

# First records of macromycetes from the Serbian side of Stara Planina Mts (Balkan Range)

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**Abstract.** A total of 117 species and 1 variety of macromycetes belonging to 37 families of phyla Ascomycota and Basidiomycota has been recorded on the Serbian side of Stara Planina Mts. All taxa are new for this area and 12 species and 1 variety are reported for the first time for Serbia. Nine species are included in national and/or European Red Lists.

**Key words:** Balkans, fungi, macromycetes, Stara Planina Mts

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## Introduction

A literature survey of the biota on the Serbian side of Stara Planina Mts (Balkan Range) yielded over 400 different titles. However, none of these titles treats fungi, and therefore the results presented in this paper are also the first data on macromycetes in the far west of Stara Planina Mts. For the Bulgarian side of the mountain quite a number of papers on fungi exist, listing a total of 361 macromycetes (Fakirova *et al.* 2002).

## Investigated area

The western stretches of the huge mountain massif Balkan (i.e., Stara Planina Mts) end in eastern Serbia, on the Serbian-Bulgarian border. The border itself coincides for 70 km with the highest mountain range which lies in the NW-SE direction. The highest peak is Midzor (2169 m), which is also the highest point in Serbia. In its vicinity, some 7km further into the Serbian territory, there is the peak of Babin Zub (1757 m). Geomorphologic features, orientation of the massifs, and the differences between two main river basins have led to climatic and vegetational differences between Serbian and Bulgarian sides of Stara Planina Mts (Misić *et al.* 1978).

The geological substrate of Stara Planina Mts is diverse, but the material was collected mainly from the area with silicate rock substrate where acid humic silicate soils (rankers) had developed. The entire area is rich in water courses.

Considering the climatic conditions of the area, the Serbian side of Stara Planina Mts is an intermediate area between the moderate-continental climate of lowlands in the north, and the subalpine climate of the Balkan mountain system in the southeast. The climate of the Serbian side of the massif is different in the north, central, and south parts as well at different altitudes, which makes this massif complex and very diverse in view of the climate (Misić *et al.* 1978). In the central part of the Serbian side of the massif, there is an area in the Toplodolska Reka River valley characterized by a climate considerably warmer than that of its immediate surroundings. The effects of this climate extend all the way up to Babin Zub peak, which represents the centre of the area where we collected macromycetes reported in this paper.

Furthermore, the Stara Planina Mts are an area of interaction of different floristic-geographical areas, which accounts for different floristic elements in its flora, from sub-Mediterranean in localities such as the Toplodolska Reka River valley, to boreal and sub-boreal floristic elements at higher altitudes. Over 50 plant communities have been described for this area (Misić *et al.* 1978). The oak forest belt is chiefly characterized by communities present in other areas of Serbia (*Quercetum frainetto-cerris serbicum* Rudski 1949, *Quercetum montanum* Cernj. et Jov. 1950 etc.), while the

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beech forest areas at higher altitudes boasts a number of specific plant communities (*Aceri heldreichii* – *Fagetum* Jov. 1957, *Fagetum submontanum mixtum silicicolum* Mistic 1972, *Fago* – *Aceri intermediae* – *colurnetum* Jov. 1955 etc.) rare for Serbia, as well as Europe. The oak forests extend from about 300 m to 1100 m a.s.l., followed by the zone of pure and mixed beech forests, extending until ca 1550 m, and by the belt of spruce that reaches altitudes up to 1700 m.

There are smaller settlements along the river valleys intercepting the Stara Planina Mts, but in the vast territory of the subalpine zone on the Serbian side of the border, covering approximately an area of 200 km<sup>2</sup>, there are no human settlements. This is an important factor for plant communities and fungi, as it reduces the anthropogenic influence and allows for the forests to be better preserved. Because of its natural riches, the Serbian part of the Stara Planina Mts has been proclaimed a natural reserve.

## Materials and Methods

Fungi were collected for two seasons (1993, 1994), during the latter half of July, mostly in the sites lying in a beech forest belt between 1450 and 1550 m a.s.l. in the wide area of Babin Zub peak, ca 30 km north of Pirot. While the beech (*Fagus sylvatica* L.) dominates the area, the mountain maple (*Acer heldreichii* Orph.) is also present at some sites. The material was collected in the following plant communities: *Fagetum subalpinum serbicum* Greb. 1950, *Luzulo* – *Fagetum serbicum* Mis. & Pop. 1954 and *Aceri heldreichii* – *Fagetum* Jov. 1957. Furthermore, in the same area, there is the site of Jabucko Ravaniste with peat bog where an interesting fungal flora characteristic of sphagnum habitats is present. A smaller number of specimens was collected at the altitudes between 600 and 1100 m in the oak forest belt (*Quercus petraea* (Mattuschka) Liebl., *Q. cerris* L.), also inhabited by some other woody species such as *Carpinus betulus* L., *Crataegus monogyna* Jacq., *Carpinus orientalis* Miller, *Fraxinus ornus* L., *Acer campestre* L., etc. The material was collected in the plant communities of *Quercetum montanum* Cernj. et Jov. 1950, *Quercetum cerris* Vuk. 1966, *Carpinetosum orientalis* Bor. 1966, and *Salicetum albae* Issl. 1926. The types of plant communities were classified according to Mistic (Mistic *et al.* 1978).

The exsiccata are kept in the Natural History Museum in Belgrade (BEO).

According to the maps of the Yugoslav Military Institute of Geography, dated 1980, the sites where the specimens were collected, are the following:

- [1] Vicinity of mountain lodge below Babin Zub and subsidiary road from the mountain lodge to Dojcinovo Vrelo
- [2] Zivadinov Dol
- [3] Dojcinovo Vrelo, Dojcinov Potok
- [4] Subsidiary road from Dojcinovo Vrelo to Jabucko Ravaniste
- [5] Jabucko Ravaniste (*Sphagnum* peat bog)
- [6] North edge of Jabucko Ravaniste

- [7] Vicinity of crossroads of mountain trails for Zarkova Cuka, Zenski Vrh and Babin Zub
- [8] Beech forest below Zarkova Cuka
- [9] Zubska Reka River basin below Babin Zub
- [10] South edge of Jabucko Ravaniste
- [11] Subsidiary road from Babin Zub to Topli Do
- [12] Rakitska Reka River
- [13] Mezdreja
- [14] Bobuk

In the list of the macromycetes reported below, the numbers beside the scientific names correspond to the site where the species were collected. The sites listed under [1-10] fall in the beech forest area at altitudes between 1450 and 1550 m, while the sites [11-14] correspond to the oak forest belt between 600 and 1100 m. The sites [11] and [14] partly cover the area of contact and overlapping of the oak and beech areas. In the site [12], lying along the riverbed of the Rakitska Reka River, the specimens were collected in willow stands (*Salix alba* L.).

## Results

### Ascomycota

#### Bulgariaceae

*Bulgaria inquinans* (Pers. : Fr.) Fr. [14]

#### Diatrypaceae

*Diatrype disciformis* (Hoffm. : Fr.) Fr. [1, 4]

#### Helotiaceae

*Bisporella citrina* (Batsch : Fr.) Korf & S.E. Carp. [11]

*Chlorociboria aeruginascens* Kanouse ex Ramamurthi, Korf & Batra [4, 6]

#### Helvellaceae

*Helvella lacunosa* Afzel. : Fr. [4]

#### Pyronemataceae

*Humaria hemisphaerica* (A. Wigg. : Fr.) Fuckel [4, 11]

*Melastiza chateri* (W.G. Sm.) Boud. [1]

*Scutellinia scutellata* (L. : Fr.) Lambotte [1, 4, 5]

#### Sclerotiniaceae

*Ciboria batschiana* (Zopf) N.F. Buchw. [13]

#### Xylariaceae

*Daldinia concentrica* (Bolton : Fr.) Ces. & De Not. [4]

*Hypoxylon fragiforme* (Pers. : Fr.) Kickx [1, 11]

*Xylaria hypoxylon* (L. : Fr.) Grev. [1, 4, 11]

*X. polymorpha* (Pers. : Fr.) Grev. [4]

#### Basidiomycota

##### Amanitaceae

*Amanita excelsa* (Fr. : Fr.) Bertillon [11]

*A. rubescens* Pers. : Fr. [6, 8]

*A. vaginata* (Bull. : Fr.) Lam. [1, 4, 11]

#### Auriculariaceae

*Auricularia auricula-judae* (Bull. : Fr.) Wettst. [13, 14]

#### Bolbitiaceae

*Bolbitius vitellinus* (Pers. : Fr.) Fr. [6]

*Panaeolus fimiputris* (Bull. : Fr.) Quél. [6]

#### Boletaceae

*Boletus badius* (Fr. : Fr.) Fr. [1, 4, 14]

*B. chrysenteron* Bull. [4, 11, 13]

*B. edulis* Bull. : Fr. [11]

*B. luridus* Schaeff. : Fr. [11]

*B. porosporus* (Imler) Watl. [14]

*B. pruinatus* Fr. [4]

*B. subtomentosus* L. : Fr. [14]

*Leccinum carpini* (Schulzer) M.M. Moser ex D.A. Reid [11, 13, 14]

*Strobilomyces strobilaceus* (Scop. : Fr.) Berk. [11]

#### Cantharellaceae

*Cantharellus cibarius* Fr. : Fr. [11, 14]

*Craterellus cornucopioides* (L. : Fr.) Pers. [14]

#### Coprinaceae

*Coprinus atramentarius* (Bull. : Fr.) Fr. [1, 6, 11]

*Lacrymaria lacrymabunda* (Bull. : Fr.) Pat. [6]

*Psathyrella pennata* (Fr. : Fr.) Konrad & Maubl. [4]

*P. piluliformis* (Bull. : Fr.) P.D. Orton [1]

#### Cortinariaceae

*Cortinarius coeruleus* (Schaeff.) Fr. [4]

*C. coeruleus* var. *depallens* M.M. Moser [11]

#### Dacrymycetaceae

*Calocera cornea* (Batsch : Fr.) Fr. [1, 4, 8, 11, 13, 14]

#### Entolomataceae

*Entoloma sinuatum* (Bull. ex Pers. : Fr.) P. Kumm. [6, 11]

#### Exidiaceae

*Exidia glandulosa* Fr. [4, 13]

#### Fomitopsidaceae

*Daedalea quercina* (L. : Fr.) Fr. [11]

#### Ganodermataceae

*Ganoderma applanatum* (Pers. ex Wallr.) Pat. [4, 11]

#### Gyroporaceae

*Gyroporus cyanescens* (Bull. : Fr.) Quél. [11]

#### Hapalopilaceae

*Bjerkandera adusta* (Willd. : Fr.) P. Karst. [1, 4, 6, 11]

#### Hymenochaetaceae

*Hymenochaete rubiginosa* (Dicks. : Fr.) Lév. [11]

*Phellinus igniarius* (L. : Fr.) Quél. [3]

#### Lycoperdaceae

*Bovista nigrescens* Pers. : Pers. [2, 6]

*B. plumbea* Pers. : Pers. [11, 14]

*Calvatia utriformis* (Bull. : Pers.) Jaap [6, 7, 11]

*Lycoperdon perlatum* Pers. : Pers. [2]

*Vascellum pratense* (Pers. : Pers.) Kreisel [14]

#### Marasmiaceae

*Marasmius alliaceus* (Jacq. : Fr.) Fr. [1, 3, 4, 8, 11]

*M. androsaceus* (L. : Fr.) Fr. [4, 6]

*M. oreades* (Bolton : Fr.) Fr. [14]

*M. scorodoni* (Fr. : Fr.) Fr. [11]

*Oudemansiella mucida* (Schrad. : Fr.) Höhn. [1]

*Xerula radicata* (Relhan : Fr.) Dörfelt [4, 6, 8]

#### Nidulariaceae

*Cyathus olla* Batsch : Pers. [14]

#### Phallaceae

*Mutinus caninus* (Huds. : Pers.) Fr. [11, 13]

*Phallus impudicus* L. : Pers. [4, 11]

#### Pleurotaceae

*Pleurotus dryinus* (Pers. : Fr.) P. Kumm. [11]

*P. ostreatus* (Jacq. : Fr.) P. Kumm. [3]

*P. pulmonarius* (Fr. : Fr.) Quél. [1]

#### Pluteaceae

*Pluteus cervinus* (Schaeff. : Fr.) P. Kumm. [1, 3, 4, 11, 14]

#### Polyporaceae s. lat.

*Cerrena unicolor* (Bull. : Fr.) Murrill [4]

*Daedalopsis confragosa* (Bolt. : Fr.) J. Schröt. [11]

*Faerberia carbonaria* (Alb. & Schwein. : Fr.) Pouzar [1]

*Fomes fomentarius* (L. : Fr.) Kickx [1, 3, 4, 8, 11]

*Laetiporus sulphureus* (Bull. : Fr.) Murrill [12]

*Lentinus tigrinus* (Bull. : Fr.) Fr. [12]

*Polyporus arcularius* (Batsch. : Fr.) Fr. [6]

*P. badius* (Pers. ex S.F. Gray) Schwein. [6]

*P. ciliatus* Fr. : Fr. [11]

*P. squamosus* Huds. : Fr. [1, 13]

*P. varius* (Pers. : Fr.) Fr. [1, 3, 4, 11]

*Pycnoporus cinnabarinus* (Jacq. : Fr.) P. Karst. [4, 6, 11, 14]

*Trametes gibbosa* (Pers. : Fr.) Fr. [7]

*T. hirsuta* (Wulfen : Fr.) Pilát [1, 2, 4, 6, 11, 13]

*T. versicolor* (L. : Fr.) Pilát [4, 11, 13, 14]

#### Russulaceae

*Lactarius blennius* (Fr. : Fr.) Fr. [11]

*L. circellatus* Fr. [13]

*L. decipiens* Quél. [6]

*L. piperatus* (L. : Fr.) Pers. [11, 14]

- L. romagnesii* Bon [11]  
*L. zonarius* Fr. [14]  
*Russula cyanoxantha* (Schaeff.) Fr. [4, 6, 11]  
*R. fellea* (Fr. : Fr.) Fr. [9]  
*R. heterophylla* Fr. : Fr. [14]  
*R. laurocerasi* Melzer [6, 11]  
*R. lutea* (Huds. : Fr.) S.F. Gray [1]  
*R. nigricans* (Bull.) Fr. [11]  
*R. romellii* Maire [14]  
*R. virescens* (Schaeff.) Fr. [11]

### Schizophyllaceae

- Schizophyllum commune* Fr. : Fr. [1, 3, 4, 11]

### Sclerodermataceae

- Astraeus hygrometricus* (Pers. : Pers.) Morgan [14]

### Stereaceae

- Stereum hirsutum* (Willd. : Fr.) Pers. [1, 4, 6, 8, 11, 13, 14]

### Strophariaceae

- Pholiota alnicola* (Fr. : Fr.) Singer [4]  
*Psilocybe fascicularis* (Huds. : Fr.) Noordel. [4, 11, 13]  
*P. semiglobata* (Batsch : Fr.) Noordel. [5]

### Suillaceae

- Suillus luteus* (L. : Fr.) Roussel [11]

### Tremellaceae

- Tremella mesenterica* Retz. : Fr. [13]

### Tricholomataceae

- Clitocybe gibba* (Pers. : Fr.) P. Kumm. [4, 6, 11, 14]  
*C. geotropa* (Lam. & DC.) Quél. [14]  
*C. odora* (Bull. : Fr.) P. Kumm. [4]  
*Collybia dryophila* (Bull. : Fr.) P. Kumm. [1, 6, 11]  
*Hygrocybe coccineocrenata* (P.D. Orton) M.M. Moser [5]  
*H. conica* (Schaeff. : Fr.) P. Kumm. [11]  
*Laccaria amethystina* (Huds.) Cooke [1, 4]  
*L. laccata* (Scop. : Fr.) Cooke [1, 4]  
*Megacollybia plathyphilla* (Pers. : Fr.) Kotl. [1, 4]  
*Micromphale brassicolens* (Romagn.) Orton [13]  
*M. foetidum* (Sow. : Fr.) Singer [13]  
*Mycena alcalina* (Fr.) P. Kumm. [4]  
*M. crocata* (Schrad. : Fr.) P. Kumm. [1]  
*M. pura* (Pers. : Fr.) P. Kumm. [1, 6, 11, 14]  
*M. renati* Quél. [1, 4]  
*M. stylobates* (Pers. : Fr.) P. Kumm. [14]  
*Panellus stipticus* (Bull. : Fr.) P. Karsten [6, 11, 13, 14]  
*Rickenella fibula* (Bull. : Fr.) Raithehl. [5]

## Discussion

A total of 117 species and 1 variety of macromycetes, new for the Serbian side of Stara Planina Mts, belonging to 37 fami-

lies of Ascomycota and Basidiomycota has been recorded during the investigations. Considering that fungi were collected only during summer the number of fungi reported here for Stara Planina Mts is underestimated.

Similar investigations in the central part of the Balkan Range (Bulgaria) reported a total of 361 macromycetes (Fakirova *et al.* 2000, 2002). For the sake of rough comparison, 180 macromycetes were recorded for Mt. Kopaonik (Ivancevic 1996) which lies in the central part of Serbia, while 251 macromycetes have been recorded from Mt. Tara (Colic 1967), in western Serbia.

The following 12 species and 1 variety were recorded for the first time for Serbia on Stara Planina Mts: *Boletus pruina-tus*, *Ciboria batschiana*, *Cortinarius coeruleus*, *C. coeruleus* var. *depallens*, *Faerberia carbonaria*, *Hygrocybe coccineocrenata*, *Lacrymaria lacrymabunda*, *Lactarius decipiens*, *L. romagnesii*, *Micromphale brassicolens*, *Mycena stylobates*, *Psathyrella pennata*, and *Russula laurocerasi*.

Although the above-mentioned taxa are not rare species, they contribute to increase the number of fungi recorded in Serbia and Montenegro which actually corresponds to 1000 macromycetes (Ivancevic 1995).

Three of the species recorded are included in the European Red List (Ing 1993): *Astraeus hygrometricus*, *Mutinus caninus*, and *Strobilomyces strobilaceus*. The national Red List (Ivancevic 1998) contains eight of the recorded species: *Astraeus hygrometricus*, *Hygrocybe coccineocrenata*, *H. conica*, *Mutinus caninus*, *Mycena renati*, *Panaeolus fimiputris*, *Pleurotus dryinus*, and *Polyporus badius*. Of those species established on Stara Planina Mts, nine species are officially protected. In Serbia, all the macromycete species included in the national Red List, as above mentioned eight species from Stara Planina Mts are protected by the law. *Lactarius zonarius* is protected under the legal provisions on the trade and collecting of edible mushrooms.

*Astraeus hygrometricus* and *Hygrocybe coccineocrenata* may be considered as threatened, vulnerable for the area of Stara Planina Mts, because their specific habitats lie in a very small area, and can easily be destroyed by anthropogenic activity.

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