



## Macrofungi of Karagöl–Sahara National Park (Şavşat-Artvin/Turkey)

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### Abstract

The present study was carried out on macrofungi growing in Karagöl-Sahara National Park (Şavşat-Artvin/Turkey) area. Macrofungi specimens were collected during field studies between the years of 2008 and 2010. The ecological and morphological features of the specimens and information on macrofungi known by local people were recorded. According to field and laboratory investigations, a total of 172 taxa belonging to 45 families and 10 orders within *Pezizomycetes*, *Leotiomycetes*, *Agaricomycetes* and *Dacrymycetes* classes were identified. Moreover, in the present study, the following 3 taxa were identified as new records for Turkish Mycobiota; *Boletus barrowsii* Thiers & A.H. Sm., *Crepidotus applanatus* (Pers.) P. Kumm. and *Russula gigasperma* Romagn.

**Key words:** macrofungal diversity, Karagöl-Sahara National Park, Artvin, Turkey

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## Karagöl-Sahara Milli Parkı'nda (Şavşat-Artvin/Türkiye) belirlenen makromantarlar

### Özet

Bu çalışma Karagöl-Sahara Milli Parkı (Şavşat-Artvin/Türkiye) sınırları içerisinde yetişen makromantarlar üzerinde gerçekleştirilmiştir. Makromantar örnekleri 2008-2010 yılları arasında yapılan arazi çalışmaları esnasında toplanmıştır. Örneklere ait ekolojik ve morfolojik özelliklerle birlikte yöre halkının örneklerle ilgili bilgileri kaydedilmiştir. Arazi ve laboratuvar çalışmaları sonucunda *Pezizomycetes*, *Leotiomycetes*, *Agaricomycetes* ve *Dacrymycetes* sınıflarında dağılım gösteren 45 familya ve 10 takıma ait toplam 172 takson belirlenmiştir. Ayrıca bu çalışma sonucunda *Boletus barrowsii* Thiers & A.H. Sm., *Crepidotus applanatus* (Pers.) P. Kumm. ve *Russula gigasperma* Romagn. türleri Türkiye Mikobiyotası için yeni kayıt olarak belirlenmiştir.

**Anahtar kelimeler:** makromantar çeşitliliği, Karagöl-Sahara Milli Parkı, Artvin, Türkiye

### 1. Introduction

Karagöl-Sahara National Park, in the borders of Şavşat district in the city of Artvin, is one of the 40 National Park areas in Turkey and consists of two separate fields: these are Karagöl and Sahara plateaus. Karagöl Plateau is situated in 45 km north of the center of Şavşat (Fig.1.a.) whereas Sahara Plateau is located in 17 km away the center of Şavşat (Fig.1.b). The forest comprises of spruce and fir trees as well as yellow pine in the subzone. Paleogene and Neogene strata are mostly found in Karagöl and in its vicinity.

The basis of the field is largely formed of sedimentary rocks. Karagöl and its neighborhood are cracked from place to place by valleys. These cracks cause landslides and mass movements to occur in the area. Rotational mass movement formed a basin in which water accumulated and Karagöl is an example of this form, namely, a landslide lake. Fields around the lake is densely covered with forest formed by spruce and pine trees. Black sea climate chiefly

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prevails but in some parts it is under the influence of continental climate that prevails in Eastern Anatolian region. Every season it rains and in winters it is cold and snowy.

Although some investigations were carried out in the area covering Eastern Black sea Region by Akata et al., (2011; 2014a; 2014b; 2016), Baydar and Sesli (1994), Demirel (1994; 1999), Demirel and Işıloğlu (1993), Demirel and Öztürk (1993), Demirel et al., (2004), Demirel et al., (2010), Keleş et al. (2014), Öder (1986; 1988), Selik (1973), Sesli (1993; 2007; 2014) and Uzun et al., (2004; 2006; 2015), there is no studies specified on Karagöl-Sahara National Park. Therefore, the present study aimed to determine the macrofungal diversity of the region. Although the number of studies on macrofungi of Turkey is increasing, the mycobiota of Turkey is still needed to be completed. During the studies completed between 1915 and March 2014 a total of 2158 macrofungi taxa, 215 of which belonging to Ascomycota and 1943 of which belonging to Basidiomycota, were identified (Sesli and Denchev, 2014).

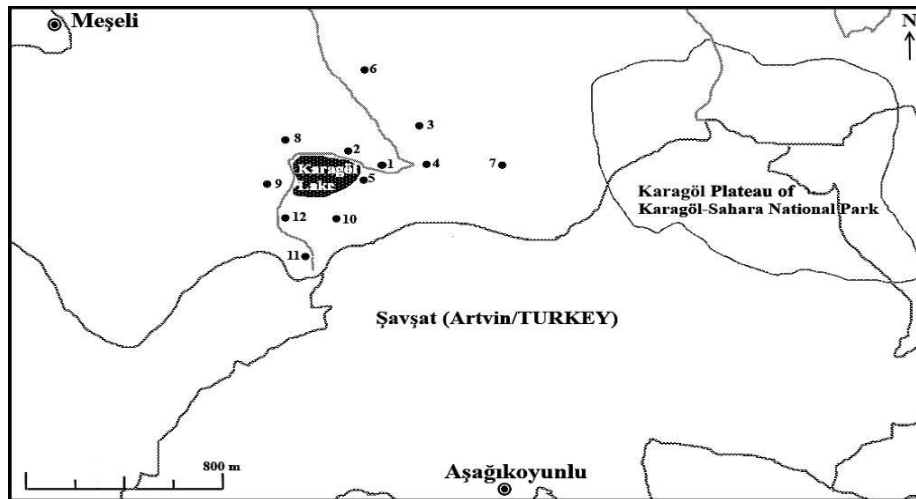


Figure 1.a. Karagöl Plateau localities of research area

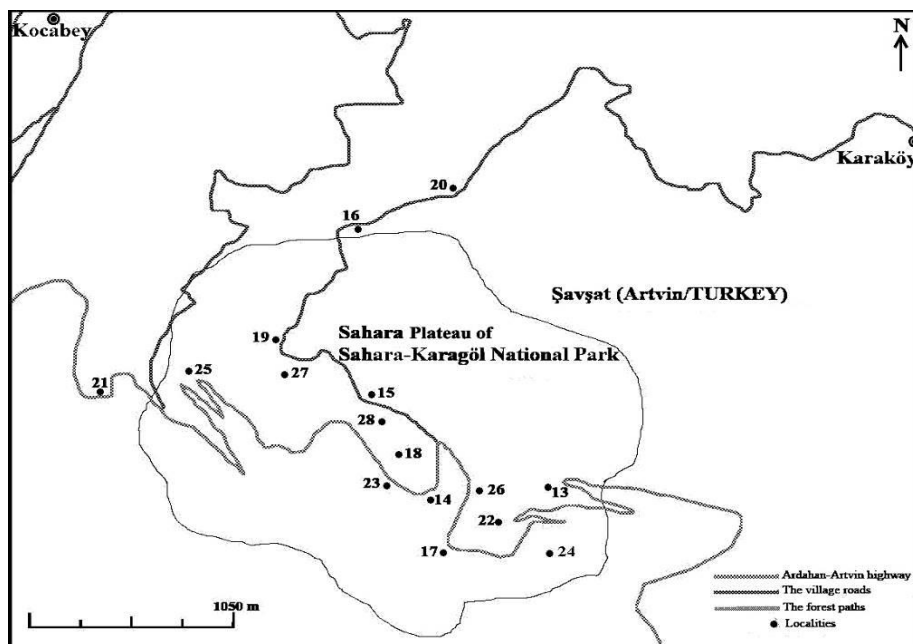


Figure 1.b. Sahara Plateau localities of research area

## 2. Materials and methods

Materials for the study comprise of macrofungi samples that were gathered from Karagöl-Sahara National Park and its neighborhood at 2008-2010. Field study was executed in areas, which are generally suitable for fungus to grow, such as forestland, streambed, grassland, bushes and conifer forest. The most convenient months for fungus to grow were found out to be May, June, September, October and November. In order to prevent any harm to patterns, specially-prepared cardboards and baskets were used and digital photos of samples being gathered were taken in their natural habitats. Moreover, morphologic and ecologic aspects of the samples were recorded so as to be used in identification

process. Microscopic examination related to fungi patterns that were taken to laboratory was implemented. In the process of identification, chemicals such as NaOH, KOH, sulfovaniline, aniline blue, Meltzer reagent and sulphuric acid were used. As a result of field and laboratory studies, macroscopic and microscopic data were put into operation to identify taxa. The data has also been compared with the literature concerning these identifications, thus the samples are described.

Successive to being dried, patterns of fungi were put into polyethylene nylon bag with labels and to prevent any harm they were held in a deep-freezer at -40 °C for 24 hours so they were transformed into fungarium materials.

The specimens that have been identified have been kept at Mycology Fungarium of Biology Department (VANF) in Yüzüncü Yıl University.

### 3. Results

Determined 172 taxa are listed alphabetically with habitat-substrate, collection date, accession and locality numbers (eg.: F. 5276 [L. 13]). Author citations are abbreviated according to <http://www.indexfungorum.org> and the systematics of the taxa is in accordance with Cannon and Kirk (2007), Kirk et al. (2008), and Index Fungorum ([www.speciesfungorum.org](http://www.speciesfungorum.org); accessed 18 November 2016). *Crepidotus applanatus* (Pers.) P. Kumm., *Boletus barrowsii* Thiers & A.H. Sm. and *Russula gigasperma* Romagn. are new records for the macromycota of Turkey. Newly recorded taxa are marked by an asterisk (\*) and are presented with short descriptions, morphological and microscopic photographs.

*Pezizomycetes* O.E. Erikss. & Winka

*Pezizales* J. Schröt.

*Caloscyphaceae* Harmaja

**3.1. *Caloscypha fulgens*** (Pers.) Boud.

Under conifer trees, 16.05.2009, F. 5276 [L. 13].

*Discinaceae* Benedix

**3.2. *Discina ancilis*** (Pers.) Sacc.

Under conifer trees, 17.05.2009, F. 5355 [L. 8].

**3.3. *Gyromitra gigas*** (Krombh.) Cooke.

Under conifer trees, 16.05.2009, F. 5309 [L. 20].

**3.4. *Gyromitra infula*** (Schaeff.) Quéf.

On conifer stump, 23.10.2009, F. 5996 [L. 2].

*Helvellaceae* Fr.

**3.5. *Helvella elastica*** Bull.

Under conifer trees, 18.08.2009, F. 5832 [L. 16].

*Morchellaceae* Rchb.

**3.6. *Morchella deliciosa*** Fr.

Under conifer trees, 16.05.2009, F. 5311 [L. 25].

**3.7. *Verpa bohemica*** (Krombh.) J. Schröt.

Under *Salix* sp. trees, 16.05.2009, F. 5321 [L. 21].

*Pezizaceae* Dumort.

**3.8. *Peziza depressa*** Pers.

Conifer forest, road side, over land, 10.08.2009, F. 5827 [L. 11].

**3.9. *Peziza succosa*** Berk.

Under conifer trees, 19.08.2009, F. 5944 [L. 15].

*Pyronemataceae* Corda

**3.10. *Flavoscypha cantharella*** (Fr.) Harmaja.

Under conifer trees, 23.10.2009, F. 5984 [L. 4].

**3.11. *Humaria hemisphaerica*** (F.H. Wigg.) Fuckel.

On conifer stump, 19.08.2009, F. 5930 [L. 18].

*Leotiomyces* O.E. Erikss. & Winka

*Helotiales* Nannf. ex Korf & Lizoň

*Geoglossaceae* Corda

**3.12. *Trichoglossum hirsutum*** (Pers.) Boud.

Under conifer trees, 18.08.2009, F. 5829 [L. 7].

*Agaricomycetes* Doweld

*Agaricales* Underw.

*Agaricaceae* Chevall.

**3.13. *Agaricus arvensis*** Schaeff.

Under conifer trees, 19.08.2009, F. 5968 [L. 4].

**3.14. *Agaricus augustus*** Fr.

On conifer stump, 06.09.2009, F. 5190 [L. 8].

**3.15. *Agaricus impudicus*** (Rea) Pilát.

Under conifer trees, 19.08.2009, F. 5919 [L. 8].

**3.16. *Agaricus langei*** (F.H. Møller & Jul. Schäff.) Maire.

Under conifer trees, 31.08.2008, F. 5065 [L. 8], 18.08.2009, F. 5779 [L. 9].

**3.17. *Agaricus sylvaticus*** Schaeff.

Under conifer trees, 18.08.2008, F. 5819 [L. 11].

**3.18. *Agaricus sylvicola*** (Vittad.) Peck

Under conifer trees, 06.07.2008, F. 4988 [L. 2],

18.08.2009, F. 5790 [L. 11], 05.09.2008, F. 5169 [L. 15],

13.08.2009, F. 5614 [L. 17], 18.08.2009, F. 5908. [L.19].

**3.19. *Agaricus urinascens*** (Jul. Schäff. & F.H. Møller) Singer

Mixed woodland clearance, 29.07.2009, F. 5512 [L. 19].

**3.20. *Agaricus xanthodermus*** Genev.

Under conifer trees, 30.06.2008, F. 4971 [4], 06.07.2008, F. 4984 [L. 8], 29.07.2009, F. 5544 [L. 5].

**3.21. *Bovista aestivalis*** (Bonord.) Demoulin.

Mixed woodland clearance, 29.07.2009, F. 5527 [L. 19].

**3.22. *Coprinus comatus*** (O.F. Müll.) Pers.

Under conifer trees, 19.08.2009, F. 5883 [L. 26].

**3.23. *Cystodermella cinnabarina*** (Alb. & Schwein.)

Under conifer trees, 19.08.2009, F. 5879 [L. 27].

**3.24. *Lepiota aspera*** (Pers.) Quéf.

Under conifer trees, 07.07.2008, F. 5044 [L. 15].

**3.25. *Lepiota clypeolaria*** (Bull.) P. Kumm.

Under conifer trees, 18.08.2009, F. 5772 [L. 10], 19.08.2009, F. 5940 [L. 7].

**3.26. *Lepiota cristata*** (Bolton) P. Kumm.

Under conifer trees, 06.07.2008, F. 4985 [L. 15].

**3.27. *Lepiota ignivolvata*** Bousset & Joss. ex Joss.

Under conifer trees, 19.08.2009, F. 5921 [L. 15].

**3.28. *Lepiota magnispora*** Murrill.

Under conifer trees, 13.08.2009, F. 5613 [L. 15].

**3.29. *Leucoagaricus leucothites*** (Vittad.) Wasser.

Conifer forest clearance, 29.07.2009, F. 5551 [L. 15].

**3.30. *Leucoagaricus nymphaeum*** (Kalchbr.) Bon.

Under conifer trees, 06.07.2008, F. 4980 [L. 9], 19.08.2008, F. 5939 [L. 18].

**3.31. *Lycoperdon lividum*** Pers.

Under conifer trees, 06.07.2008, F. 4981 [L. 28].

**3.32. *Lycoperdon mammiforme*** Pers.

Mixed woodland, 29.07.2009, F. 5528 [L. 18], 19.08.2008, F. 5960 [L. 21].

**3.33. *Lycoperdon molle*** Pers.

Under conifer trees, 19.08.2009, F. 5920 [L. 17].

**3.34. *Lycoperdon perlatum*** Pers.

Under conifer trees, 06.07.2008, F. 4982 [L. 8], 23.10.2009, F. 5988 [L. 3], mixed woodland clearance, 29.07.2009, F. 5526 [L. 17].

**3.35. *Lycoperdon pyriforme*** Schaeff.

Conifer forest, on wood remnants, 26.10.2008, F. 5255 [L. 26], 16.05.2009, F. 5284 [L. 28], conifer forest clearance, 18.08.2009, F. 5769 [L. 15], 23.10.2009, F. 6012 [L. 18].

**3.36. *Lycoperdon utriforme*** Bull.

Conifer forest clearance, 27.07.2009, F. 5543 [L. 19].

**3.37. *Macrolepiota excoriata*** (Schaeff.) Wasser

Conifer forest clearance, 27.07.2009, F. 5541 [L. 28], 19.08.2009, F. 5874 [L. 14], under conifer trees, 23.10.2009, F. 6010 [L. 12].

**3.38. *Macrolepiota mastoidea*** (Fr.) Singer.

Under conifer trees, 19.08.2009, F. 5889 [28].

**3.39. *Macrolepiota procera*** (Scop.) Singer

Under conifer trees, 31.08.2008, F. 5082 [L. 12], 06.09.2008, F. 5198 [L. 7], 18.08.2009, F. 5810 [L. 3], 23.10.2009, F. 6009 [L. 9], 27.07.2009, F. 5561 [L. 20], 13.08.2009, F. 5608 [L. 25], 19.08.2009, F. 5873 [L. 23], 23.10.2009, F. 6015 [L. 19].

**Amanitaceae** R. Heim ex Pouzar**3.40. *Amanita citrina*** Pers.

Under conifer trees, 19.08.2009, F. 5888 [L. 28].

**3.41. *Amanita eliae*** Quéf.

Under conifer trees, 19.08.2009, F. 5945 [L. 28].

**3.42. *Amanita friabilis*** (P. Karst.) Bas.

Mixed woodland, 19.08.2009, F. 5852 [L. 21].

**3.43. *Amanita gemmata*** (Fr.) Bertill

Under conifer trees, 18.08.2009, F. 5813 [L. 10], 19.08.2009, F. 5878 [L. 16], 19.08.2009, F. 5925 [L. 23].

**3.44. *Amanita muscaria*** (L.) Lam.

Under conifer trees, 29.07.2009, F. 5537 [L. 28], 19.08.2009, F. 5969 [L. 17], 18.08.2009, F. 5840 [L. 4].

**3.45. *Amanita pantherina*** (DC.) Krombh.

Under conifer trees, 07.07.2008, F. 5035 [L. 28], 19.08.2009, F. 5891 [L. 16], 18.08.2009, F. 5764 [L. 10].

**3.46. *Amanita rubescens*** Pers.

Mixed woodland, 29.07.2009, F. 5536 [L. 19], conifer forest, 19.08.2009, F. 5966 [L. 15].

**3.47. *Amanita submembranacea*** (Bon) Gröger

Under conifer trees, 07.07.2008, F. 5028 [L. 28].

**3.48. *Amanita vaginata*** (Bull.) Lam.

Under conifer trees, 30.06.2008, F. 4970 [L. 8], 06.07.2008, F. 4992 [L. 5], 18.08.2009, F. 5814 [L. 12].

**Bolbitiaceae** Singer**3.49. *Bolbitius tütubans*** (Bull.) Fr.

Under conifer trees, 07.07.2008, F. 5046 [L. 22].

**Clavariaceae** Chevall.**3.50. *Clavulinopsis corniculata*** (Schaeff.) Corner

Under conifer trees, 23.10.2009, F. 6003 [L. 8].

**Cortinariaceae** R. Heim ex Pouzar**3.51. *Cortinarius naps*** Fr.

Mixed woodland 19.08.2009, F. 5937 [L. 19].

**3.52. *Cortinarius odorifer*** Britzelm.

Under conifer trees, 23.10.2009, F. 5980 [L. 7].

**3.53. *Cortinarius pseudonapus*** Rob. Henry

Under conifer trees, 19.08.2009, F. 5959 [L. 28].

**3.54. *Cortinarius triformis*** Fr.

Under conifer trees, 07.07.2008, F. 5022 [28], 23.10.2009, F. 5995 [L. 8].

**Entolomataceae** Kotl. & Pouzar**3.55. *Entoloma hirtipes*** (Schumach.) M.M. Moser.

Under conifer trees, 16.05.2009, F. 5275 [L. 13].

**Hygrophoraceae** Lotsy**3.56. *Hygrophorus chrysodon*** (Batsch) Fr.

Mixed woodland, 19.08.2009, F. 5957 [L. 19].

**Hymenogastraceae** Vittad.**3.57. *Gymnopilus penetrans*** (Fr.) Murrill

Under conifer trees, 29.06.2008, F. 4964 [L. 23].

**3.58. *Gymnopilus sapineus*** (Fr.) Murrill

Under conifer trees, 19.08.2009, F. 5943 [L. 14].

**3.59. *Hebeloma laterinum*** (Batsch) Vesterh.

Under conifer trees, 06.07.2008, F. 4991 [L. 12].

**3.60. *Hebeloma longicadum*** (Pers.) P. Kumm.

Under conifer trees, 19.08.2009, F. 5917 [L. 28].

**3.61. *Hebeloma sinapizans*** (Fr.) Sacc.

Mixed woodland, 19.08.2009, F. 5844 [L. 21].

**Inocybaceae** Jülich**3.62. \**Crepidotus applanatus*** (Pers.) P. Kumm.

**Pileus:** 1-4 cm; crust-shaped; somewhat droopy; smooth or finely velutinous, first whitish, later brownish to ochre; margin often slightly striate. **Lamellae:** Close whitish, becoming brownish with age. **Stipe:** absent. **Flesh:** thin and smoother. **Spores** 4-6  $\mu\text{m}$ , spheric, brownish, very finely spotted (Fig.2).

On conifer wood remnants, 23.10.2009, F. 6019 [L. 18].

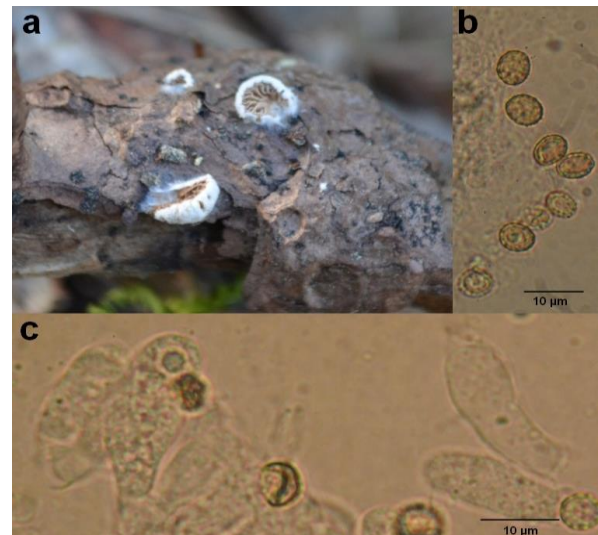


Figure 2. *Crepidotus applanatus*; a. fruiting bodies, b. basidiospores, c. basidium and cheilocystidia

**3.63. *Inocybe abietis*** Kühn.

Under conifer trees, 18.08.2009, F. 5039 [L. 7].

**3.64. *Inocybe catalaunica*** Singer

Under conifer trees, 23.10.2009, F. 5831 [L. 3].

**3.65. *Inocybe cervicolor*** (Pers.) Quéf.

Under conifer trees, 19.08.2009, F. 5909 [L. 28].

**3.66. *Inocybe dulcamara*** (Alb. & Schwein.) P. Kumm.

Under conifer trees, 07.07.2008, F. 5023 [L. 28].

**3.67. *Inocybe geophylla*** (Bull.) P. Kumm.

Under conifer trees, 23.10.2009, F. 6001 [L. 8].

**3.68. *Inocybe nitidiuscula*** (Britzelm.) Lapl.

Under conifer trees, 07.07.2008, F. 5030 [L. 24].

**3.69. *Inocybe rimosa*** (Bull.) P. Kumm.

Conifer forest clearance, 27.07.2009, F. 5553 [L. 28], under conifer trees, 19.08.2009, F. 5869 [L. 17].

**3.70. *Inocybe whitei*** (Berk. & Broome) Sacc.

Under conifer trees, 23.10.2009, F. 6017 [L. 18].

#### *Lyophyllaceae* Jülich

**3.71. *Asterophora lycoperdoides*** (Bull.) Ditmar

Under conifer trees, 31.08.2008, F. 5071 [L. 6].

**3.72. *Calocybe gambosa*** (Fr.) Donk

Under conifer trees, 19.08.2009, F. 5946 [L.28].

#### *Marasmiaceae* Roze ex Kühner

**3.73. *Marasmius oreades*** (Bolton) Fr.

Conifer forest clearance, 05.09.2008, F. 5164 [L.24], 03.10.2008, F. 5223 [L. 23], 29.07.2009, F. 5552 [L. 15].

**3.74. *Rhodocollybia butyracea*** (Bull.) Lennox

Under conifer trees, 07.07.2008, F. 5027 [L. 28], 18.08.2009, F. 5773 [L. 10], 23.10.2009, F. 5979 [L. 7], 06.07.2008, F. 4975, 4987 [L. 12, 8].

#### *Mycenaceae* Roze

**3.75. *Mycena epipterygia*** (Scop.) Gray.

Conifer forest, on the remnants of conifer wood, 19.08.2009, F. 5950 [L. 22].

**3.76. *Mycena pura*** (Pers.) P. Kumm.

Under conifer trees, 07.07.2008, F. 5020 [L. 22], 19.08.2009, F. 5923 [L. 28].

**3.77. *Mycena strobilicola*** J. Favre & Kühner

Under conifer trees, 07.07.2008, F. 5041 [L. 28].

**3.78. *Xeromphalina campanella*** (Batsch) Maire

Under conifer trees, 07.07.2008, F. 5029 [L. 28].

#### *Pluteaceae* Kotl. & Pouzar

**3.79. *Pluteus petasatus*** (Fr.) Gillet.

Under conifer trees, 29.06.2008, F. 4961 [L. 28].

**3.80. *Pluteus roseipes*** Höhn.

Under conifer trees, 06.07.2008, F. 4977 [L. 18].

#### *Physalacriaceae* Corner

**3.81. *Strobilurus esculentus*** (Wulfen) Singer

Under conifer trees, 16.05.2009, F. 5277 [L. 15].

**3.82. *Strobilurus stephanocystis*** (Kühner & Romagn. ex Hora) Singer

Under conifer trees, 16.05.2009, F. 5282 [L. 15].

#### *Psathyrellaceae* Vilgalys, Moncalvo & Redhead

**3.83. *Coprinellus micaceus*** (Bull.) Vilgalys, Hopple & Jacq. Johnson

On *Salix* sp. stump, 27.07.2009, F. 5563 [L. 21].

**3.84. *Psathyrella spadiceogrisea*** (Schaeff.) Maire.

Under conifer trees, 16.05.2009, F. 5281 [L. 22].

#### *Schizophyllaceae* Qué. l.

**3.85. *Schizophyllum commune*** Fr.

On conifer stump, 07.07.2008, F. 5045 [L. 24].

#### *Strophariaceae* Singer & A.H. Sm.

**3.86. *Hypholoma capnoides*** (Fr.) P. Kumm.

Under conifer trees, 19.08.2009, F. 5884 [L. 28].

**3.87. *Hypholoma fasciculare*** (Huds.) P. Kumm.

Under conifer trees, 18.08.2009, F. 5807 [L. 6], On conifer stump, 23.10.2009, F. 5981 [L. 4].

**3.88. *Hypholoma lateritium*** (Schaeff.) P. Kumm.

Conifer forest, on wood remnants, 16.05.2009, F. 5283 [15].

**3.89. *Pholiota aurivella*** (Batsch) P. Kumm.

On conifer stump, 05.09.2008, F. 5165 [22].

**3.90. *Pholiota decussata*** (Fr.) M.M. Moser

Under conifer trees, 16.05.2009, F. 5307 [23].

**3.91. *Pholiota highlandensis*** (Peck) A.H. Sm. & Hesler

Under conifer trees, 06.07.2008, F. 4996 [L. 1].

**3.92. *Pholiota subochracea*** (A.H. Sm.) A.H. Sm. & Hesler

Under conifer trees, 23.10.2009, F. 5982 [L. 9].

#### *Tricholomataceae* R. Heim ex Pouzar

**3.93. *Clitocybe gibba*** (Pers.) P. Kumm.

Under conifer trees, 06.07.2008, F. 4974 [L. 8], 18.08.2009, F. 5835 [L. 2], 29.07.2009, F. 5565 [L. 28], 19.08.2009, F. 5900 [L. 18].

**3.94. *Clitocybe infundibuliformis*** (Schaeff.) Qué. l.

Under conifer trees, 06.07.2008, F. 5005 [L. 3].

**3.95. *Clitocybe inornata*** (Sowerby) Gillet

Under conifer trees, 19.08.2009, F. 5933 [L. 28].

**3.96. *Clitocybe nebularis*** (Batsch) P. Kumm.

Under conifer trees, 23.10.2009, F. 6018 [L. 18].

**3.97. *Infundibulicybe geotropa*** (Bull.) Harmaja

Under conifer trees, 07.07.2008, F. 5026 [L. 28].

**3.98. *Lepista nuda*** (Bull.) Cooke

Under conifer trees, 07.07.2008, F. 5038 [L. 17], 23.10.2009, F. 6005 [L. 2].

**3.99. *Lepista sordida*** (Schumach.) Singer

Mixed woodland, 19.08.2009, F. 5843 [L. 21].

**3.100. *Melanoleuca cognata*** (Fr.) Konrad & Maubl.

Under conifer trees, 07.07.2008, 5013 [L. 28], 16.06.2009, F. 5278 [L. 15].

**3.101. *Melanoleuca excisssa*** (Fr.) Singer

Under conifer trees, 19.08.2009, F. 5924 [L. 18], 23.10.2009, F. 6011 [L. 10].

**3.102. *Tricholoma aurantium*** (Schaeff.) Ricken

Under conifer trees, 07.07.2008, F. 5016 [L. 28].

**3.103. *Tricholoma vaccinum*** (Schaeff.) P. Kumm.

Under conifer trees, 23.10.2009, F. 5993 [L. 4].

#### *Boletales* E.-J. Gilbert

##### *Boletaceae* Chevall.

**3.104. \**Boletus barrowsii*** Thiers & A.H. Sm.

**Pileus:** 6-15 cm; first hemispherical, later broadly convex, dry, bald, cream colored, becoming pale brownish at maturity. **Pores:** whitish when young, later yellow or olive yellow, tubes to 2 cm deep. **Stipe:** 7-13 x 2.5-5 cm, cylindrical, often reticulate at apex. **Flesh:** white and does not turn blue when bruised. **Spores:** 13-16.5 x 4-6 µ; pale brownish, elliptic or spindle-shaped (Fig.3).

Under conifer trees, 19.08.2009, F. 5892 [L. 21].

**3.105. *Boletus chrysenteron*** Bull.

Under conifer trees, 07.07.2008, F. 5034 [L. 23], 30.08.2008, F. 5057 [L. 18], 03.10.2008, F. 5224 [L. 15], 19.08.2009, F. 5913 [L. 22], 18.08.2009, F. 5841 [L. 8].

**3.106. *Boletus edulis*** Bull.

Under conifer trees, 06.07.2008, F. 4994 [L. 6], 18.08.2009, F. 5778 [L. 9], 19.08.2009, F. 5882 [L. 23].

**3.107. *Boletus erythropus*** Pers.

Conifer forest clearance, 05.09.2008, F. 5163 [L. 15].

**3.108. *Boletus luridus*** Schaeff.

Under conifer trees, 07.07.2008, F. 5033 [L. 28].

**3.109. *Boletus pinophilus*** Pilát & Dermek

Under conifer trees, 18.08.2009, F. 5793 [L. 8], 18.08.2009, F. 5890 [L. 18].

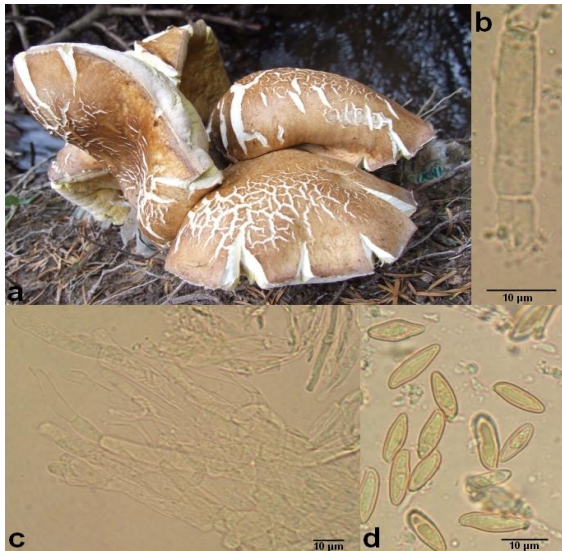


Figure 3. *Boletus barrowsii*; **a.** Fruiting bodies, **b.** basidium, **c.** caulocystidia, **d.** basidiospores

**3.110. *Boletus reticulatus*** Schaeff.

Under conifer trees, 18.08.2009, F. 5954 [L. 28].

**3.111. *Boletus subtomentosus*** L.

Under conifer trees, 18.08.2009, F. 5837 [L. 10].

**3.112. *Leccinum versipelle*** (Fr. & Hök) Snell

Under conifer trees, 06.07.2008, F. 4999 [L. 10], 29.07.2009, F. 5539 [L. 17].

**3.113. *Tylopilus porphyrosporus*** (Fr. & Hök) A.H. Sm. & Thiers

Under conifer trees, 05.09.2008, F. 5172 [L. 23].

*Gyroporaceae* Locq.

**3.114. *Gyroporus castaneus*** (Bull.) Quél.

Under conifer trees, 29.07.2009, F. 5535 [L. 23].

*Paxillaceae* Lotsy

**3.115. *Paxillus involutus*** (Batsch) Fr.

Under conifer trees, 30.06.2008, F. 4969 [L. 6], 06.07.2008, F. 4997 [L. 7], mixed woodland, 19.08.2009, F. 5881 [L. 21].

*Suillaceae* Besl & Bresinsky

**3.116. *Suillus granulatus*** (L.) Roussel

Conifer forest clearance, 29.07.2009, F. 5534 [L. 28], under conifer trees, 18.08.2009, F. 5804 [L. 4].

**3.117. *Suillus luteus*** (L.) Roussel

Under conifer trees, 23.10.2009, F. 5992 [L. 8].

**3.118. *Suillus variegatus*** (Sw.) Kuntze

Under conifer trees, 30.06.2008, F. 4968 [L. 8], 03.10.2009, F. 5218 [L. 28], 19.08.2009, F. 5867 [L. 16].

*Tapinellaceae* Locq.

**3.119. *Tapinella atrotomentosa*** (Batsch) Šutara

On conifer stump, 06.09.2009, F. 5181 [L. 11], 18.08.2009, F. 5783 [L. 3], 29.07.2009, F. 5531 [L. 15].

*Cantharellales* Gäum.

*Cantharellaceae* J. Schröt.

**3.120. *Cantharellus cibarius*** Fr.

Under conifer trees, 06.07.2008, F. 4986 [L. 8], 06.07.2008, F. 5001 [L. 4], 31.08.2008, F. 5079 [L. 7], 18.08.2009, F. 5775 [L. 10], 23.10.2009, F. 5997 [L. 9].

**3.121. *Craterellus tubaeformis*** (Schaeff.) Quél.

Under conifer trees, 18.08.2009, F. 5784 [L. 2].

**3.122. *Pseudocraterellus undulatus*** (Pers.) Rauschert

Under conifer trees, 23.10.2009, F. 5999 [L. 10].

*Clavulinaceae* Donk

**3.123. *Clavulina cinerea*** (Bull.) J. Schröt.

On conifer stump, 18.08.2009, F. 5825 [L. 7].

*Hydnaceae* Chevall.

**3.124. *Hydnum repandum*** L.

Under conifer trees, 31.08.2008, F. 5064 [L. 8], 18.08.2009, F. 5792 [L. 6], 23.10.2009, F. 6004 [L. 2], 05.09.2008, F. 5088 [L. 23].

*Gastrales* K. Hosaka & Castellano

*Gastraceae* Corda

**3.125. *Gastrum schmidelii*** Vittad.

Under conifer trees, 13.08.2009, F. 6013 [L. 28].

*Gomphales* Jülich

*Clavariadelphaceae* Corner

**3.126. *Clavariadelphus ligula*** (Schaeff.) Donk

Under conifer trees, 18.08.2009, F. 5826 [L. 8].

*Gomphaceae* Donk

**3.127. *Ramaria flava*** (Schaeff.) Quél.

Under conifer trees, 07.07.2008, F. 5021 [L. 23].

**3.128. *Ramaria lutea*** (Vent.) Schild

Under conifer trees, 19.08.2009, F. 5906 [L. 15].

**3.129. *Ramaria neoformosa*** R.H. Petersen

Under conifer trees, 23.10.2009, F. 5991 [L. 7].

*Gomphidiaceae* Maire ex Jülich

**3.130. *Gomphidius maculatus*** (Scop.) Fr.

Under conifer trees, 19.08.2009, F. 5887 [L. 23].

*Hymenochaetales* Oberw.

*Hymenochaetaceae* Imazeki & Toki

**3.131. *Coltricia perennis*** (L.) Murrill

Under conifer trees, 18.08.2009, F. 5833 [L. 12], 23.10.2009, F. 6024 [L. 15].

*Polyporales* Gäum.

*Fomitopsidaceae* Jülich

**3.132. *Climacocystis borealis*** (Fr.) Kotl. & Pouzar

On conifer stump, 05.09.2008, F. 5171 [L. 28], 19.08.2009, F. 5896 [L. 17].

**3.133. *Fomitopsis pinicola*** (Sw.) P. Karst.

On conifer stump, 30.06.2008, F. 4967 [L. 8], 06.07.2008, F. 5000 [L. 1], 31.08.2008, F. 5061 [L. 12], 17.05.2009, F. 5343 [L. 3], 18.08.2009, F. 5351 [L. 7], 23.10.2009, F. 5976 [L. 11], 07.07.2008, F. 5037 [L. 13], 05.09.2008, F. 5084 [L. 22], 05.09.2008, F. 5148 [L. 27], 25.10.2008, F. 5232 [L. 14].

**3.134. *Fomitopsis rosea*** (Alb. & Schwein.) P. Karst.

Under conifer trees, 07.07.2008, F. 5031 [15], conifer, stump over, 31.08.2008, F. 5060 [L. 11].

**3.135. *Postia stiptica*** (Pers.) Jülich

Under conifer trees, 03.10.2008, F. 5222 [L. 28].

*Ganodermataceae* Donk

**3.136. *Ganoderma applanatum*** (Pers.) Pat.

On conifer stump, 30.08.2008, F. 5052 [L. 21].

**3.137. *Ganoderma carnosum*** Pat.

On conifer stump, 05.09.2008, F. 5166 [L. 24].

**3.138. *Ganoderma lucidum*** (Curtis) P. Karst.

On *Quercus* sp. stump, 30.08.2008, F. 5051 [L. 21], 03.10.2008, F. 5214 [L. 21].

*Meruliaceae* P. Karst.

- 3.139. *Merulius tremellosus*** Schrad.  
On conifer stump, 23.10.2009, F. 5977 [L. 7].

*Polyporaceae* Fr. ex Corda

- 3.140. *Polyporus arcularius*** (Batsch) Fr.  
Under *Salix* sp. trees, 16.05.2009, F. 5316 [L. 21],  
on wood remnants, 17.05.2009, F. 5349 [L. 10].  
**3.141. *Polyporus brumalis*** (Pers.) Fr.  
On wood remnants, 30.08.2008, F. 5054 [L. 23].  
**3.142. *Trametes hirsuta*** (Wulfen) Lloyd  
Under conifer trees, 18.08.2009, F. 5796 [L. 9].

*Russulales* Kreisel ex P.M. Kirk, P.F. Cannon & J.C. David

*Albatrellaceae* Nuss

- 3.143. *Albatrellus cristatus*** (Schaeff.) Kotl. & Pouza  
Under conifer trees, 07.07.2008, F. 5015 [L. 15], 18.08.2009,  
F. 5816 [L. 4].

*Bondarzewiaceae* Kotl. & Pouzar

- 3.144. *Heterobasidion annosum*** (Fr.) Bref.  
On stump, 31.08.2008, F. 5063 [L. 7].

*Russulaceae* Lotsy

- 3.145. *Lactarius deliciosus*** (L.) Gray  
Under conifer trees, 31.08.2008, F. 5081 [L. 6],  
29.07.2008, F. 5530 [L. 28], 19.08.2009, F. 5963 [L. 15].  
**3.146. *Lactarius evosmus*** Kühner & Romagn.  
Under conifer trees, 19.08.2009, F. 5956 [L. 23].  
**3.147. *Lactarius quietus*** (Fr.) Fr.  
Under *Salix* sp. tree, 16.05.2009, F. 5847 [L. 21].  
**3.148. *Lactarius rufus*** (Scop.) Fr.  
Under conifer trees, 16.05.2009, F. 5898 [L. 23].  
**3.149. *Lactarius scrobiculatus*** (Scop.) Fr.  
Under conifer trees, 18.08.2009, F. 5801 [L. 10], 19.08.2009,  
F. 5907 [L. 15].  
**3.150. *Lactarius tabidus*** Fr.  
Under conifer trees, 18.08.2009, F. 5836 [L. 8], 19.08.2009,  
F. 5871 [L. 23].  
**3.151. *Lactarius zonarioides*** Kühner & Romagn.  
Under conifer trees, 18.08.2009, F. 5770 [L. 6],  
23.10.2009, F. 5998 [L. 8], mixed woodland, 16.05.2009, F.  
5851 [L. 21].  
**3.152. *Russula acetolens*** Rauschert.  
Under conifer trees, 19.08.2009, F. 5967 [L. 23], 23.10.2009,  
F. 6016 [L. 18].  
**3.153. *Russula adulterina*** Fr.  
Under conifer trees, 19.08.2009, F. 5876 [L. 15].  
**3.154. *Russula aeruginea*** Fr.  
Under conifer trees, 31.08.2008, F. 5055 [L. 23], 05.09.2008,  
F. 5162 [L. 18].  
**3.155. *Russula albonigra*** (Krombh.) Fr.  
Under conifer trees, 18.08.2009, F. 5838 [L. 6].  
**3.156. *Russula badia*** QuéL.  
Under conifer trees, 31.08.2008, F. 5911 [L. 3].  
**3.157. *Russula chloroides*** (Krombh.) Bres.  
Under conifer trees, 31.08.2008, F. 5062 [L. 10], 19.08.2009,  
F. 5902 [L. 22].  
**3.158. *Russula cyanoxantha*** (Schaeff.) Fr.  
Under conifer trees, 19.08.2009, F. 5926 [L. 23].  
**3.159. *Russula delica*** Fr.  
Under conifer trees, 31.08.2008, F. 5058 [L. 23],  
19.08.2009, F. 5862 [L. 15], 31.08.2008, F. 5072 [L. 3].  
**3.160. *Russula emetica*** (Schaeff.) Pers.  
Under conifer trees, 29.07.2008, F. 5533 [L. 23].

**3.161. \**Russula gigasperma*** Romagn.

**Pileus:** 4-9 cm across, hemispherical at first, becoming convex to plane and indented at the center with age, shiny when moist, violet-brownish to purple in color, margin slightly striate. **Lamellae:** whitish at first, later orange-brown, narrowly attached, edges entire. **Stipe:** 3-7.5 x 1-2 cm, cylindrical, solid when young, white at first, becoming yellow-brownish and longitudinally venose at maturity. **Flesh:** white, thin. **Spores:** 9-13 x 8-12 µm, subglobose, thick, spine-like warts.  
Under conifer trees, 18.08.2009, F. 5766 [L. 3].

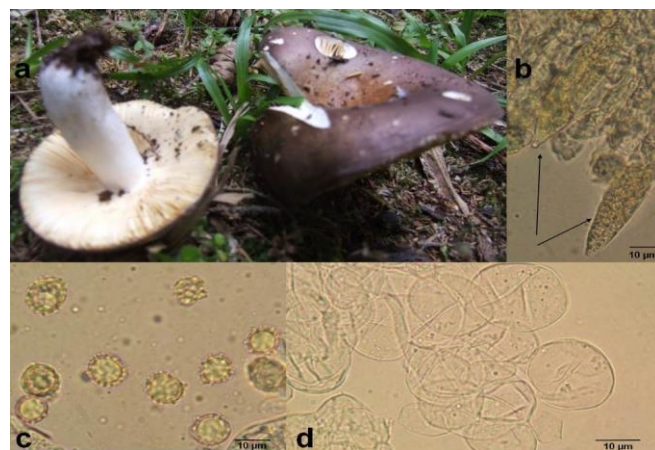


Figure 4. *Russula gigasperma*; **a.** Fruiting bodies, **b.** cheilocystidia, **c.** basidiospores, **d.** pileipellis

**3.162. *Russula integra*** (L.) Fr.

Under conifer trees, 30.08.2008, F. 5059 [L. 15].

**3.163. *Russula nigricans*** (Bull.) Fr.

Under conifer trees, 31.08.2008, F. 5070 [L. 6].

**3.164. *Russula paludosa*** Britzelm.

Under conifer trees, 31.08.2008, F. 5938 [L. 3].

**3.165. *Russula risigallina*** (Batsch) Sacc.

Mixed woodland, 29.07.2009, F. 5529 [L. 19].

**3.166. *Russula sancaguinaria*** (Schumach.) Rauschert

Under conifer trees, 06.07.2008, F. 4995 [L. 3].

**3.167. *Russula silvestris*** (Singer) Reumaux

Under conifer trees, 18.08.2009, F. 5824 [L. 10].

**3.168. *Russula turci*** Bres.

Under conifer trees, 19.08.2009, F. 5895 [L. 23]

**3.169. *Russula viscida*** Kudřna

Under conifer trees, 18.08.2009, F. 5771 [L. 3].

*Thelephorales* Corner ex Oberw.

*Bankeraceae* Donk

**3.170. *Hydnellum aurantiacum*** (Batsch) P. Karst.

Under conifer trees, 31.08.2008, F. 5067 [L. 2],  
18.08.2009, F. 5822 [L. 4], 23.10.2009, F. 5987 [L. 8],  
13.08.2009, F. 5611 [L. 23], 23.10.2009, F. 6022 [L. 15],  
mixed woodland, 05.09.2009, F. 5088 [L. 21].

**3.171. *Sarcodon imbricatus*** (L.) P. Karst.

Under conifer trees, 14.08.2008, F. 5691 [L. 28],  
19.08.2009, F. 5886 [L. 15], 19.08.2009, F. 5955 [L. 16].

*Dacrymycetes* Doweld

*Dacrymycetales* Henn.

*Dacrymycetaceae* J. Schröt.

**3.172. *Calocera viscosa*** (Pers.) Fr.

Under conifer trees, 18.08.2009, F. 5787 [L. 8].

Table 1. Macrofungi collection localities

No	Localities	Coordinates	Altitudes
1	The northeastern part of the Karagöl Lake	41° 18.514'N, 42° 29.191'E	1639 m
2	The northern part of the Karagöl Lake	41° 18.551'N, 42° 29.135'E	1644 m
3	Between the Karagöl lake and the Karagöl Plateau (a)	41° 18.613'N, 42° 29.338'E	1680 m
4	Between the Karagöl lake and the Karagöl Plateau (b)	41° 18.513'N, 42° 29.351'E	1646 m
5	The eastern part of the Karagöl Lake	41° 18.483'N, 42° 29.175'E	1647 m
6	Between the Meşeli village and the Karagöl Plateau	41° 18.745'N, 42° 29.175'E	1760 m
7	Between the Karagöl lake and the Karagöl Plateau (c)	41° 18.511'N, 42° 29.552'E	1683 m
8	The northwestern part of the Karagöl Lake	41° 18.576'N, 42° 28.920'E	1648 m
9	The western part of the Karagöl Lake	41° 18.456'N, 42° 28.872'E	1645 m
10	The southern part of the Karagöl Lake	41° 18.368'N, 42° 29.072'E	1650 m
11	The entrance of the Karagöl Lake, picnic area	41° 18.275'N, 42° 28.972'E	1600 m
12	The southwestern part of the Karagöl Lake	41° 18.375'N, 42° 28.915'E	1637 m
13	The entrance of the Sahara Plateau from Ardahan	41° 13.636'N, 42° 27.464'E	2088 m
14	Side of the highway in the Sahara Plateau (a)	41° 13.597'N, 42° 27.031'E	1909 m
15	Picnic area of the Sahara Plateau (a)	41° 13.924'N, 42° 26.863'E	1925 m
16	Between the Sahara Plateau and the Karaköy village (a)	41° 14.462'N, 42° 26.799'E	1920 m
17	Side of the highway in the Sahara Plateau (b)	41° 13.433'N, 42° 27.071'E	1941 m
18	The central part of the Sahara Plateau	41° 13.746'N, 42° 26.924'E	1911 m
19	Between the Sahara Plateau and the Karaköy village (b)	41° 14.121'N, 42° 26.492'E	1917 m
20	Between the Sahara Plateau and the Karaköy village (c)	41° 14.574'N, 42° 27.180'E	1919 m
21	Vicinity of the Laşet trout restaurant	41° 13.965'N, 42° 25.721'E	1570 m
22	Side of the highway in the Sahara Plateau (c)	41° 13.521'N, 42° 27.283'E	2053 m
23	Side of the highway in the Sahara Plateau (d)	41° 13.643'N, 42° 26.869'E	1862 m
24	The southeastern part of the Sahara Plateau	41° 13.429'N, 42° 27.462'E	2026 m
25	Side of the highway in the Sahara Plateau (e)	41° 14.034'N, 42° 26.104'E	1745 m
26	Side of the highway in the Sahara Plateau (f)	41° 13.582'N, 42° 27.152'E	1961 m
27	Between the Sahara Plateau and the Karaköy village (d)	41° 14.053'N, 42° 26.498'E	1917 m
28	Picnic area of the Sahara Plateau (b)	41° 13.837'N, 42° 26.873'E	1913 m

## Conclusions and discussion

As a consequence of studying the patterns which were picked up by means of field search carried out in the borders of Sahara-Karagöl National Park, 10 order, 46 families and 172 macrofungus species ranging in 73 genera were identified. Of these taxa, 11 are classified as *Pezizomycetes*, 1 as *Leotiomyces*, 160 as *Agaricomycetes* and 1 as *Dacrymyces*. Among widely available families, *Agaricaceae* is represented with 27, *Russulaceae* with 25 while *Strophariaceae* is represented with 12 and *Tricholomataceae* with 11. This situation can be explained by referring to widespread conifer forest that play an important role in plant cover as well as in ecology conditions of Sahara and Karagöl National Parks, which are selected as study area.

Moreover, in the present study, the following 3 taxa were identified as new records for Turkish Mycobiota; *Boletus barrowsii* Thiers & A.H. Sm., *Crepidotus applanatus* (Pers.) P. Kumm. and *Russula gigasperma* Romagn.

Of all taxa determined in the area, 68 are edible, 86 are inedible and 18 are poisonous. Although 68 of these are edible, the number of taxa that are locally known in the area and consumed as food is 12. Hence this only forms 17 % of edible taxa. These are; *Morchella deliciosa*, *Agaricus arvensis*, *A. urinascens*, *Macrolepiota procera*, *Clitocybe gibba*, *Boletus edulis*, *Cantharellus cibarius*, *Ramaria flava*, *Lactarius deliciosus* and *Russula delica*.

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