet protected areas in Finland. Projects to identify Important Fungus Areas and Important Stonewort Areas in the UK have already been completed. In Spain several research projects into IPAs in different regions have begun, including the Valencia and Navarra regions; in Andalusia a mapping of areas of mycological interest is foreseen. In June 2003, the IUCN Centre of Mediterranean Cooperation, Planta Europa and Plantlife International coordinated an IPA workshop with participants from Croatia, Cyprus, Egypt, France, Greece, Gibraltar, Italy, Libanon, Marocco and Spain.

The Southern Africa Botanical Network, organised a regional IPA workshop for seven countries (Angola, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe). The ASEAN network in south east Asia has also begun the process of discussing IPA projects at a regional level with representatives from nine countries (Brunei, Cambodia, Indonesia, Lao, Malaysia, The Philippines, Singapore, Thailand, Vietnam). The New Zealand Plant Conservation Network is developing a strategy for implementing IPAs and the other targets of the *Global Strategy for Plant Conservation*.

Few days before the ECCF meeting in Cordoba there was the Steering Committee meeting of Planta Europa in Minsk: Important to report till now is that the **5th Planta Europa Conference on the conservation of Wild Plants** will be in **Cluj Napoca in Romania, in September, 5-9<sup>th</sup> 2007**. ([www.plantaeuropa.org](http://www.plantaeuropa.org))

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## Resolutions of the 7 th-Meeting in Cordoba, 9-12 November 2005 (Palace of Congresses, room Pablo Céspedes, old town of Cordoba)

Beatrice Senn-Irlet  
Secretary of ECCF

### List of participants:

Anders Bohlin	Sweden	anders.bohlin@telia.com
André Fraiture	Belgium	andre.fraiture@br.fgov.be
Beatrice Senn-Irlet	Switzerland	beatrice.senn@wsl.ch
Heikki Kotiranta	Finland	heikki.kotiranta@ymparisto.fi
Shelley Evans	United Kingdom	shelley.evans@myco-services.freemove.co.uk
Claudia Perini	Italy	perini@unisi.it
Anders Dahlberg	Sweden	anders.dahlberg@ArtData.slu.se
Ruben Walley	Belgium	ruben.walley@inbo.be
Gudridur Gyda Eyjolfsson	Iceland	gge@ni.is
Eef Arnolds	The Netherlands	arnolds21@hetnet.nl
Jacob Heilmann-Clausen	Denmark	jhc@habitatvision.dk
José-Luis Baptista Ferreira	Portugal	jlferreira@fc.ul.pt
Rostislav Fellner	Czech Republic	rfellner@svatojanskakolej.cz
Stephanos Diamandis	Greece	diamandi@fri.gr
Armin Mesic	Croatia	armin.mesic@zg.htnet.hr
Maria Lawrynowicz	Poland	miklaw@biol.uni.lodz.pl
Peter Roberts	United Kingdom	Pr02kg@lion.rbgkew.org.uk
Martyn Ainsworth	United Kingdom	ainsworthmartyn@aol.com
Francesco Bellu	Italy	bellu.francesco@rolmail.net
Livia Fodor	Hungary	kisne@mail.kvvm.hu
Boris Ivancevic	Serbia and Montenegro	i.boris@beotel.yu
Vera Hayova	Ukraine	veha@in.ua
Tine Grebenc	Slovenia	tine.grebenc@gozdis.si
Michel Heykoop	Spain	michel.heykoop@uah.es
Baldomero Moreno-Arroyo	Spain	baldomero.moreno.arroyo@juntadelandaluz.es
Pablo Daniels	Spain	pperezd@egmasa.es
Carlos Almagro Abellan	Spain	calmago@egmasa.es
David Minter, EMA- president	United Kingdom	<a href="mailto:d.minter@cabi.org">d.minter@cabi.org</a>

### Elections

Anders Bohlin will be the chair only until the next European Congress of Mycologist 2007 in St. Petersburg.

Peter Otto would like to be replaced by André Fraiture.

Anders Dahlberg is elected into the executive committee for the project of an European Red List.

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### Activities of the ECCF for the coming period

European Red List

Unanimously it was decided that the production of an European Red list of macrofungi has uppermost priority for the next 2-4 years. National conservation efforts are

desperately dependant on sound information about the distribution and the ecology of fungi to be protected.

### **Mapping macrofungi**

A European Red List will essentially be based on distribution data mapped on an European scale in the grid units of Flora Europaeae.

The ultimate ambition is to get the collaboration of each European country! In the next future the sampling of data has to be speeded up. André Fraiture aims to distribute the maps on the 33 species proposed for the Bern Convention in March 2006.

### **New work-groups**

#### **1. European Red List of Macrofungi**

Co-ordinator: Anders Dahlberg

Project outline

Until March 2007: Screening of the compiled list of fungi on an published national Red list (for the time being 4400 species, see [www.eccf.info](http://www.eccf.info)) by experts in these groups.

Goal: reducing the list for further detailed examination. The main question to be answered: is there any chance for a given species to be on an European Red list having in mind its ecology and its presently known or estimated distribution. Only species with a sound taxonomic concept behind should be considered (i.e. no aggregates such as *Laccara laccata*).

Group members: Erast Parmasto, Heikki Kotiranta, Jacob Heilmann-Clausen (Aphyllous); Eef Arnolds, Claudia Perini, Beatrice Senn-Irlet (Agaricales s.l.), Peter Roberts (Heterobasidiomycetes), Mikael Jeppson (Gasteromycetes). Eugene Popov, ..... (Ascomycetes)

Within the next 12 months: Funding efforts!

Group members:

Anders Bohlin, Anders Dahlberg, David Minter, Livia Fodor, Jacob Heilmann-Clausen, Stephanos Diamanidis, Shelley Evans (Funding of an European Red List).

#### **2. Microfungi**

Co-ordinator: Vera Hayova

Group members: David Minter, Cvetomir Denchev

#### **3. Saproxylic fungi and their conservation**

Co-ordinator: Jacob Heilmann-Clausen

Group members: Martyn Ainsworth, Heikki Kotiranta, Erast Parmasto

#### **4. Waxcap group**

Co-ordinator: Shelley Evans

Group members: Eef Arnolds, Tine Grebenc

#### **5. Monitoring methods**

Co-ordinator: Rotislav Fellner

Group members: Ruben Walley, Beatrice Senn-Irlet

Every group is open for more mycologists willing to contribute. Please contact the co-ordinators.

Work-groups no 2-5 are asked to present a short report on their activities at the next meeting during the EMC in St. Petersburg. Activities may include a list of recently published literature in that field or summaries from internal discussions (i.e. internet forum) or even meetings.

Information about activities related to the conservations of fungi

### **Countdown 2010 (an Initiative of IUCN)**

The following information is taken from

[http://www.iucn.org/places/europe/rofe/rofe\\_at\\_work/countdown.htm](http://www.iucn.org/places/europe/rofe/rofe_at_work/countdown.htm)

#### **Background**

The goal of halting the loss of biodiversity by 2010 is the subject of several key international agreements, amongst other the EU Heads of State have committed themselves to this goal at the Gothenburg summit in 2001, and in the European Union Strategy for Sustainable Development. The Countdown 2010 has a focus on the commitment made at pan-European level by Environment Ministers at the 5th Environment for Europe Conference in May 2003 in Kiev.

#### **The Challenge**

Given the current rapid decline in biodiversity, both in Europe and worldwide, and the ever-increasing extent and intensity of many human activities, the objective of halting the decline in biodiversity by 2010 will require unprecedented efforts in adapting our activities to the needs of natural systems. These include transformations in sectors such as agriculture, forestry, fisheries, tourism and land-use planning, but also ways of dealing successfully with such conservation issues as landscape protection, combating invasive alien species, developing practicable biodiversity indicators, realising community-based conservation and securing the full integration of biodiversity objectives into other sectors, including financial institutions and trade, development and aid policies.

#### **The Response of IUCN**

IUCN, given its unique scale, structure and affiliation, is in a position to play a leading role in delivering this impetus by organising highly focused action on a limited number of areas that are crucial to the success of the objective.

For more information and for your comments:

IUCN - The World Conservation Union

Regional Office for Europe

Rue Vergote 15

1030 Brussels, Belgium

Tel.: +32 2 739 3007

Fax: +32 2 732 94 99

[europe@iucn.org](mailto:europe@iucn.org)

**CH- Birmensdorf, 20th February 2006, Beatrice Senn-Irlet**