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## The Check-list of Italian Fungi, Part I (*Basidiomycetes*, *Basidiomycota*)

### Abstract

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Mycologists, both from Universities and mycological amateur groups, contributed to the achievement of the first part of the Check-list of Italian Fungi (*Basidiomycetes*, *Basidiomycota*) that is now completed. It comprises 4296 taxa, held in a computerized database. The consistency of mycodyversity in each region is here analysed and the results are summarized and discussed.

### Introduction

Global fungal biodiversity is still unknown, and environmental transformations and pollution jeopardize the mycota, causing changes in composition, due to the reduction and disappearance of susceptible species. In this contest, many European countries elaborated census and mapping of fungi programs, also in order to obtain scientific and official red lists.

Germany completed the distribution maps of all macrofungi growing on its territory, i.e. 5500 taxa (Kriegelsteiner 1991, 1993), so it is now going to propose a scientific red list of 1400 fungal species, filed into 5 categories against the official German red list which nowadays includes only 25 species.

A similar work was carried out in The Netherlands during the last 20 years, listing 3488 species and proposing a red list including 944 species. Austria has an official red list of 78 species and a scientific red list of 542 species and, starting from 1986, Poland has an official red list with 15 species and a scientific one with 1013 species.

Census and mapping programs for fungi have been recently proposed in Switzerland and France. In spite of looking at a comprehensive knowledge of their mycota, many countries proposed red lists, which will be later improved. In particular France proposed to include 628 species in a scientific red list, while Switzerland proposed to protect 232 fungi. The number of fungi included in the Spanish red list is 159, while United Kingdom proposed a provisional list of 453 species. Finland, Norway, Sweden, and Denmark published scientific red lists, with 325, 831 (10 extinct), 528, and 898 species, respectively. Hungarian red list includes 535 taxa, belonging to 5 categories: extinct, threatened with

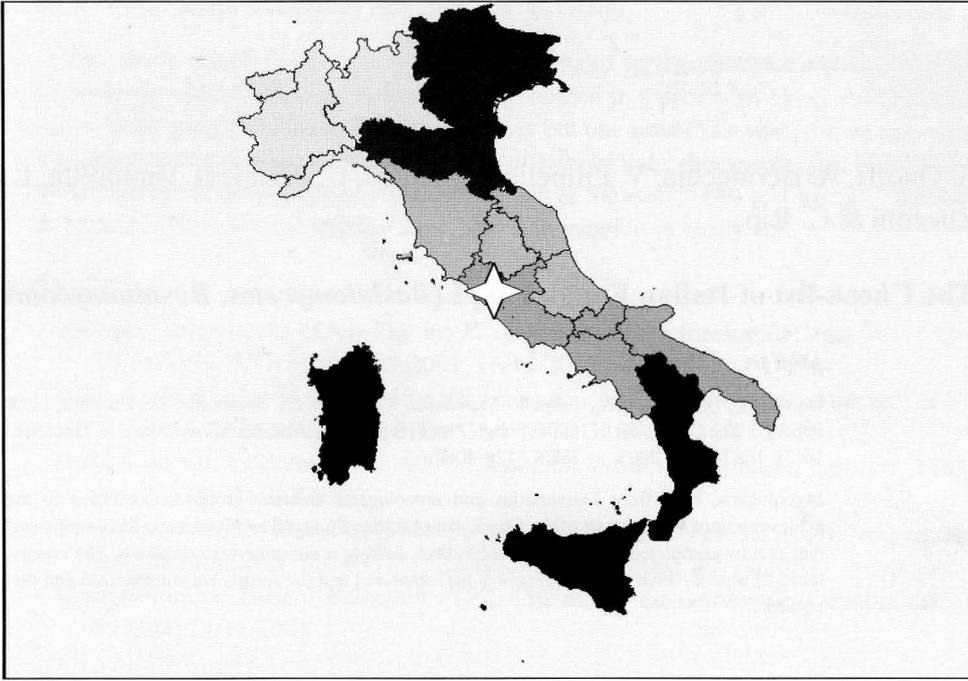


Fig. 1. Allotment of Italian territory into five coordinating groups.

extinction, very threatened, threatened and rare. Federation of Russia, Ukraine and Federal Republic of Yugoslavia have scientific red lists respectively with 200, 30 and 96 species. Estonia has an official red list including 30 species and a scientific one with 74 species. The red list in Latvia is restricted to 37 species. In Moldavia 500 species are considered as threatened, 30 of which were proposed for an official red list. In Slovak Republic 4815 fungal species are listed (Lizoň pers. comm.) and a red list includes 52 species and Czech Republic have an official red list including 46 species (Lizoň 2001a-b). Slovenia has an official red list including 70 species. Notwithstanding Greece published in 1973 an index of 1950 fungi and recently presented a Check-list of 811 *Basidiomycetes* (Zervakis & al. 1998) and 185 *Ascomycetes* (Zervakis & al. 1999), a red list is not still available. Red lists for fungi are also lacking in Armenia, Belgium, Island, Portugal, Romania and Luxemburg (Koune 1999).

Venturella & al. (1997) published for Italy a preliminary list of 23 fungal species belonging to category K (insufficiently known). According to the original threat categories by IUCN - The World Conservation Union (1994), it comprises taxa "that are suspected but not definitely known to belong to any of the threat categories, because of lack of information" (Groombridge 1992).

After the compilation, between 1905 and 1938, on Fridiano Cavara's initiative, of *Flora Italica Cryptogama* (Saccardo 1915), none list of Italian fungi has ever been published.

In order to reduce the gap of knowledge, the first part of a "Check-list of Italian Fungi", (including species, subspecies, varieties and forms) mainly based on recent reports, was prepared.

“The Check-list of Italian Fungi, Part I” is the product of the Agreement between Ministry of Environment and University of Tuscia in Viterbo. The compilation of an up-to-date Check-list comes out from the need to account for a homogeneous cognitive corpus and a nomenclatural reference for successive steps, above all the realization of distribution maps, and local and national red lists.

In fact, the Bern Convention (19 September 1979, treaty n. 104, European Council 1979) and the European Council for Conservation of Fungi (ECCF) provide for a number of actions to compile lists of rare or threatened species: these lists will be used for fungal protection and conservation. At moment, it exists a total number of 33 species candidates for listing in Appendix I of the Convention; the selection of the proposed species has been mainly based on information in the many available European national and regional Red Data Lists of threatened species (ECCF 2001). Twenty-two of these species are included in the Check-list here presented.

### Material and method

The organization of the working group on check-listing of Italian fungi was hierarchical: 1 National Coordinator, 5 Regional Coordinators filing data from 17 data collectors, 168 mycologists, 36 mycological groups and associations (Fig. 1).

As a consequence of the huge amount of total registered records, the first part of the Italian Fungi Check-list lists at present only *Basidiomycetes*, *Basidiomycota*. *Urediniomycetes* and *Ustilaginomycetes* will eventually be listed later.

The aim of the project includes also *Ascomycota* and *Zygomycota* in the forthcoming second part of the Check-list.

A database (Microsoft Access 2000), in which most of fungal records are mentioned as species, only a few as subspecies and many as varieties and forms, was prepared at the University of Viterbo. Each specific and infra-specific name is reported as binomial Latin nomenclature followed by the author's name; for almost all fungi the most significant and usual synonyms are reported.

The most important nomenclatural sources used were the Dutch Check-list (Arnolds & al. 1999) and *Fungi of Europe* (Courtecuisse & Duhem 1995). Other general sources as the CABI Bioscience Database of Fungal Names, on Internet <http://194.131.255.3/cabi-pages/Names/names.asp?strGenus=>, the search CBS *Aphylophorales* database, on Internet <http://www.cbs.knaw.nl/aphyllo/database.html>, Hjortstam (1997), Moser (1980), Jülich (1989), Ryvarde & Gilbertson (1993-1994), Eriksson & Ryvarde (1973, 1975, 1976), Eriksson & al. (1978, 1981, 1984), Hjortstam & al. (1988), and also many monographs, were used for appropriate names and authors. Other information on species characteristics is reported, mainly on the base of revisers suggestions, as criticality, endemism, exoticism and rarity.

Data on records are reported in separated fields, such as distribution source, Region, year of last recording and notes in which habitat, substrate and other general information are annotated. Fungal records mainly arise from scientific papers, but a consistent number of mycologists and mycological associations contributed with personal lists. The

Table 1. Number of fungi for each region on 22757 total records and 4296 species and infraspecific taxa.

Region	Fungi
Abruzzo	600
Basilicata	372
Calabria	1216
Campania	767
Emilia Romagna	2309
Friuli Venezia Giulia	605
Lazio	1348
Liguria	1373
Lombardia	2095
Marche	266
Molise	95
Piemonte	1488
Puglia	864
Sardegna	1235
Sicilia	1248
Toscana	2128
Trentino Alto Adige	2527
Umbria	255
Valle d'Aosta	150
Veneto	1808

Legislative data field lists Italian National and Regional laws and rules on harvesting and marketing of species.

In the Check-list an essential bibliography, including all references used as nomenclatural source and therefore fundamental for univocal use of the names of taxa, is also reported.

In addition, a program (in Microsoft Visual Basic 6.0 language) to manage and to easily consult the database was prepared.

### Results and discussion

In the Check-list of Italian Fungi (*Basidiomycetes*, *Basidiomycota*) are listed 4296 species and infrasispecific taxa, basing on 22757 records.

In Table 1 an alphabetical list of Italian Regions and the corresponding number of recorded fungi is reported, while Figure 2 shows the amount of data recorded for each Region, subdivided in four categories.

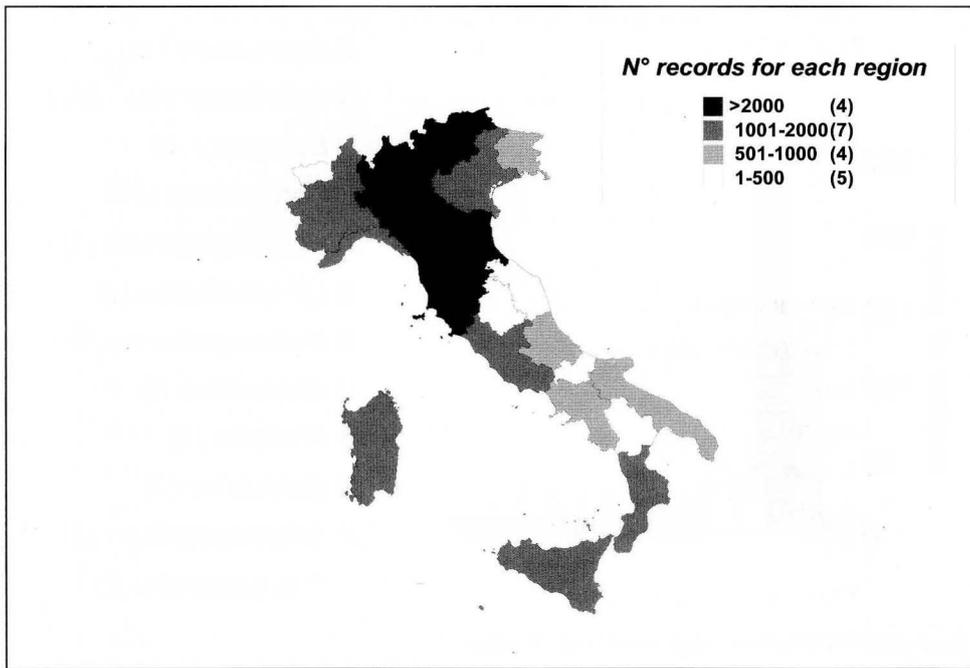


Fig. 2. The four categories showing the recorded number of fungi in each region. Number of regions in each category in brackets.

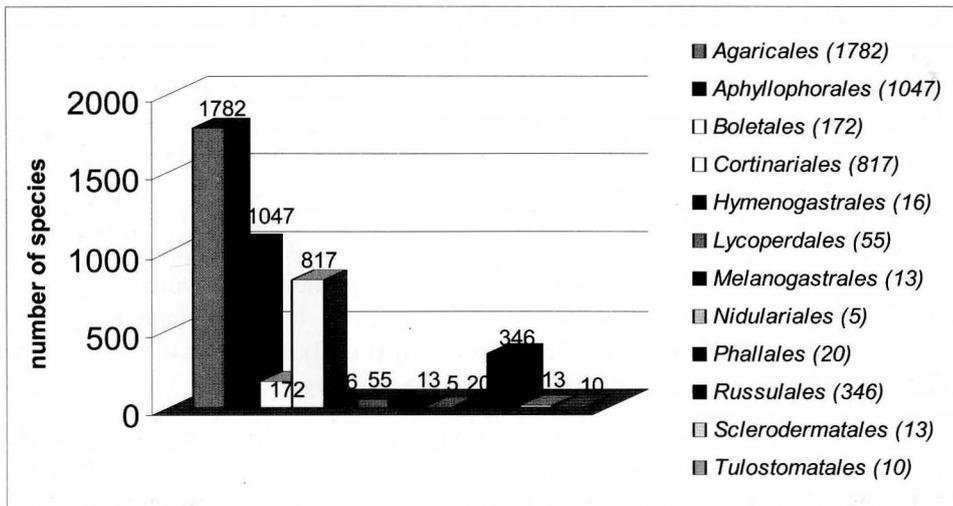


Fig. 3. Distribution of recorded species within orders.

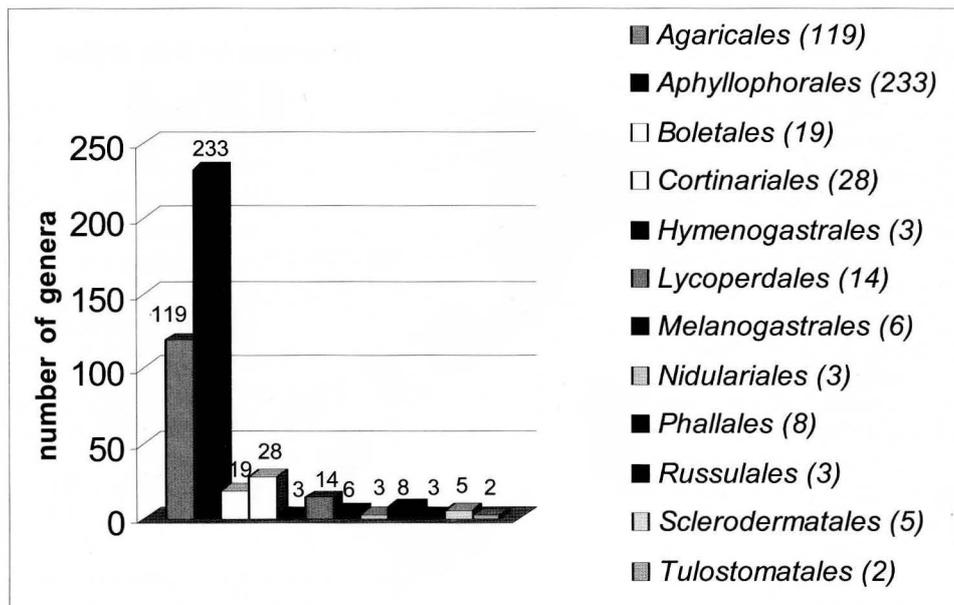


Fig. 4. Distribution of recorded genera within orders.

The differences in the number of fungi for each Region are also due to the distribution of mycologists in Italy.

Among the four Regions with a number of records lower than 500, Molise and Valle d'Aosta are the less investigated Regions; Trentino, Emilia Romagna, Toscana and Lombardia are among the most studied Regions (number of records higher than 2000).

The database can also provide additional information, in order to study some particular aspects of the Italian mycoflora; for example, on the base of revisers suggestions, it results that in Italy there are 55 possibly endemic species, while 93 species are rare and/or endangered.

Figure 3 and Figure 4 show the distribution into orders of recorded species and genera, respectively. From these distributions, information about the presence of taxonomic groups on the total records could be obtained.

Among the 11 identified orders (*Agaricales*, *Boletales*, *Cortinariales*, *Hymenogastrales*, *Lycoperdales*, *Melanogastrales*, *Nidulariales*, *Phallales*, *Russulales*, *Sclerodermatales*, *Tulostomatales*, and the informal group) the highest number of species (1782) belongs to the *Agaricales* (41,5%), followed by 'aphyllophorales' and *Cortinariales*, with 1047 and 817 species, respectively (Fig. 3). Basing on distribution into genera (Fig. 4) it results that 'aphyllophorales' is the most representative group, with 233 genera followed by *Agaricales*, with 119 genera. Few genera belong to the other orders.

#### Acknowledgements

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