



## Macrofungal diversity of Zigana Mountain (Gümüşhane/Turkey)

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### Abstract

This study is based on macrofungi collected from Zigana Mountain between 2011 and 2014, and 166 species were identified. Including 16 species previously reported, a list of 182 taxa belonging to 60 families have been compiled. Six of them are given as new records for the mycobiota of Turkey. Among new records, *Vibrissea flavovirens* (Pers.) Korf & J.R. Dixon is new at family level, *Ascotremella faginea* (Peck) Seaver, *Pezizella alniella* (Nyl.) Dennis and *Propolis farinosa* (Pers.) Fr. are new at genus level while *Ciboria caucus* (Rebent.) Fuckel and *Leptosphaeria doliolum* (Pers.) Ces. & De Not are new at species level.

**Key words:** Macrofungi, biodiversity, Zigana Mountain, Turkey

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## Zigana Dağı (Gümüşhane/Türkiye)'nin Makrofungus Çeşitliliği

### Özet

Bu çalışma 2011 ve 2014 yılları arasında Zigana Dağı'ndan toplanan makrofungus örneklerine dayanmaktadır ve 166 tür tespit edilmiştir. Önceden bildirilen 16 tür de dahil olmak üzere, 60 familyaya ait 182 tür listelenmiştir. Bunlardan altı tanesi Türkiye mikobiyotası için yeni kayıt olarak verilmiştir. Yeni kayıtlardan *Vibrissea flavovirens* (Pers.) Korf & J.R. Dixon familya düzeyinde, *Ascotremella faginea* (Peck) Seaver, *Pezizella alniella* (Nyl.) Dennis ve *Propolis farinosa* (Pers.) Fr. cins düzeyinde, *Ciboria caucus* (Rebent.) Fuckel ve *Leptosphaeria doliolum* (Pers.) Ces. & De Not ise tür düzeyinde yenisidir.

**Anahtar kelimeler:** Makrofunguslar, biyoçeşitlilik, Zigana Dağı, Türkiye

### 1. Introduction

The Zigana Mountain is located at the intersection of the boundaries of Gümüşhane and Trabzon provinces (Figure 1), falling mainly within Gümüşhane province, and shows a transition character between Central Anatolian and North-East Black Sea regions. The area falls in Euro-Siberian phytogeographical region within the holarctic floral kingdom and A7 square according to Davis' grid square system (Davis, 1965). The region is characterized by alpine and subalpine forest vegetation and the plant cover is dominated by conifers especially spruce, fir, scots pine, juniper and deciduous trees such as beech, oak, alder, hazelnut, mountain ash, chestnut, poplar and willow.

Numerous investigations on Turkish macromycota have been conducted and the accumulated data were presented as checklists in different times (Doğan et al., 2005; Sesli and Denchev, 2008; Solak et al., 2015). Recently, new additions were also made to these lists (Solak et al., 2014; Türkoğlu and Castellano, 2014; Uzun et al., 2014; Akata et al., 2015; Akata and Doğan, 2015; Doğan and Öztürk, 2015; Kaya, 2015; Kaya and Uzun, 2015; Sesli et al., 2015; Allı et al., 2016; Doğan and Kurt, 2016; Güngör et al., 2016; Kaya et al., 2016).

Though some local mycological list were presented around the study area by Sesli (1993), Demirel et al. (2003), Pekşen and Karaca (2003), Uzun et al. (2006), Sesli (2007), Demirel et al. (2010), Keleş and Demirel (2010), Allı (2011), Akata et al. (2014), and some new records were given by Sesli (1998a, 1998b), Akata et al. (2011a, 2011b),

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Akata (2012a, 2012b), Akata and Doğan (2011), Akata et al. (2012), Akata and Kaya (2013a, 2013b), Akata et al. (2013), Kaya et al. (2013), Akata et al. (2014a, 2014b), Sesli (2014), Uzun et al. (2014, 2015), Akata and Doğan (2015), Sesli et al. (2015) and Akata et al. (2016), there is not any detailed mycological investigation in Zigana Mountain.

The aim of the current study is to determine the macrofungal diversity of Zigana Mountain and to make a contribution to the Turkish mycobiota.

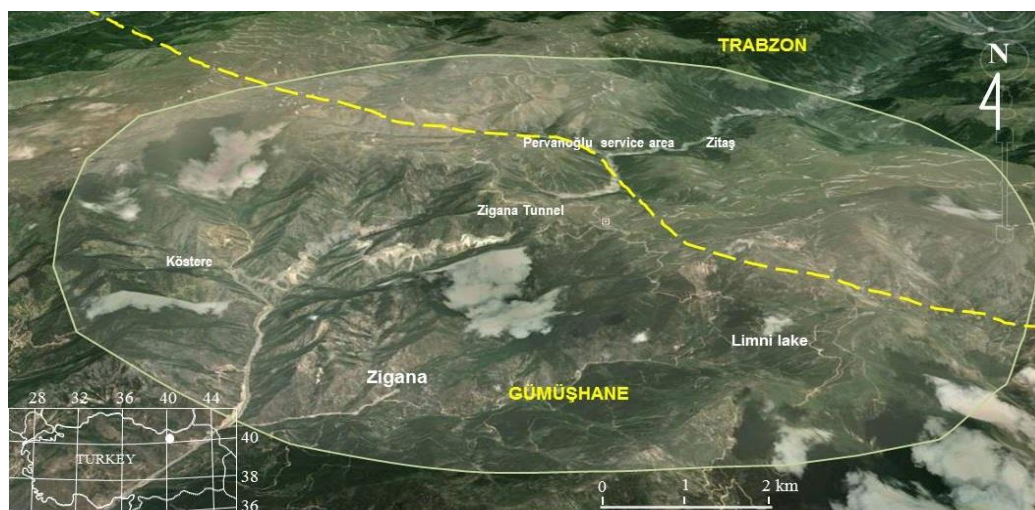


Figure 1. Map of the research area

## 2. Materials and methods

Fungi samples were collected from different localities within Zigana Mountain (Gümüşhane) between 2011 and 2014. During field studies, relevant morphological and ecological characteristics of the samples were noted and they were photographed in their natural habitats. In the laboratory, the samples were further examined and microstructural data were obtained by light microscopy. Reagents such as distilled water, Melzer's reagent, 5% KOH, H<sub>2</sub>SO<sub>4</sub>, Cotton blue, Congo red etc. were used for microscopic investigations. Identification of the specimens was performed according to Breitenbach and Kränzlin (1984–2000), Hansen and Knudsen (1992–2000), Ryvarden and Gilbertson (1993), Pegler et al. (1997), Calonge (1998), Heilmann-Clausen et al. (1998), Kränzlin (2005) and Medardi (2006). All specimens were deposited at Karamanoğlu Mehmetbey University, Kamil Özdağ Science Faculty, Karaman, Turkey.

## 3. Results

As a result of the current study, 182 taxa were compiled. The systematic of the taxa is presented in accordance with Cannon and Kirk (2007), Kirk et al. (2008), and Index fungorum ([www.indexfungorum.org](http://www.indexfungorum.org); accessed 1 June 2016). Taxa are given in alphabetical order and are listed together with locality, notes on habitat, geographical position, collection date, and accession numbers (Kaya: K, Akata: A, Uzun: U). Newly reported taxa for Turkey are also described briefly.

### Fungi

#### Ascomycota

#### Helotiales

#### Cudoniaceae

##### 1. *Cudonia circinans* (Pers.) Fr.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1735 m, 13.08.2013, K&A&U.493.

##### 2. *Spathularia flavida* Pers.

Yediharman way, spruce forest, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.547.

#### Dermateaceae

##### 3. *Tapesia fusca* (Pers.) Fuckel

Zigana village, beech and spruce mixed forest, on beech stump, 40°36'N - 39°22'E, 1530 m, 12.10.2013, K&A&U.732.

#### Helotiaceae

##### 4. *Ascocoryne cylichnium* (Tul.) Korf

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.817.

##### 5. *Ascotremella faginea* (Peck) Seaver

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1630 m, K&A&U.933.

Apothecia shortly stipitate, 10-20 mm broad, turbinate to hemispherical (Figure 2a). Hymenium smooth, pinkish purple to violet, gelatinous and shiny when humid, outer surface concolorous. Asci 70-80 × 7-8 µm, eight-spored, cylindrical to clavate (Figure 2b, c). Paraphyses non septate and filiform. Spores uniseriate to biseriata, 7-9 × 3.5-4.5 µm, ellipsoid, hyaline, looking like smooth but longitudinally striated (usually very difficult to see under light microscope, 100× 10) with two oil drops (Figure 2d).

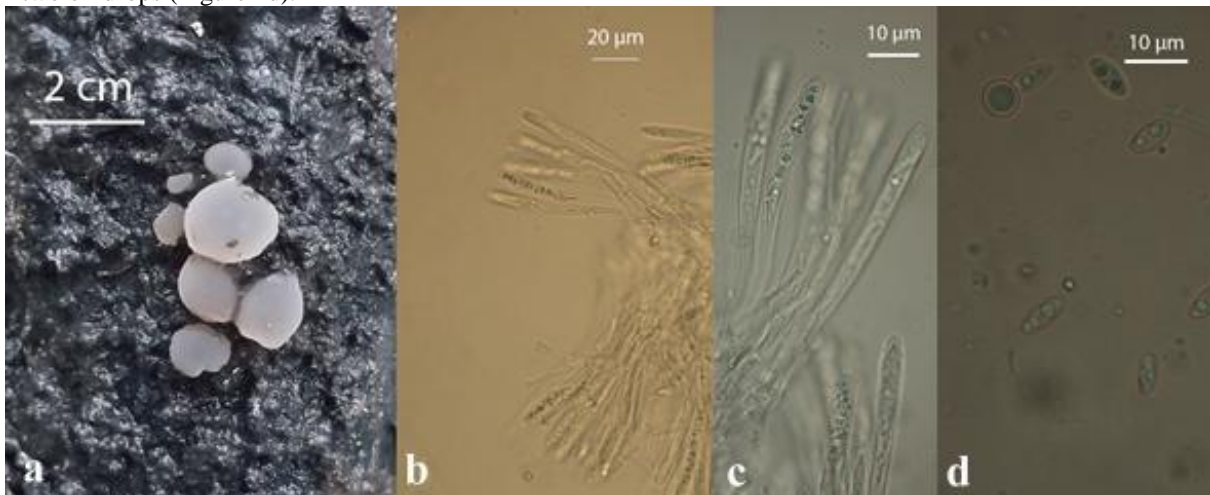


Figure 2. *Ascotremella faginea*: a- apothecia, b,c-asci, d-spores

6. **Bisporella citrina** (Batsch) Korf & S.E. Carp.

Zigana village, beech and spruce mixed forest, on beech branch, 40°37'N - 39°22'E, 1650 m, 13.10.2013, K&A&U.883.

7. **Hymenoscyphus calyculus** (Fr.) W. Phillips

Zigana village, beech and spruce mixed forest, on beech branch, 40°37'N - 39°22'E, 1630 m, 13.10.2013, K&A&U.834.

8. **Hymenoscyphus herbarum** (Pers.) Dennis

Zigana tunnel entrance, beech and spruce mixed forest, on herb, 40°39'N - 39°23'E, 1980 m, 30.06.2013, K&A&U.265.

**Lachnaceae**

9. **Lachnum brevipilosum** Baral (Akata et al., 2014a).

10. **Lachnum virgineum** (Batsch) P. Karst.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°26'E, 1760 m, 16.08.2013, K&A&U.613.

**Hyaloscyphaceae**

11. **Neodasyscypha cerina** (Pers.) Spooner

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°26'E, 1750 m, 23.11.2013, K&A&U.937.

12. **Peizizellaalniella** (Nyl.) Dennis

Köster village, on fallen female cones of alder, 40°37'N - 39°20' E, 1240 m, 13.10.2013, K&A&U.893.

Apothecia stipitate, 0.5-1 mm broad, at first turbinate, then disk shaped to convex (Figure 3a). Hymenium cream yellowish to pale yellow smooth to whitish pruinose, outer surface concolorous, weakly pruinose. Asci 55-60 × 6-7 µm, eight-spored and clavate (Figure 3b). Paraphyses septate, cylindrical to slightly clavate. Spores biseriata, 8-10 × 2.5-3 µm, smooth, ellipsoid to fusiform (Figure 3c).

**Hemiphacidiaceae**

13. **Heyderia abietis** (Fr.) Link

Pervanoğlu, spruce forest, on needle litter, 40°41'N - 39°24'E, 1800 m, 26.09.2011, K&A&U.79.

**Leotiaceae**

14. **Leotia lubrica** (Scop.) Pers.

Pervanoğlu, beech and spruce mixed forest, 40°41'N - 39°24'E, 1790 m, 26.09.2011, K&A&U.67.

**Marthamycetaceae**

15. **Propolis farinosa** (Pers.) Fr.

Yediharman way, beech and spruce mixed forest, on beech branch, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.584.

Apothecia 2-4 × 2-3 mm, circular or elliptic, embedded in the substrate, exposed by rupturing of the wood or bark (Figure 4a). Hymenium brown but powdered and bordered with white. Asci 140-150 × 12-13 µm, biseriata, eight-spored and cylindrical (Figure 4b,c). Paraphyses non septate, branched toward to apex. Spores 20-22 × 5-7 µm, hyaline, cylindrical to slightly reniform with drops.

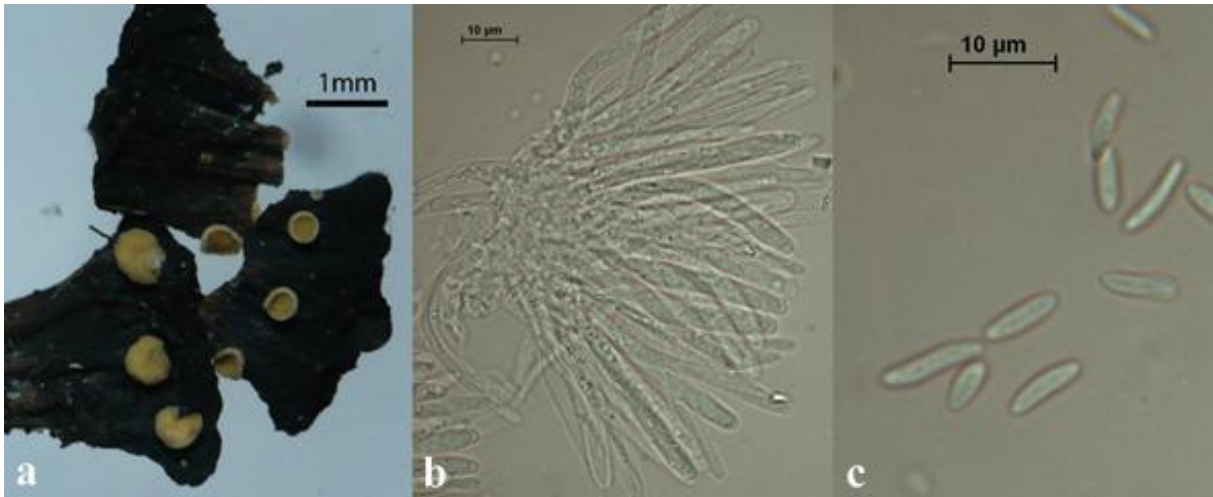


Figure 3. *Pezizella alniella*: a- apothecia, b-asci, c-spores

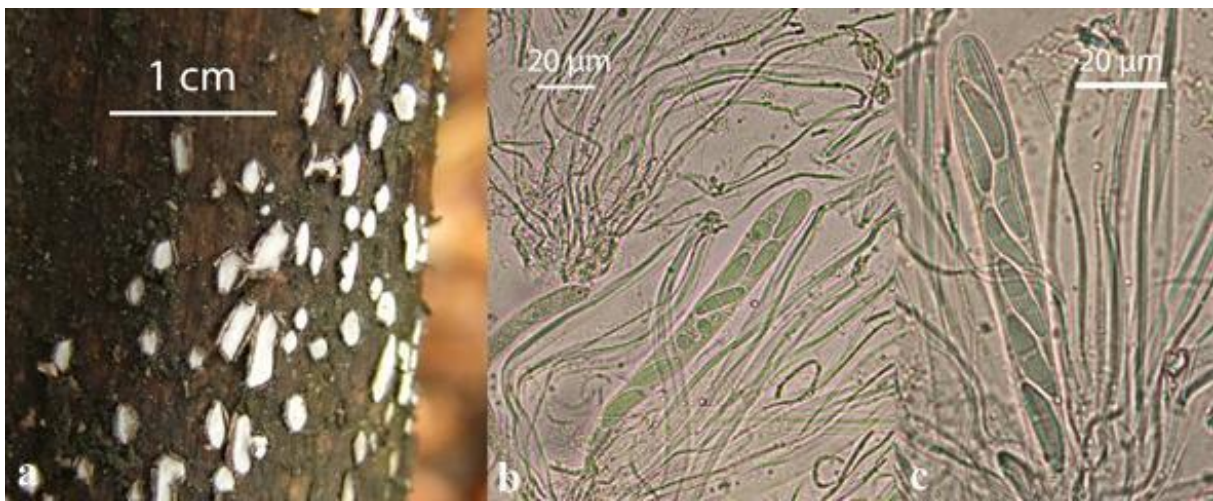


Figure 4. *Propolis farinosa*: a- apothecia, b,c- ascus, paraphyses and spores in portion of ascus

**Vibrisseaceae**

16. ***Vibrissea flavovirens*** (Pers.) Korf & J.R. Dixon

Zitaş, near stream, on willow branch, 40°40'N - 39°26'E, 1760 m, 29.06.2013, K&A&U.169.

Apothecia sessile or subsessile, 1-2 mm across, disc to cup-shaped (Figure 5a). Hymenium smooth, yellowish to orange, slightly convex to flat. Stipe 0.2-0.3 mm long. Asci 200-280 × 6-8 µm, cylindrical, 8-spored and multiseriate. Paraphyses septate, cylindrical, slightly enlarged at the apex (Figure 5b,c). Spores 160-180 × 1.5-2 µm, filiform, straight to sigmoid, multi-septate, smooth and hyaline (Figure 5d).

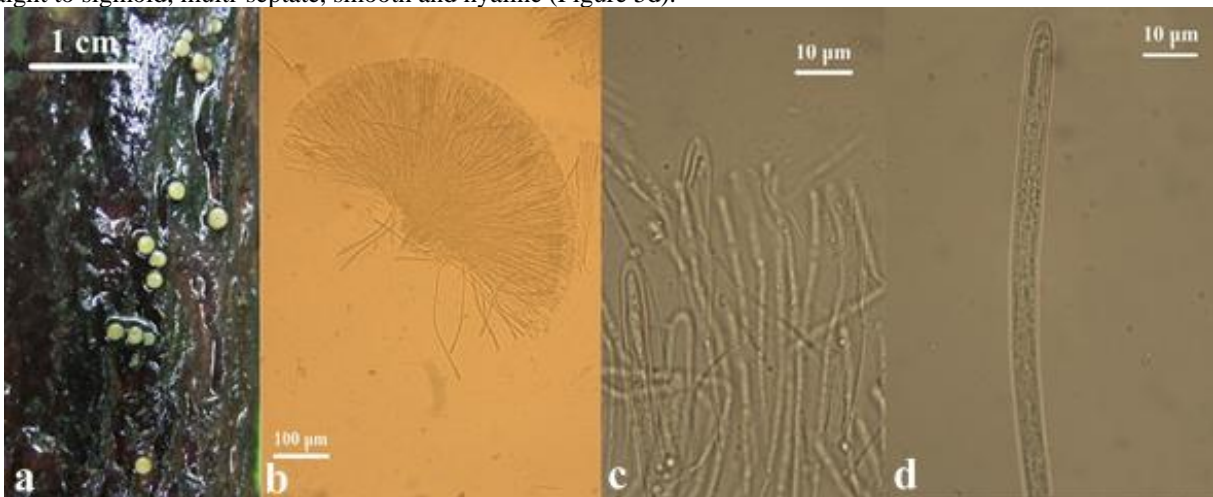


Figure 5. *Vibrissea flavovirens*: a- apothecia, b,c-asci and paraphyses, d-spores in portion of ascus

**Sclerotiniaceae**17. **Ciboria caucus** (Rebent.) Fuckel

Köstere village, on fallen male catkins of alder, 40°37'N - 39°20'E, 1240 m, 26.06.2013, K&A&U.173.

Apothecia stipitate, 5-10 mm broad, at first cup shaped, then saucer to disk shape (Figure 6a). Hymenium smooth, light brown to grayish brown, outer surface concolorous. Asci 100-130 × 7-9 μm, eight-spored and cylindrical. Paraphyses non septate and filiform, slightly swollen at apex (Figure 6b,c). Spores uniseriate, 8-10 × 5-6 μm, hyaline and ellipsoid.

**Nectriaceae**18. **Nectria cinnabarina** (Tode) Fr.

Pervanoğlu, near road, on mountain-ash branch, 40°41'N - 39°24'E, 1780 m, 12.10.2013, K&A&U.784.

**Pleosporales****Leptosphaeriaceae**19. **Leptosphaeria doliolum** (Pers.) Ces. & De Not

Zigana village, near beech and spruce mixed forest, on wild angelica, 40°36'N - 39°22'E, 1535 m, 13.10.2013, K&A&U.851.

Stromata up to 5 mm, conical to spherical, immersed at first, then exposed by rupturing the host epidermis, resting on the substrate with a broad, flattened base, black and smooth with a marked furrow around the ostiole (Figure 7a). Asci 120-130 × 8-10 μm, uniseriate, eight-spored and cylindrical (Figure 7b,c). Spores 18-22 × 6-7 μm, yellowish brown to light brown, septate, broadly fusiform with drops (Figure 7d).

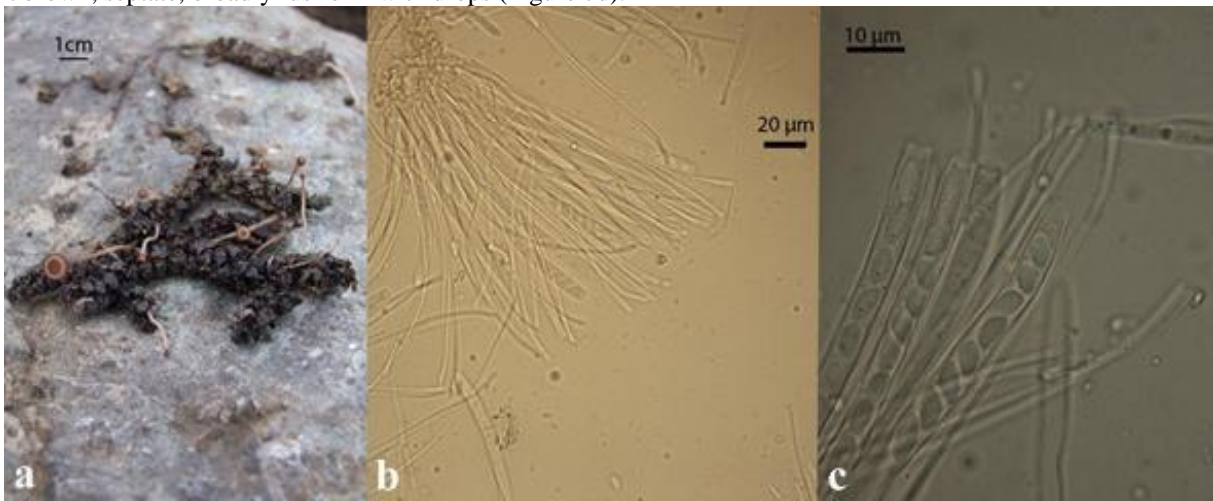


Figure 6. *Ciboria caucus*: a- apothecia, b,c-asci, paraphyses and spores in portion of asci

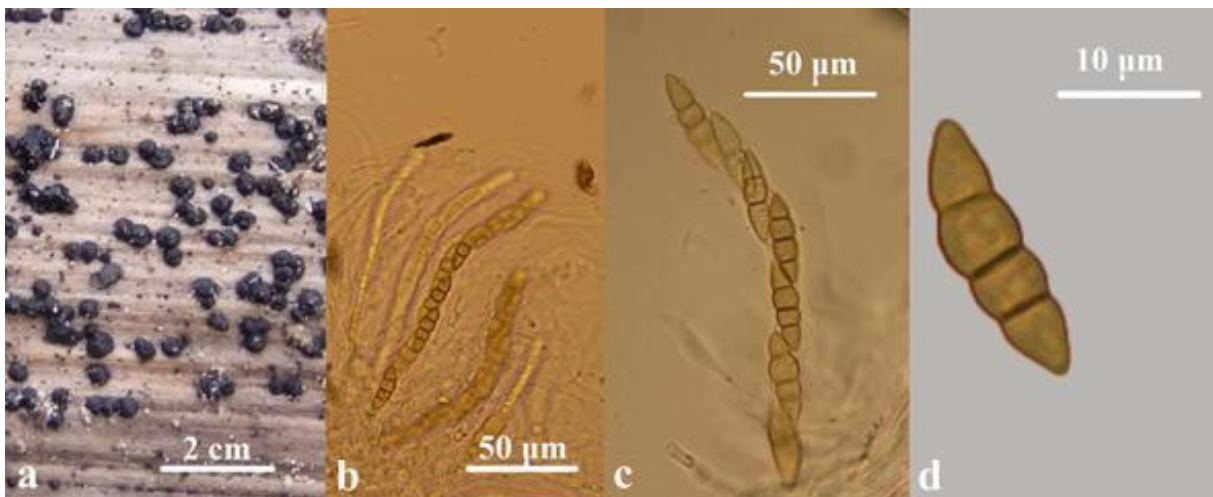


Figure 7. *Leptosphaeria doliolum*: a- Stromata, b,c-asci, c- a single spore

**Pezizales****Discinaceae**20. **Gyromitra infula** (Schaeff.) Quéf.

Pervanoğlu, spruce forest, on spruce stump, 40°41'N - 39°24'E, 1800 m, 12.10.2013, K&A&U.794.

**Helvellaceae**21. **Helvella crispa** (Scop.) Fr.

Yediharman way, pastureland, 40°41'N - 39°26'E, 1680 m, 26.09.2011, K&A&U.113.

22. **Helvella elastica** Bull.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1640 m, 09.08.2011, K&A&U.42.

#### **Pezizaceae**

23. **Peziza badia** Pers.

Zigana village, beech and spruce mixed forest, 40°37'N - 39° 22' E, 1660 m, 12.10.2013, K&A&U.768.

24. **Peziza succosa** Berk.

Zigana tunnel entrance, beech and spruce mixed forest, 40°39'N - 39°23'E, 1990 m, 13.10.2013, K&A&U.915.

#### **Pyronemataceae**

25. **Aleuria aurantia** (Pers.) Fuckel

Pervanoğlu, near road, 40°39'N - 39°25'E, 1740 m, 09.10.2011, K&A&U.122.

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

Pervanoğlu, spruce forest, 40°40'N - 39°24'E, 1700 m, 26.09.2011, K&A&U.81.

27. **Otidea onotica** (Pers.) Fuckel

Pervanoğlu, spruce forest, 40°39'N - 39°25'E, 1750 m, 30.10.2011, K&A&U.155.

28. **Rhodoscypa ovilla** (Peck) Dissing & Sivertsen

Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1740 m, 28.08.2013, K&A&U.633.

29. **Scutellinia scutellata** (L.) Lambotte:

Pervanoğlu, beech and spruce mixed forest, on beech branch, 40°39'N - 39°25'E, 1746 m, 26.09.2011, K&A&U.73.

#### **Sarcoscyphaceae**

30. **Sarcoscypha coccinea** (Jacq.) Sacc.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1660 m, 26.09.2011, K&A&U.92.

#### **Xylariales**

##### **Diatrypaceae**

31. **Diatrype disciformis** (Hoffm.) Fr.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1650 m, 29.06.2013, 29.06.2013, K&A&U.211.

##### **Xylariaceae**

32. **Daldinia concentrica** (Bolton) Ces. & De Not.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1647 m, 26.09.2011, K&A&U.104.

33. **Hypoxylon fuscum** (Pers.) Fr.

Yediharman way, on common hazel branch, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.536.

34. **Hypoxylon fragiforme** (Pers.) J. Kickx f.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1650 m, 13.10.2013, K&A&U.812.

35. **Kretzschmaria deusta** (Hoffm.) P.M.D. Martin

Zigana village, beech and spruce mixed forest, on beech stump, 40°37'N - 39°22'E, 1660 m, 12.10.2013, K&A&U.757.

36. **Xylaria hypoxylon** (L.) Grev.

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°27'E, 1640 m, 09.08.2011, K&A&U.55.

37. **Xylaria longipes** Nitschke

Pervanoğlu, beech and spruce mixed forest, on beech stump, 40°41'N - 39°24'E, 1790 m, 30.10.2011, K&A&U.151.

38. **Xylaria polymorpha** (Pers.) Grev.

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°26'E, 1735 m, 13.08.2013, K&A&U.503.

#### **Basidiomycota**

##### **Agaricales**

##### **Agaricaceae**

39. **Agaricus augustus** Fr.

Zitaş, spruce forest, 40°40'N - 39°27'E, 1647 m, 09.08.2011, K&A&U.39.

40. **Agaricus campestris** L.

Zigana village, pastureland, 40°36'N - 39°22'E, 1535 m, 13.10.2013, K&A&U.840.

41. **Agaricus cupreobrunneus** (Jul. Schäff. & Steer) Pilát

Zigana village, pastureland, 40°36'N - 39°22'E, 1620 m, 13.10.2013, K&A&U.861.

42. **Bovista nigrescens** Pers.

Karayolları station, pastureland, 40°39'N - 39°21'E, 1543 m, 08.08.2011, K&A&U.29.

43. **Bovista plumbea** Pers.

Yediharman way, pastureland, 40°40'N - 39°25'E, 1673 m, 08.08.2011, K&A&U.14.

44. **Chlorophyllum rachodes** (Vittad.) Vellinga

Zigana village, beech and spruce mixed forest, 40°36'N - 39°22'E, 1540 m, 13.10.2013, K&A&U.836.

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

Zigana village, pastureland, 40°36'N - 39°22'E, 1535 m, 11.10.2011, K&A&U.148.

46. **Crucibulum laeve** (Huds.) Kambly

- Yediharman way, spruce forest, on spruce stump, 40°40'N - 39°25'E, 1673 m, 08.08.2011, K&A&U.06.
47. **Cyathus olla** (Batsch) Pers.  
Zigana tunnel entrance, near road, 40°39'N - 39°23'E, 1980 m, 09.10.2011, K&A&U.141.
48. **Cyathus striatus** (Huds.) Willd.  
Pervanoğlu, spruce forest, on spruce stump, 40°40'N - 39°24'E, 1708 m, 26.09.2011, K&A&U.72.
49. **Leucoagaricus nymphaeum** (Kalchbr.) Bon  
Yediharman way, spruce forest, 40°41'N - 39°26'E, 1670 m, 26.07.2013, K&A&U.388.
50. **Lycoperdon perlatum** Pers.  
Zitaş, spruce forest, 40°40'N - 39°27'E, 1640 m, 26.09.2011, K&A&U.86.
51. **Lycoperdon pratense** Pers.  
Karayolları station, pastureland, 40°39'N - 39°21'E, 1550 m, 13.10.2013, K&A&U.908.
52. **Lycoperdon pyriforme** Schaeff.  
Pervanoğlu, spruce forest, on spruce stump, 40°40'N - 39°24'E, 1708 m, 30.10.2011, K&A&U.153.
53. **Lycoperdon utriforme** Bull.  
Pervanoğlu, pastureland, 40°40'N - 39°24'E, 1710 m, 13.08.2013, K&A&U.402.
54. **Macrolepiota excoriata** (Schaeff.) Wasser  
Zigana village, beech and spruce mixed forest, 40°36'N - 39°22'E, 1535 m, 13.10.2013, K&A&U.850.
55. **Macrolepiota mastoidea** (Fr.) Singer  
Zigana village, pastureland, 40°37'N - 39°22'E, 1660 m, 12.10.2013, K&A&U.772.
56. **Macrolepiota procera** (Scop.) Singer  
Zitaş, pastureland, 40°40'N - 39°27'E, 1647 m, 26.09.2011, K&A&U.96.
- Amanitaceae**
57. **Amanita citrina** (Pers.) Pers.  
Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1640 m, 09.08.2011, K&A&U.34.
58. **Amanita excelsa** (Fr.) Bertill.  
Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.809.
59. **Amanita gemmata** (Fr.) Bertill.  
Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1735 m, 13.08.2013, K&A&U.476.
60. **Amanita muscaria** (L.) Lam.  
Yediharman way, spruce forest, 40°41'N - 39°26'E, 1680 m, 08.08.2011, K&A&U.22.
61. **Amanita pantherina** (DC.) Krombh.  
Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1750 m, 26.09.2011, K&A&U.91.
62. **Amanita phalloides** (Vaill. ex Fr.) Link  
Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1650 m, 26.09.2011, K&A&U.109.
63. **Amanita rubescens** Pers.  
Zigana tunnel entrance, beech and spruce mixed forest, 40° 39'N - 39° 23'E, 1980 m, 09.10.2011, K&A&U.137.
64. **Amanita vaginata** (Bull.) Lam.  
Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1640 m, 09.08.2011, K&A&U.63.
- Fistulinaceae**
65. **Fistulina hepatica** (Schaeff.) With.  
Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°27'E, 1647 m, 09.08.2011, K&A&U.57.
- Hydnangiaceae**
66. **Laccaria amethystina** Cooke  
Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1640 m, 28.08.2013, K&A&U.644.
67. **Laccaria laccata** (Scop.) Cooke  
Pervanoğlu, spruce forest, 40°41'N - 39°24'E, 1796 m, 30.10.2011, K&A&U.154.
68. **Laccaria pumila** Fayod  
Zigana village, spruce forest, 40°37'N - 39°22'E, 1650 m, 13.10.2013, K&A&U.875.
- Hygrophoraceae**
69. **Hygrocybe conica** (Schaeff.) P. Kumm.  
Karayolları station, near spruce forest, 40°39'N - 39°21'E, 1560 m, 13.10.2013, K&A&U.905.
70. **Hygrocybe helobia** (Arnolds) Bon (Uzun et al., 2006).
71. **Hygrophorus agathosmus** (Fr.) Fr.  
Zigana tunnel entrance, beech and spruce mixed forest, 40°39'N - 39°23'E, 1990 m, 13.10.2013, K&A&U.919.
72. **Hygrophorus pudorinus** (Fr.) Fr.  
Limni, fir forest, 40°37'N - 39°23'E, 1990 m, 14.10.2013, K&A&U.922.
- Hymenogastraceae**
73. **Hebeloma crustuliniforme** (Bull.) Quéf.  
Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.813.
74. **Hebeloma mesophaeum** (Pers.) Quéf.

Zigana tunnel entrance, beech and spruce mixed forest, 40°39'N - 39°23'E, 1990 m, 13.10.2013, K&A&U.914.

75. **Hebeloma sinapizans** (Paulet) Gillet

Yediharman way, spruce forest, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.576.

#### **Inocybaceae**

76. **Crepidotus cesatii** (Rabenh.) Sacc.

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°27'E, 1640 m, 28.08.2013, K&A&U.635.

77. **Inocybe geophylla** (Fr.) P. Kumm.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1647 m, 26.09.2011, K&A&U.85; Zigana tunnel entrance, beech and spruce mixed forest, 40°39'N - 39°23'E, 1980 m, 09.10.2011, K&A&U.138.

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

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.828.

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

Pervanoğlu, spruce forest, 40°39'N - 39°25'E, 1746 m, 09.10.2011, K&A&U.129.

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

Yediharman way, spruce forest, 40°40'N - 39°25'E, 1673 m, 08.08.2011, K&A&U.03.

#### **Marasmiaceae**

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

Zigana village, pastureland, 40°36'N - 39°22'E, 1540 m, 12.10.2013, K&A&U.724.

#### **Mycenaceae**

82. **Mycena acicula** (Schaeff.) P. Kumm.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1765 m, 16.08.2013, K&A&U.621.

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

Pervanoğlu, spruce forest, 40°39'N - 39°25'E, 1746 m, 26.09.2011, K&A&U.76.

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

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1647 m, 26.09.2011, K&A&U.83.

85. **Mycena rosea** Gramberg

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.831.

86. **Mycena viridimarginata** P. Karst. (Uzun et al., 2006).

#### **Omphalotaceae** Bresinsky

87. **Gymnopus dryophilus** (Bull.) Murrill

Zigana tunnel, beech and spruce mixed forest, 40°39'N - 39°23'E, 1980 m, 09.10.2011, K&A&U.142.

88. **Gymnopus confluens** (Pers.) Antonín, Halling & Noordel. (Uzun et al., 2006).

89. **Mycetinis scorodonius** (Fr.) A.W. Wilson & Desjardin

Yediharman way, spruce forest, on needle litter, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.581.

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

Zitaş, beech and spruce mixed forest, on beech leaves, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.806.

#### **Pleurotaceae**

91. **Pleurotus dryinus** (Pers.) P. Kumm. (Uzun et al., 2006).

#### **Pluteaceae**

92. **Pluteus atromarginatus** (Konrad) Kühner

Pervanoğlu, spruce forest, on spruce stump, 40°40'N - 39°24'E, 1710 m, 13.08.2013, K&A&U.422.

93. **Pluteus brunneoradiatus** Bonnard (Uzun et al., 2006).

#### **Physalacriaceae**

94. **Armillaria mellea** (Vahl) P. Kumm.

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°27'E, 1640 m, 26.09.2011, K&A&U.106.

95. **Armillaria ostoyae** (Romagn.) Herink (Uzun et al., 2006).

96. **Flammulina velutipes** (Curtis) Singer

Zigana village, beech and spruce mixed forest, on beech stump, 40°36'N - 39°22'E, 1540 m, 13.10.2013, K&A&U.848.

97. **Mucidula mucida** (Schrad.) Pat.

Zitaş, beech and spruce mixed forest, on beech, 40°40'N - 39°27'E, 1640 m, 28.08.2013, K&A&U.641.

#### **Psathyrellaceae**

98. **Coprinellus disseminatus** (Pers.) J.E. Lange

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°27'E, 1640 m, 26.09.2011, K&A&U.88.

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

Zigana tunnel entrance, beech and spruce mixed forest, 40°39'N - 39°23'E, 1980 m, 09.10.2011, K&A&U.143.

100. **Coprinopsis atramentaria** (Bull.) Redhead, Vilgalys & Moncalvo

Zigana village, pastureland, 40°36'N - 39°22'E, 1535 m, 11.10.2011, K&A&U.147.

101. **Psathyrella prona** (Fr.) Gillet

Zigana village, beech and spruce mixed forest, 40°37'N - 39°22'E, 1650 m, 12.10.2013, K&A&U.751.

#### **Schizophyllaceae**



102. **Schizophyllum commune** Fr.

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°27'E, 1650 m, 26.09.2011, K&A&U.90.

**Strophariaceae**103. **Hypholoma capnoides** (Fr.) P. Kumm.

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.807.

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

Zigana village, beech and spruce mixed forest, on beech stump, 40°37'N - 39°22'E, 1670 m, 12.10.2013, K&A&U.775.

105. **Kuehneromyces mutabilis** (Schaeff.) Singer & A.H. Sm.

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°26'E, 1760 m, 16.08.2013, K&A&U.618.

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

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°26'E, 1750 m, 16.08.2013, K&A&U.601.

107. **Pholiota lucifera** (Lasch) Quéf.

Zigana village, beech and spruce mixed forest, on beech stump, 40°37'N - 39°22'E, 1650 m, 13.10.2013, K&A&U.869.

**Tricholomataceae**108. **Arrhenia spathulata** (Fr.) Redhead

Köstere village, spruce forest, among mosses, 40°39'N - 39°20'E, 1450 m, 13.08.2013, K&A&U.507.

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

Yediharman way, spruce forest, on needle litter, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.553.

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

Zigana village, beech and spruce mixed forest, 40°37'N - 39°22'E, 1660 m, K&A&U.760.

111. **Clitocybe odora** (Bull.) P. Kumm.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.810.

112. **Lepista irina** (Fr.) H.E. Bigelow

Zigana village, beech and spruce mixed forest, 40°36'N - 39°22'E, 1530 m, 12.10.2013, K&A&U.738.

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

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1640 m, 09.08.2011, K&A&U.36.

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

Zigana village, pastureland, 40°36'N - 39°22'E, 1540 m, 13.10.2013, K&A&U.835.

115. **Pseudoclitocybe cyathiformis** (Bull.) Singer

Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1750 m, 23.11.2013, K&A&U.936.

116. **Rimbachia bryophila** (Pers.) Redhead (Kaya et al., 2013).117. **Tricholoma terreum** (Schaeff.) P. Kumm.

Pervanoğlu, spruce forest, on spruce stump, 40°39'N - 39°25'E, 1740 m, 30.10.2011, K&A&U.150.

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

Yediharman way, spruce forest, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.592.

119. **Tricholomopsis rutilans** (Schaeff.) Singer

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1660 m, 26.09.2011, K&A&U.105.

**Auriculariales****Auriculariaceae**120. **Exidia glandulosa** (Bull.) Fr.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1647 m, 26.09.2011, K&A&U.104.

121. **Exidia recisa** (Ditmar) Fr.

Zitaş, near stream, on willow branch, 40°40'N - 39°26'E, 1740 m, 13.10.2013, K&A&U.814.

122. **Pseudohydnum gelatinosum** (Scop.) P. Karst.

Zitaş, beech and spruce mixed forest, on spruce stump, 40°40'N - 39°26'E, 1735 m, 13.08.2013, K&A&U.500.

**Boletales****Boletaceae**123. **Boletus erythropus** Pers.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1650 m, 26.09.2011, K&A&U.84.

124. **Neoboletus pseudosulphureus** (Kallenb.) Kľofac (Uzun et al., 2006).125. **Strobilomyces strobilaceus** (Scop.) Berk (Akata, 2012).126. **Tylopilus felleus** (Bull.) P. Karst.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.808.

127. **Xerocomellus chrysenteron** (Bull.) Šutara

Yediharman way, spruce forest, 40°41'N - 39°26'E, 1670 m, 26.09.2011, K&A&U.118.

**Diplocystidiaceae**128. **Astraeus hygrometricus** (Pers.) Morgan

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1647 m, 26.09.2011, K&A&U.110.

**Paxillaceae**129. **Paxillus involutus** (Batsch) Fr.

Zigana tunnel entrance, beech and spruce mixed forest, 40°39'N - 39°23'E, 1980 m, 09.10.2011, K&A&U.145.

**Rhizopogonaceae**

130. **Rhizopogon obtextus** (Spreng.) R. Rauschert

Karayolları station, under pine, 40°39'N - 39°23'E, 1890 m, 28.08.2013, K&A&U.684.

**Suillaceae**

131. **Suillus collinitus** (Fr.) Kuntze

Karayolları station, under pine, 40°39'N - 39°21'E, 1550 m, 13.10.2013, K&A&U.912.

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

Zigana village, under pine, 40°36'N - 39°22'E, 1545 m, 12.10.2013, K&A&U.723.

133. **Suillus luteus** (L.) Roussel (Uzun et al., 2006).

**Tapinellaceae**

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

Pervanoğlu, spruce forest, on spruce stump, 40°39'N - 39°25'E, 1750 m, 30.10.2011, K&A&U.149.

**Cantharellales**

**Cantharellaceae**

135. **Cantharellus cibarius** Fr.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1640 m, 26.09.2011, K&A&U.108.

136. **Cantharellus cinereus** (Pers.) Fr. (Uzun et al., 2006).

137. **Craterellus tubaeformis** (Fr.) Quél.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.830.

**Clavulinaceae**

138. **Clavulina rugosa** (Bull.) J. Schröt.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1760 m, 16.08.2013, K&A&U.607.

**Hydnaceae**

139. **Hydnum repandum** L.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1647 m, 09.08.2011, K&A&U.32.

**Dacrymycetales**

**Dacrymycetaceae**

140. **Calocera cornea** (Batsch) Fr.

Zigana village, beech and spruce mixed forest, on beech stump, 40°36'N - 39°22'E, 1560 m, 13.10.2013, K&A&U.838.

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

Zitaş, beech and spruce mixed forest, on spruce branch, 40°40'N - 39° 27'E, 1640 m, 26.09.2011, K&A&U.87.

142. **Dacrymyces stillatus** Nees.

Zigana village, beech and spruce mixed forest, on beech branch, 40°36'N - 39°22'E, 1530 m, 12.10.2013, K&A&U.743.

**Geastrales**

**Geastraceae**

143. **Geastrum fimbriatum** Fr.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1760 m, 16.08.2013, K&A&U.620.

144. **Geastrum triplex** Jungh.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1640 m, 28.08.2013, K&A&U.654.

145. **Sphaerobolus stellatus** Tode

Yediharman way, beech and spruce mixed forest, on spruce stump, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.571.

**Gloeophyllales**

**Gloeophyllaceae**

146. **Gloeophyllum odoratum** (Wulfen) Imazeki

Köstere village, spruce forest, on spruce branch, 40°37'N - 39°20'E, 1240 m, 13.10.2013, K&A&U.898.

**Gomphales**

**Clavariadelphaceae**

147. **Clavariadelphus truncatus** Donk

Yediharman way, spruce forest, 40°41'N - 39°26'E, 1670 m, K&A&U.532.

**Gomphaceae**

148. **Gomphus clavatus** (Pers.) Gray

Zitaş, spruce forest, 40°40'N - 39°26'E, 1760 m, 16.08.2013, K&A&U.609.

149. **Ramaria stricta** (Pers.) Quél.

Zitaş, spruce forest, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.811.

**Hymenochaetales**

**Hymenochaetaceae**

150. **Hymenochaete rubiginosa** (Dicks.) Lév.

Trabzon-Erzurum highway, near road on oak stump, 40°38'N - 39°23'E, 1790 m, K&A&U.706.

151. **Phellinus hartigii** (Allesch. & Schnabl) Pat.

Limni, fir forest, on fir, 40°37'N - 39°23'E, 1990 m, 14.10.2013, K&A&U.920.

#### **Incertae sedis**

152. **Trichaptum fuscoviolaceum** (Ehrenb.) Ryvarden

Yediharman way, beech forest, on beech branch, 40°41'N - 39°26'E, 1670 m, 16.08.2013, K&A&U.530.

#### **Phallales**

##### **Phallaceae**

153. **Mutinus caninus** (Huds.) Fr.

Zigana tunnel entrance, beech and spruce mixed forest, 40°39'N - 39°23'E, 1980 m, 09.10.2011, K&A&U.139.

154. **Phallus impudicus** L.

Zitaş, beech and spruce mixed forest,, 40°40'N - 39°27'E, 1660 m, 09.08.2011, K&A&U.59.

#### **Polyporales**

##### **Fomitopsidaceae**

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

Zigana tunnel entrance, beech and spruce mixed forest, on beech stump, 40°39'N - 39°23'E, 1980 m, 09.10.2011, K&A&U.144.

156. **Postia caesia** (Schrad.) P. Karst.

Pervanoğlu, spruce forest, on spruce branch, 40°40'N - 39°24'E, 1710 m, 13.08.2013, K&A&U.426.

##### **Polyporaceae**

157. **Hapalopilus nidulans** (Fr.) P. Karst.

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°26'E, 1735 m, 13.08.2013, K&A&U.471.

158. **Polyporus varius** (Pers.) Fr.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1630 m, 28.08.2013, K&A&U.625.

159. **Pycnoporus cinnabarinus** (Jacq.) P. Karst.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.827.

160. **Trametes versicolor** (L.) Lloyd

Zitaş, beech and spruce mixed forest, on beech stump, 40°40'N - 39°27'E, 1645 m, 26.09.2011, K&A&U.103.

161. **Trametes hirsuta** (Wulfen) Lloyd

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1650 m, 09.08.2011, K&A&U.61.

#### **Russulales**

##### **Auriscalpiaceae**

162. **Auriscalpium vulgare** Gray

Karayolları station, under pine, on pine cone, 40°39'N - 39°21'E, 1540 m, 13.10.2013, K&A&U.901.

163. **Lentinellus cochleatus** (Pers.) P. Karst.

Kösterre village, spruce forest, on spruce stump, 40°37'N - 39°20'E, 1240 m, 13.10.2013, K&A&U.892.

##### **Peniophoraceae**

164. **Peniophora aurantiaca** (Bres.) Höhn. & Litsch.

Kösterre village, on alder branch, 40°37'N - 39°20'E, 1250 m, 26.01.2014, K&A&U.975.

##### **Russulaceae**

165. **Lactarius aurantiacus** (Pers.) Gray

Zigana village, beech and spruce mixed forest, 40°36'N - 39°22'E, 1530 m, 12.10.2013, K&A&U.747.

166. **Lactarius controversus** Pers.

Zigana village, under common hazel, 40°37'N - 39°22'E, 1630 m, 13.10.2013, K&A&U.890.

167. **Lactarius deliciosus** (L.) Gray (Uzun et al., 2006).

168. **Lactarius salmonicolor** R. Heim & Leclair

Limni, fir forest, 40°37'N - 39°23'E, 1990 m, 14.10.2013, K&A&U.924.

169. **Lactarius scrobiculatus** (Scop.) Fr.

Zigana village, beech and spruce mixed forest, 40°40'N - 39°26'E, 1760 m, 16.08.2013, K&A&U.603.

170. **Lactarius tabidus** Fr. (Uzun et al., 2006).

171. **Lactarius volemus** (Fr.) Fr.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1647 m, 26.09.2011, K&A&U.37.

172. **Lactifluus bertillonii** (Neuhoff ex Z. Schaef.) Verbeken (Uzun et al., 2006).

173. **Russula anthracina** Romagn.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°26'E, 1735 m, 13.08.2013, K&A&U.482.

174. **Russula chloroides** (Krombh.) Bres.

Kösterre village, beech forest, 40°37'N - 39°20'E, 1240 m, 13.10.2013, K&A&U.896.

175. **Russula cyanoxantha** (Schaeff.) Fr.

Zitaş, beech and spruce mixed forest, 40°40'N - 39°27'E, 1645 m, 09.08.2011, K&A&U.53.

176. **Russula delica** Fr. (Uzun et al., 2006).

177. *Russula firmula* Jul. Schäff. (Uzun et al., 2006).

#### Thelephorales

##### Bankeraceae

178. *Hydnellum peckii* Banker

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1630 m, 13.10.2013, K&A&U.829.

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

Pervanoğlu, spruce forest, 40°41'N - 39°24'E, 1790 m, 30.10.2011, K&A&U.152.

#### Tremellales

##### Tremellaceae

180. *Tremella encephala* Willd.

Pervanoğlu, spruce forest, on spruce branch, 40°40'N - 39°24'E, 1700 m, 13.08.2013, K&A&U.400.

181. *Tremella foliacea* Pers.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1640 m, 28.08.2013, K&A&U.629.

182. *Tremella mesenterica* Retz.

Zitaş, beech and spruce mixed forest, on beech branch, 40°40'N - 39°27'E, 1640 m, 09.08.2011, K&A&U.32.

#### 4. Discussion

In this study, 182 macrofungi species belonging to 117 genera within 60 families were listed. The list contains 38 *Ascomycota* (*Xylariaceae* 7; *Helotiaceae* and *Pyronemataceae* 5; *Cudoniaceae*, *Helvellaceae*, *Hyaloscyphaceae*, *Lachnaceae* and *Pezizaceae* 2; *Dermateaceae*, *Diatrypaceae*, *Discinaceae*, *Hemiphacidiaceae*, *Leotiaceae*, *Leptosphaeriaceae*, *Marthamycetaceae*, *Nectriaceae*, *Sarcoscyphaceae*, *Sclerotiniaceae* and *Vibrisseaceae* 1) and 144 *Basidiomycota* (*Agaricaceae* 18; *Russulaceae* 13; *Tricholomataceae* 12; *Amanitaceae* 8; *Boletaceae*, *Inocybaceae*, *Mycenaceae*, *Polyporaceae* and *Strophariaceae* 5; *Hygrophoraceae*, *Omphalotaceae*, *Physalacriaceae* and *Psathyrellaceae* 4; *Auriculariaceae*, *Cantharellaceae*, *Dacrymycetaceae*, *Geastraceae*, *Hydnangiaceae*, *Hymenogastraceae*, *Suillaceae* and *Tremellaceae* 3; *Auriscalpiaceae*, *Bankeraceae*, *Fomitopsidaceae*, *Gomphaceae*, *Hymenochaetaceae*, *Phallaceae* and *Pluteaceae* 2; *Clavariadelphaceae*, *Clavulinaceae*, *Diplocystidiaceae*, *Fistulinaceae*, *Gloeophyllaceae*, *Hydnaceae*, *Incertae sedis*, *Marasmiaceae*, *Paxillaceae*, *Peniophoraceae*, *Pleurotaceae*, *Rhizopogonaceae*, *Schizophyllaceae* and *Tapinellaceae* 1).

Fourty six of 182 macrofungi species are edible but only 4 species (*Agaricus campestris*, *Macrolepiota procera*, *Cantharellus cibarius* ve *Lactarius volemus*) are collected and consumed by local people. There are also 17 poisonous species determined in the study area. These are; *Amanita gemmata*, *A. muscaria*, *A. pantherina*, *A. phalloides*, *Boletus erythropus*, *Coprinopsis atramentaria*, *Gyromitra infula*, *Peziza badia*, *Hapalopilus rutilans*, *Hebeloma crustuliniforme*, *H. mesophaeum*, *Hypholoma fasciculare*, *Inocybe geophylla*, *I. rimoso*, *Mycena pura*, *M. rosea* and *Paxillus involutus*. There is not any report of poisoning in the study area, because the native people are keen on collecting only well known edible mushrooms.

Six species, *Ascotremella faginea* (Peck) Seaver, *Ciboria caucus* (Rebent.) Fuckel, *Leptosphaeria doliolum* (Pers.) Ces. & De Not, *Pezizella alniella* (Nyl.) Dennis, *Propolis farinosa* (Pers.) Fr. and *Vibrissea flavovirens* (Pers.) Korf & J.R. Dixon are recorded for the first time from Turkey. Among them, *V. flavovirens* is the first member of the family *Vibrisseaceae* in Turkey. Likewise, *A. faginea*, *P. alniella* and *P. farinosa* are also the first members of the genera *Ascotremella*, *Pezizella* and *Propolis* respectively. With this study, a new family name and four genera names were introduced for the first time to the mycobiota list of Turkey.

The taxa determined in the study area reflect some similarities with those of the investigations carried out in its close environs. These studies and the similarity percentages are presented in Table 1. The reason of this similarity may be the similarities in vegetation and climate.

Table 1. Similarity percentages of neighboring studies with Zigana Mountain

Investigations	Total taxa	Identical taxa	Similarity (%)
Sesli (1993)	64	25	39,06
Uzun et al. (2006)	105	39	37,14
Akata et al. (2014)	236	87	36,86
Demirel et al. (2010)	126	39	30,95
Pekşen and Karaca (2003)	169	52	30,77
Demirel et al. (2003)	114	35	30,70
Allı (2011)	106	22	20,75
Keleş and Demirel (2010)	191	38	19,90

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