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MACROFUNGI OF IZNIK PROVINCE

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ABSTRACT

In this study, it is aimed to determine macrofungi diversity of İznik province. The fungal specimens were collected between 2013 and 2014 years during field and laboratory studies, 78 macrofungi taxa belonging 30 families and 2 classis were determined. Among these taxa, *Mycena erubescens* was identified at the first time in Turkey and reported as new record for Turkish Mycota.

KEYWORDS: Iznik, macrofungi biodiversity, taxonomy, new record, *Mycena erubescens*

1. INTRODUCTION

İznik, located South Marmara Region of Turkey, is one of the historical areas and has an importance for Turkish culture and history. Besides of this, İznik province has natural beauty and rich ecological value. The area has rich vegetation due to positive effects of İznik Lake on climatic conditions. Basically, deciduous forests (*Quercus frainetto, Q. cerris, Q. petraea, Castanea sativa, Fagus orientalis, Carpinus betulus* and *Acer campestre*) and coniferous forests (*Pinus nigra* and *P. brutia*) are located in the area (1). These factors show that climatic conditions and vegetations are suitable for mushrooms.

In recent years, several studies have been carried out on biodiversity of Turkish mycota. But, the macrofungi biodiversity of Turkey is not fully determined and scientific studies on macrofungi biodiversity are not carried

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out in some areas of Turkey (2, 3, 4, 5, 6, 7). Similarly, İznik is one of these areas in which the macrofungi biodiversity is not determined (8, 9, 10), and additionally, this area is under anthropogenic threats as a consequence of its cultural and agricultural importance. So, we attempted to determine macrofungi biodiversity of the İznik and vicinity of İznik Lake (Figure 1).

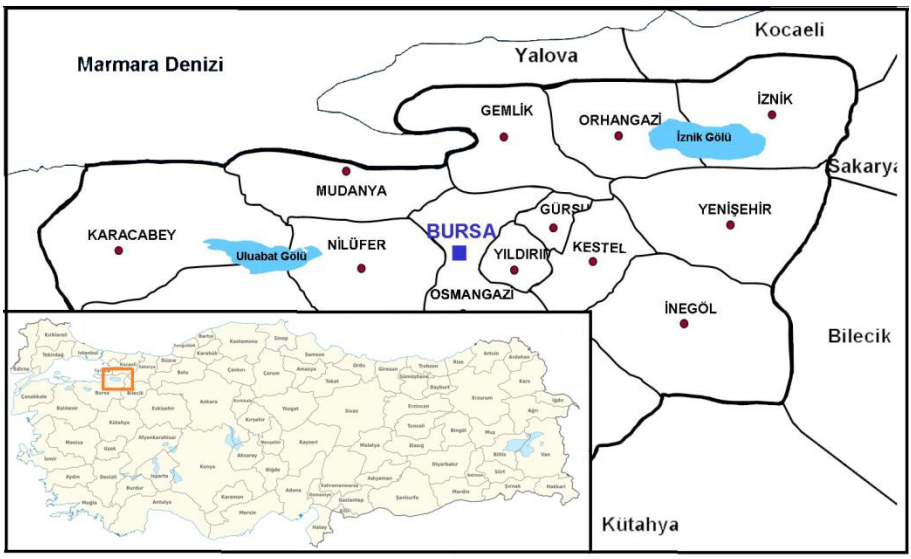

Figure 1. İznik province

2. MATERIAL AND METHODS

Specimens of macrofungi were collected from different localities of İznik province and vicinity of İznik Lake during routine field trips in 2013-2014. In the field, morphological and ecological features of specimens were recorded and they photographed in their habitat. The specimens were brought to laboratory with suitable conditions. Microscopic features were examined by using light microscope, and then specimens were identified morphologically using the references of current literature (11, 12, 13, 14, 15, 16, 17).
The identified specimens were deposited at the fungarium of Muğla Sıtkı Koçman University.

3. RESULTS

The taxonomy of taxa are given in accordance with Index Fungorum (www.indexfungorum.org, accessed date, 01.01.2016). The taxa are listed with locality features, collection date and accession number.

Ascomycota Caval.- Sm.

Diatrypaceae Nitschke

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

Bayırköy, on beech branches, *Fagus orientalis – Pinus nigra* mixed forest, 547 m.,13.04.2014, *Allı* 5429. Not edible.

2. **Diatrypella quercina** (Pers.) Cooke

Yörükler village, on dead oak branches, hardwood forest, 341 m., 24.11.2013, *Allı* 5256. Not edible.

Helvellaceae Fr.

3. **Helvella leucomelaena** (Pers.) Nannf.

Gürbüzlü, *Pinus pinea* forest, 425 m., 13.04. 2014, *Allı* 5436. Poisonous.

Pyronemataceae Corda

4. **Scutellinia scutellata** (L.) Lambotte

İstanbul Gate of Ottoman Walls, İznik centre, 86 m., 13.04. 2014, *Allı* 5440. Not edible.

Xylariaceae Tul. & C. Tul.

5. **Biscogniauxia nummularia** (Bull.) Kuntze

Bayırköy, on beech branches, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 13.04.2014, *Allı* 5427. Not edible.

6. **Xylaria carpophila** (Pers.) Fr.

Bayırköy, on beech branches, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 13.04.2014, *Allı* 5431. Not edible.

Basidiomycota R.T. Moore

Auriculariaceae Fr.

7. **Exidia glandulosa** (Bull.) Fr.

Bayırköy, on beech branches, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 13.04.2014, *Allı* 5426. Not Edible.

Agaricaceae Chevall.

8. **Agaricus bisporus** (J.E. Lange) Imbach

Karacasu Delta, in grass, 78 m., 23.11.2013, *Allı* 5211. Edible.

9. **Agaricus macrocarpus** F.H. Møller

Yörükler village, in grass, 321m., 24.11.2013, *Allı* 5249. Edible.

10. **Agaricus silvicolae-similis** Bohus & Locsmándi

Aydınlar village, mixed conifer forest, 327 m., 23.11.2013, *Allı* 5216. Edible.

11. **Agaricus subfloccosus** (J.E. Lange) Hlaváček

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5299. Edible.

12. **Agaricus xanthodermus** Genev.

Aydınlar village, mixed conifer forest, 327 m., 23.11.2013, *Allı* 5219. Poisonous.

13. **Bovista nigrescens** Pers.

Karacasu Delta, in grass, 78 m., 23.11.2013, *Allı* 5209. Edible.

14. **Cystodermella granulosa** (Batsch) Harmaja

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5294. Not Edible.

15. **Lycoperdon perlatum** Pers.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5280. Edible.

16. **Lycoperdon pyriforme** Schaeff.

Bayırköy village, on stumps, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5280a. Edible.

17. **Lycoperdon umbrinum** Pers.

Aydınlar village, mixed conifer forest, 327 m., 23.11.2013, *Allı* 5222. Edible.

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

Karacasu Delta, in grass, 78 m., 23.11.2013, *Allı* 5206; Yörükler village, in grass, 321m., 24.11.2013, *Allı* 5251. Edible.

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

Yörükler village, hardwood forest, 341m., 24.11.2013, *Allı* 5255; Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5277. Edible.

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

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5276; 26.05.2014, *Allı* 5575. Edible.

Amanitaceae R. Heim ex Pouzar

21. **Amanita citrina** Pers.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5288; *Allı* 5290. Not edible.

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

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5297. Deadly poisonous.

Bankeraceae Donk

23. **Hydnellum concrescens** (Pers.) Banker

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5274. Not edible.

Bolbitiaceae Singer

24. **Panaeolus fimicola** (Pers.) Gillet

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5279. Not edible.

Cortinariaceae R. Heim ex Pouzar

25. **Hebeloma crustuliniforme** (Bull.) Quél.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5273. Not edible.

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

Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5245. Not edible.

Geastraceae Corda

27. **Geastrum pectinatum** Pers.

Karacasu Delta, in grass, 78 m., 23.11.2013, *Allı* 5208. Not edible.

Gomphidiaceae Maire ex Jülich

28. **Chroogomphus helveticus** (Singer) M.M. Moser

Bayırköy village, *Fagus orientalis* – *Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5268. Edible.

29. **Chroogomphus rutilus** (Schaeff.) O.K. Mill.

Aydınlar village, mixed conifer forest, 327 m., 23.11.2013, *Allı* 5220. Edible.

Inocybaceae Jülich

30. **Crepidotus caspari** Velen.

Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5233; Bayırköy village, *Fagus orientalis* – *Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5579. Not edible.

31. **Inocybe auricoma** (Batsch) Sacc.

Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5242. Not edible.

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

Bayırköy village, *Fagus orientalis* – *Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5289. Poisonous.

33. **Inocybe mixtilis** (Britzelm.) Sacc.

Bayırköy village, *Fagus orientalis* – *Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5284. Poisonous.

34. **Inocybe queletii** Konrad

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5269. Poisonous.

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

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5281. Poisonous.

Lyophyllaceae Jülich

36. **Lyophyllum connatum** (Schumach.) Singer

Göllüce village, hardwood forest, 92 m., 23.11.2013, *Allı* 5231. Not edible.

Marasmiaceae Roze ex Kühner

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

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5301. Edible.

Mycenaceae Roze

38. **Hemimycena gracilis** (Quél.) Singer

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5282. Not edible.

39. **Mycena erubescens** Höhn.

Cap, 8-25 mm, convex to hemispherical when young, later campanulate convex, usually with a obtuse papilla, ocher, pink-brownish to reddish brown or warm brown, darker at the center and paler or whitish towards the margin (Figure 2a).
Lamellea, adnate with a decurrent tooth, ventricose, greyish white, orange red when damaged (Figure 2b).
Stem, 20-50 x 0.5-2 mm, smooth, slightly pubescent at apex, apex white to whitish, increasingly brownish towards to base (Figure 2b).

Spores, 8-10.3 x 6.7-8.2 µm, smooth, hyaline, broadly ellipsoid, amyloid (Figure 2c).
Basidia, 25-30 × 8 – 11 µm, clavate, with two sterigma (Figure 2d).
Ecological features: It grows at autumn to early winter on mossy trunks of broadleaves trees.
Specimen examined: Yörükler village, on *Quercus* sp. trunk, 341m., 24.11.2013, Allı 5258. Not edible.

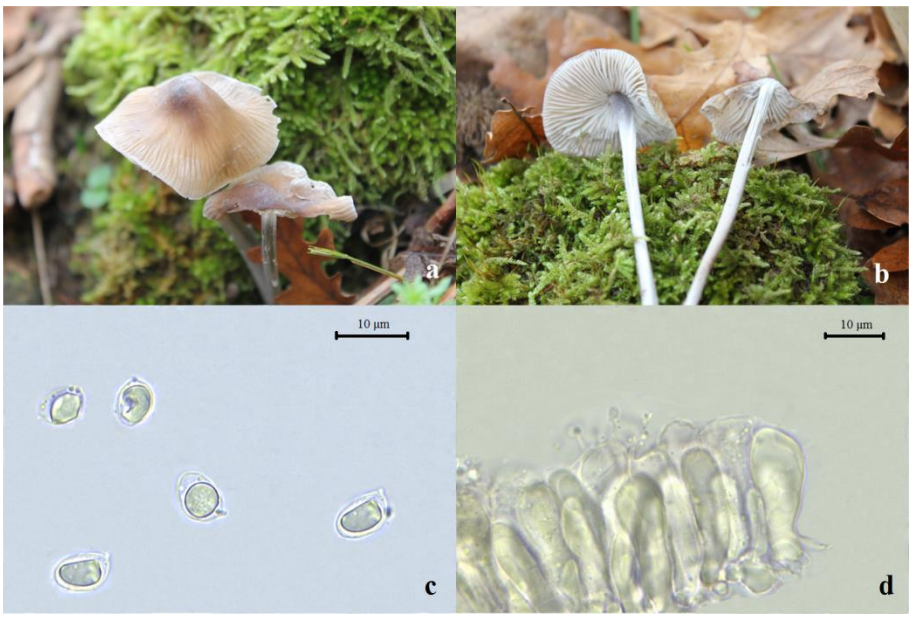

Figure 2. *Mycena erubescens*, a-b. basidiocarp c. spores, d. basidium

Omphalotaceae Bresinsky

40. **Omphalotus olearius** (DC.) Singer

Yörükler village, hardwood forest, 341m., 24.11.2013, *Allı* 5257. Poisonous.

Physalacriaceae Corner

41. **Armillaria borealis** Marxm. & Korhonen

Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5239. Not edible.

42. **Armillaria cepistipes** Velen.

Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5236. Not edible.

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

Elbeyli crossroad, 91 m., 23.11.2013, *Allı* 5214; Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5234. Not edible.

44. **Hymenopellis radicata** (Relhan) R.H. Petersen

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5578. Not edible.

Pleurotaceae Kühner

45. **Hohenbuehelia petaloides** (Bull.) Schulzer

Yörükler village, hardwood forest, 341m., 24.11.2013, *Allı* 5260. Edible.

46. **Pleurotus ostreatus** (Jacq.) P. Kumm.

Bayırköy village, on *Populus* sp., 547 m., 24.11.2013, *Allı* 5302. Edible.

Polyporaceae Fr. ex Corda

47. **Polyporus arcularius** (Batsch) Fr.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5421. Not edible.

48. **Trametes trogii** Berk.

İstanbul Gate of Ottoman Walls, İznik centre, on *Platanus orientalis* trunk, 86 m., 13.04.2014, *Allı* 5441; Yörükler village, hardwood forest, 341m., 26.05.2014, *Allı* 5584. Not edible.

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

Göllüce, on *Quercus* sp., 92 m., 01.06.2013, *Allı* 4974. Not edible.

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

Aydınlar village, mixed conifer forest, 327 m., 23.11.2013, *Allı* 5218. Not edible.

Psathyrellaceae Vilgalys, Moncalvo & Redhead

51. **Coprinopsis marcescibilis** (Britzelm.) Örstadius & E. Larss.

Göllüce village, hardwood forest, 92 m., 23.11.2013, *Allı* 5226; Yörükler village, in grass, 321m., 24.11.2013, *Allı* 5252. Not edible.

52. **Coprinopsis picacea** (Bull.) Redhead

Yörükler village, in grass, 341m., 24.11.2013, *Allı* 5254. Not edible.

53. **Coprinopsis radiata** (Bolton) Redhead

Göllüce village, hardwood forest, 92 m., 23.11.2013, *Allı* 5227. Not edible.

54. **Psathyrella candolleana** (Fr.) Maire

Göllüce village, on *Quercus* sp., 2 m., 23.11.2013, *Allı* 5224. Edible.

Pluteaceae Kotl. & Pouzar

55. **Volvariella volvacea** (Bull.) Singer

Göllüce village, hardwood forest, 23.11.2013, 92m., *Allı* 5223, *Allı* 5225; Yörükler village, in grass, 321m., 24.11.2013, *Allı* 5250. Edible.

Rhizopogonaceae Gäum. & C.W. Dodge

56. **Rhizopogon roseolus** (Corda) Th. Fr.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5267. Edible.

Russulaceae Lotsy

57. **Lactarius chrysorrheus** Fr.

Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5241. Poisonous.

58. **Lactarius deliciosus** (L.) Gray

Aydınlar village, mixed conifer forest, 327 m., 23.11.2013, *Allı* 5217; Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5240; Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5261; *Allı* 5278. Edible.

59. **Lactarius quieticolor** Romagn.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5291. Edible.

60. **Lactarius sanguifluus** (Paulet) Fr.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5300. Edible.

61. **Lactarius semisanguifluus** R. Heim & Leclair

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5262. Edible.

62. **Russula delica** Fr.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5263. Edible.

Schizophyllaceae Quél.

63. **Schizophyllum commune** Fr.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 13.04.2014, *Allı* 5425; İstanbul Gate of Ottoman Walls, İznik centre, on *Platanus orientalis*, 86 m., 13.04.2014, *Allı* 5442. Not edible.

Stereaceae Pilát

64. **Stereum hirsutum** (Willd.) Pers.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 13.04.2014, *Allı* 5419. Not edible.

Strophariaceae Singer & A.H. Sm.

65. **Stropharia caerulea** Kreisel

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5285. Not edible.

66. **Stropharia coronilla** (Bull.) Quél.

Yörükler village, in grass, 321m., 24.11.2013, Allı 5248. Edible.

Suillaceae Besl & Bresinsky

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

Aydınlar village, mixed conifer forest, 327 m., 23.11.2013, *Allı* 5221; Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5238; Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5265. Edible.

Tricholomataceae R. Heim ex Pouzar

68. **Clitocybe metachroa** (Fr.) P. Kumm.

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5295. Not edible.

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

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5287. Not edible.

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

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5286. Edible.

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

Göllüce village, hardwood forest, 92 m., 23.11.2013, *Allı* 5229. Edible.

72. **Lepista personata** (Fr.) Cooke

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5270. Edible.

73. **Melanoleuca iris** Kühner

Karacasu Delta, in grass – lawn, 78 m., 23.11.2013, *Allı* 5207. Edible.

74. **Tricholoma fracticum** (Britzelm.) Kreisel

Bayırköy village, *Fagus orientalis – Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5272. Not edible.

75. **Tricholoma sciodes** (Pers.) C. Martín

Müşgüle village, mixed hardwood – conifer forest, 488 m., 23.11.2013, *Allı* 5237. Not edible.

76. **Tricholoma terreum** (Schaeff.) P. Kumm.

Bayırköy village, *Fagus orientali*s – *Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5264. Edible.

Tubariaceae Vizzini

77. **Tubaria furfuracea** (Pers.) Gillet

Göllüce village, hardwood forest, 92 m., 23.11.2013, *Allı* 5228; Allı 5230; Bayırköy village, *Fagus orientali*s – *Pinus nigra* mixed forest, 547 m., 24.11.2013, *Allı* 5283. Not edible.

78. **Tubaria romagnesiana** Arnolds

Yörükler village, in grass, 321m., 24.11.2013, Allı 5246. Not edible.

4. DISCUSSION

As a result of the study, seventy eight macrofungi taxa belonging 30 family and 2 classis were determined in the research area. Among the taxa, 6 of them is belonging Ascomycota (*Diatrypaceae* 2, *Helvellaceae* 1, *Pyronemataceae* 1, *Xylariaceae* 2), and 72 of them is Basidiomycota (*Auriculariaceae* 1, *Agaricaceae* 13, *Amanitaceae* 2, *Bankeraceae* 1, *Bolbitiaceae* 1, *Cortinariaceae* 2, *Geastraceae* 1, *Gomphidiaceae* 2, *Inocybaceae* 6, *Lyophyllaceae* 1, *Marasmiaceae* 1, *Mycenaceae* 2, *Omphalotaceae* 1, *Physalacriaceae* 4, *Pleurotaceae* 2, *Polyporaceae* 4, *Psathyrellaceae* 4, *Pluteaceae* 1, *Rhizopogonaceae* 1, *Russulaceae* 6, *Schizophyllaceae* 1, *Stereaceae* 1, *Strophariaceae* 2, *Suillaceae* 1, *Tricholomataceae* 9, *Tubariaceae* 2). Additionally, *Mycena erubescens* was recorded at the first time in Turkey, and reported as new record for Turkish mycota. Before this study, 59 members of the genus *Mycena* were reported in Turkey (8, 9, 10), and *Mycena erubescens* is 60th member of this genus.

While 31 taxa are edible, 36 of them are inedible. Similarly, 10 taxa are poisonous (Figure 3). Although 31 taxa are edible, only 4 taxa (*Lactarius deliciosus, L. queticolor, L. sanguifluus* and *L. semisanguifluus*) are known by local people as edible.

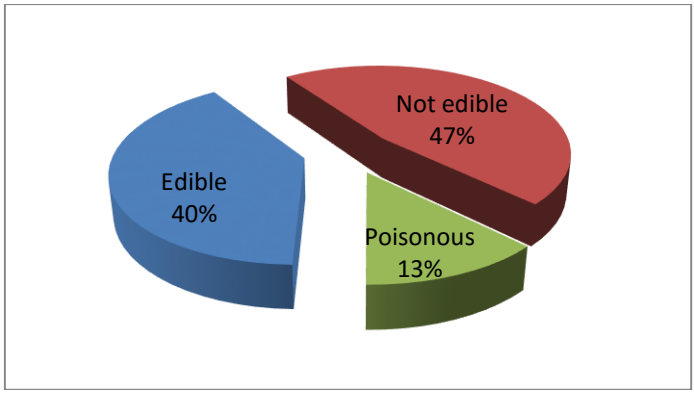

Figure 3. Edibility of taxa

Some studies on macrofungi had been carried out at Bursa. 13 taxa from vicinity of Uludağ and its environs (18), and 22 taxa from İnegöl (19) had been reported. Also, Solak and Gücin (20) reported 72 taxa as macrofungi biodiversity of Bursa province, but they didn't indicate the collecting area of the taxa. According to current literature, this is the first taxonomic study on the macrofungi in the study area, and it is shown that İznik province has rich macrofungi biodiversity. Additionally, it has been shown that 147 macrofungi taxa grow in Bursa province in accordance with this study and the current literature (18, 19, 20).

The similarity percentage of the study and its environs is given in Table 1. The reason of the low similarity percentage of the studies might be ecological features of the study area. İznik Lake softens its environs and increases the moisture levels. So, this situation supports the macrofungi biodiversity of İznik province. But, the climatic conditions are suitable for olive trees and it has been cultivated by local people for economical purposes. So, natural forests are converted as olive farms. This situation is threatened macrofungi generations via destroying of natural habitats of them. For this reason, natural forests should be protected, thus macrofungi biodiversity can be protected in the area.

Table 1. Similarity percentages of study area and its environs

	Number of identical taxa	Total taxa	Similarity percentage (%)
Karamanoğlu and Öder (18)	4	13	30.76
Öztürk et al. (19)	1	22	4.54
Solak and Gücin (20)	17	80	21.25

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