

Fungal diversity in Mediterranean and sub-Mediterranean plant communities of Strandzha Mountain, Bulgaria

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Abstract. The present study reports 131 larger fungi in Mediterranean and sub-Mediterranean plant communities of Mt Strandzha floristic region. Of these, sixty-nine (69) species are reported for the first time from Mt Strandzha floristic region. New localities on sixty-two (62) macrofungi are also reported. The predominant part of species belongs to the class Agaricomycetes (127 species), other part belongs to the Pezizomycetes (4 species). Seven species (*Agaricus macrocarpus*, *Amanita caesarea*, *A. vittadinii*, *Clathrus ruber*, *Chlorophyllum agaricoides*, *Gaeastrum triplex* and *Poronia punctata*) are included in the Red List of fungi in Bulgaria and Red Data Book of the Republic of Bulgaria. Five of them (*Agaricus macrocarpus*, *Amanita vittadinii*, *Chlorophyllum agaricoides*, *Gaeastrum triplex* and *Poronia punctata*) are new to this floristic region. *Myriostoma coliforme* is rare and threatened in Bulgaria and Europe. The following rare, steppe, xerothermic and thermophilous fungi (*Agaricus comtulus*, *A. cupreobrunneus*, *Chlorophyllum agaricoides*, *Entoloma incanum*, *Gaeastrum corollinum*, *G. pectinatum*, *G. striatum*, *Geopora arenicola*, *Hygrocybe virginea*, *Lepiota erminea*, *Leucopaxillus lepistoides* and *Myriostoma coliforme*) deserve special attention. In addition, new collections of some threatened, rare, and lesser-known species are also included. The aim of the paper is to enrich the information about fungal diversity of the Mt Strandzha floristic region, which area is important for conservation of the fungal diversity in Bulgaria.

Key words: fungal conservation, fungal diversity, larger fungi, Mt Strandzha.

Introduction

The fungal diversity not been well studied not only in Strandzha Mountain, but in all Mt. Strandzha floristic region (Drumeva-Dimcheva & Gyosheva-Bogoeva, 1993; Denchev & Bakalova, 2002, 2005; Gyosheva & Dimcheva, 1991). Separate data of single species were given by Burzakov (1928), Vanev & Reid (1986), Kuthan & Kotlaba (1989), Drumeva-Dimcheva & Gyosheva-Bogoeva (1993), Assyov & Denchev (2004), Lacheva (2006). Up to the present there have been a few mycological investigations from neighboring areas (Black Sea coast regions) (Burzakov, 1928; Vanev & Reid, 1986; Kuthan & Kotlaba, 1989) and for Mt Sakar in the Toundzha Hilly Country regions (Lacheva, 2015a). More specific mycological studies

of Strandzha Mountain and specifically Strandzha Peak were conducted by Denchev & Petrova (2005), Hüseyin & Selçuk (2007), Hüseyin et al. (2011).

Denchev & Assyov (2010) report on the relatively rich species diversity of mushrooms in the areas of Strandzha region and Strandzha mountain, but note that specific studies in both areas are extremely few or completely lacking (Denchev & Petrova, 2005; Hüseyin & Selçuk, 2007; Hüseyin et al., 2011). Particularly unstudied for both regions are edible wild mushrooms, for which general information can only be found in the publications of Denchev & Petrova (2005), Denchev & Assyov (2010) and Radoukova et al. (2024). Ethnomycological information of wild edible mush-

rooms in the Strandzha and Southern Black Sea coast regions described in the literature, is indicated in Drumeva-Dimcheva & Gyosheva-Bogoeva (1993) and Radoukova et al. (2024).

According to the previous research in this region, 219 macromycetes (from them 87 basidiomycetes proper) are known (Denchev & Petrova, 2005; Denchev & Assyov, 2010).

A summary overview of macromycetes in Mediterranean and sub-Mediterranean plant communities of Bulgaria is provided by Gjoševa (1997) and Lacheva (2015a), but there has not however, yet been any detailed mycological research devoted to Mediterranean and sub-Mediterranean plant communities of Mt Strandzha and its environs.

The goal of this study is to present recent, systematically collected data on the fungi in Mediterranean and sub-Mediterranean plant communities of the Strandzha Mountain and to contribute to enriching scientific information about the fungal diversity of the Strandzha floristic region, as well as about the larger fungi in Bulgaria as a whole.

Materials and methods

Study area

Strandzha Mountain is situated in Southeast Bulgaria, in the southeastern part of the Balkan Peninsula. Besides the European and Macedonian-Thracian floristic elements, there are also Euxinian floristic elements, steppe and Mediterranean species and, therefore, Mt Strandzha has been set apart into an independent region of the Macedonian-Thracian Province (Bondev, 2002). It falls within the Continental-Mediterranean climatic region (Velev, 2002). Summers are warm and winters are mild, without lasting snow cover and with small temperature amplitudes. The climate of the area is influenced considerably by the Black Sea and is predominantly transitional to Mediterranean.

The main river in the region is Veleka. The Veleka river is the largest and the longest river in Strandzha Mountain, Southeastern part of Bulgaria. It springs into Turkish territory through many karst springs; runs through primary forest ecosystems within the natural park Strandzha and flows into the Black Sea, near the village of Sinemorets. Its watershed covers an area of 1054.6 km² of which 788 km² on the territory of Bulgaria (Lizama-Rivas & Koleva-Lizama, 2017; Gecheva et al, 2022).

According to the physical and geographical regionalisation, the mountain is situated in Thracian-Strandzha region within the Sakar-Strandzha subregion (Penin, 2007). The highest peak in the Mt Strandzha is Golyamo Gradishte (709 m).

Soil cover in the Strandzha Mountain is represented by shallow leached and strongly leached to podzolized cinnamon-forest soils. The predominant soil types are cinnamon-podzolic soils (Ninov, 1982).

In the composition of the plant communities participate trees, shrubs and herbaceous species, many of which are with Mediterranean and sub-Mediterranean distribution. Forests are dominated by *Quercus cerris*, *Q. frainetto*, *Q. pubescens*, *Q. virgiliana*, *Tilia rubra*, *Ulmus minor*, etc. Typical representatives of shrub and herbaceous plants (*Bothriochloa ischaemum*, *Chrysopogon gryllus*, *Poa bulbosa* etc.) are some Mediterranean species as *Jasminum fruticans*, *Ilex aquifolium*, *Paliurus spina-christi*, *Phillyrea latifolia*, *Ruscus aculeatus* etc. There are also typical sub-Mediterranean communities presented by *Carpinus orientalis*, *Fraxinus ornus*, *Ostrya carpiniifolia*, *Populus nigra*, *Rosa canina*, etc. (Bondev, 1991).

List of collection localities (Fig. 1):

Burgas Municipality:

1. Draganovo, on northwestern slope, in mixed forest from *Quercus rubra* L., *Q. pubescens* Willd. and *Pinus nigra* Arnold.
2. Burgas, in open place with sandy soil.
3. Balgarovo, in *Populus nigra* culture.
4. Bryastovets, in meadow, near oak forest (*Quercus cerris* L. and *Q. pubescens* Willd.).
5. Izvor, along the upper part of a road, near *Pinus nigra* culture.
6. Kableshkovo, on northern slopes, in mixed forest (*Fraxinus ornus* L., *Quercus pubescens* Willd. and *Pinus nigra* Arnold.).
7. Kamenar, in deciduous forest (*Fraxinus ornus* L., *Quercus frainetto* Ten. and *Q. pubescens* Willd.), along the upper part of a road, in the ravine.
8. Ravnets, in *Robinia pseudoacacia* culture, on northern slopes.
9. Izvorishte, in meadow, under oak forest (*Quercus cerris* L. and *Q. pubescens* Willd.).
10. Mirolyubovo, on northern slopes, in meadow, under oak forest (*Quercus cerris* L. and *Q. pubescens* Willd.).
11. Bratovo, in meadow with *Paliurus spina-christi* Mill.

12. Marinka, in meadow with *Paliurus spinachristi* Mill.

13. Tvarditsa, meadow with *Paliurus spinachristi* Mill.

14. Dimchevo, in meadow.

Tsarevo Municipality:

15. Velika, in deciduous forest (*Fraxinus ornus* L., *Fagus sylvatica* L. and *Q. pubescens* Willd.)

16. Balgari, in deciduous forest from (*Fraxinus ornus* L., *Quercus frainetto* Ten. and *Q. pubescens* Willd.).

17. Brodilovo, in deciduous forest (*Fraxinus ornus* L., *Quercus frainetto* Ten. and *Q. pubescens* Willd.).

18. Kosti, in deciduous forest (*Fagus sylvatica* L. and *Quercus frainetto* Ten.).

19. Ahtopol, in deciduous forest (*Q. pubescens* Willd. and *Fraxinus ornus* L.).

20. Sinemorets, in deciduous forest (*Quercus frainetto* Ten. and *Fraxinus ornus* L.).

Malko Tarnovo Municipality:

21. Slivarovo, in meadow and pastures.

22. Visitsa, in meadow.

23. Gramaticovo, in meadow.

24. Bliznak, in deciduous forests to the road.

25. Zabernovo, in stony meadows.

26. Stoilovo, in stony meadows.

27. Mladezhko, in meadow and pastures.

28. Kalovo, in mixed forest (*Fraxinus ornus* L., *Quercus frainetto* Ten. and *Pinus nigra* Arnold).

Primorsko Municipality:

29. Novo Panicharevo, in meadow over wild vines, near oak forest (*Quercus cerris* L. and *Q. pubescens* Willd.).

30. Kiten, in grassland and pastures.

31. Yasna polyana, in oak forest (*Quercus cerris* L. and *Q. pubescens* Willd.).

32. Pismenovo, in oak forest (*Quercus cerris* L. and *Q. pubescens* Willd.).

33. Veselie, in oak forest (*Quercus cerris* L. and *Q. pubescens* Willd.).

34. Fazanovo, in oak forest (*Quercus cerris* L. and *Q. pubescens* Willd.).

35. Primorsko, in old *Populus nigra* culture.

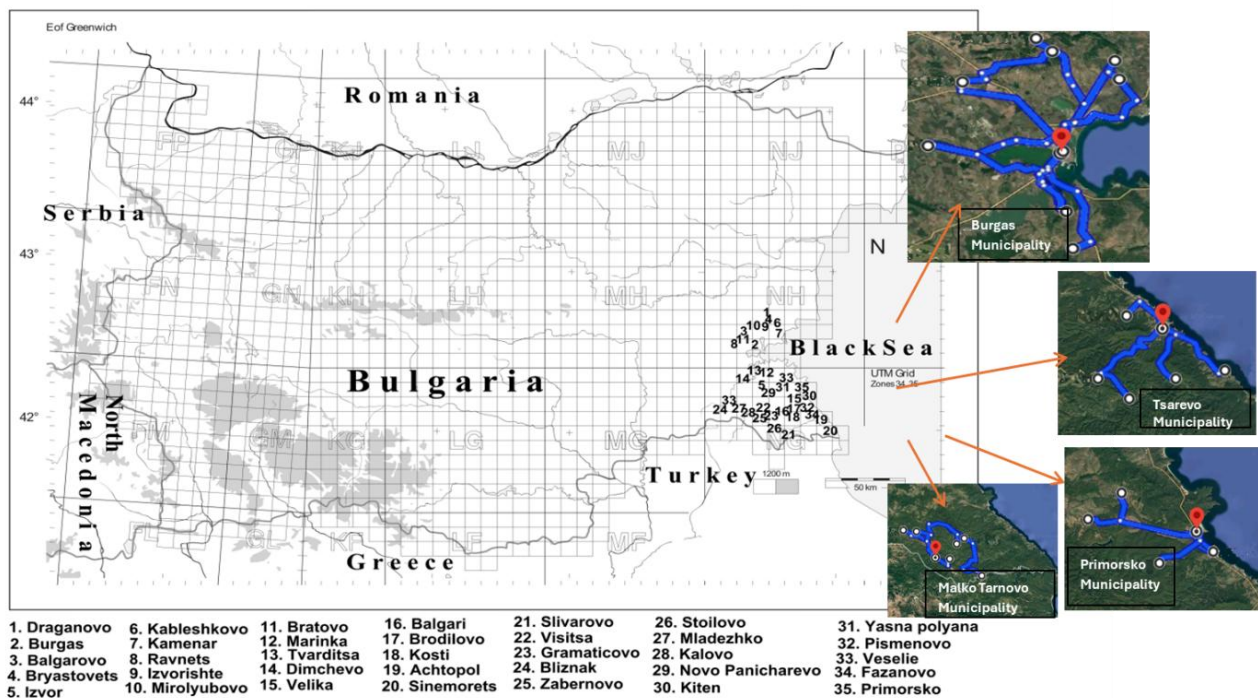


Fig. 1. Location of the studied sites.

Collection, determination, nomenclature and keeping of the fungal samples

The current research is based on data was collected during the period of 2023-2025, in differ-

ent Mediterranean and sub-Mediterranean plant communities (broadleaves forests, xerothermic grasslands, meadows and pastures), on soil or on fallen branches, stumps, logs or living trees. Spe-

cimens were collected by the authors, unless otherwise stated. Relevant morphological and ecological characters were recorded for the fungi, which were photographed in their natural habitats. Some of the species were determined while still in a fresh condition (Agaricales), and the others were to undergo further laboratory analyses.

The determination and taxonomy of the specimens was done during the field research and at the Botanical Laboratory of the Agricultural University – Plovdiv, microscopically by using reagents (Melzer's reagent, sulfovanilin, 5% KOH, H₂O, etc.). The following keys and monographs were used as resources for determination of the collected specimens: Watling (1973), Hinkova & Stoichev (1983), Michael et al. (1983–1988), Sunhede (1989), Breitenbach & Kränzlin (1986, 1995), Phillips (1981, 2006), Cappelli (1984), Cléménçon (1984), Alessio (1985), Hansen & Knudsen (1992–2000), Courtecuisse & Duhem (1995), Jordan (1995), Galli (1996), Dähncke (2001), Heilmann-Clausen et al. (1998), Contu (2003), Kränzlin (2005), Moser (1967, 1978, 1983), Dennis (1978), Neubert et al. (1993), Ryvarden & Gilbertson (1993, 1994), Heilmann-Clausen et al. (1998), Dissing (2000), Wasser (2000), Holec (2001), Wald et al. (2004), Neville & Poumart (2004), Parra (2005), Razaq & Shahzad (2007), Klaus et al. (2013), Assyov (2012, 2014), etc. The nomenclature follows Kirk et al. (2001, 2008), Turland et al. (2018) and Index fungorum. The author's names of the fungal taxa are abbreviated according to Kirk (2004) and Kirk & Ansell (1992) and the plants taxa by Brummit & Powell (1992), Hansen & Knudsen (1992).

The conservation status of the species was based on the Red List of fungi in Bulgaria (Gyosheva et al., 2006) and the Red Data Book of the Republic Bulgaria Volume 1 (Peev et al., 2015), using the Red Book categories of IUCN (IUCN 2001, 2003a, b).

The ecological-trophic groups were carried out after direct observations and based on literature data (Arnolds, 1982; Kalamees, 1979; Gyosheva & Vasilev, 1994; Vulchev et al., 2000; Dimitrova & Gyosheva, 2009, 2010; Gyosheva & Denchev, 2000). Different wood substrates were studied: dead wood (branches, stumps, trunks, bark, etc.) and living trees (Arnolds, 1982, 1992).

Part from the specimens have been preserved in the herbarium of Agricultural University – Plovdiv.

Results and Discussion

Species composition

The species are listed alphabetically; species reported for the first time from Mt Strandzha floristic region are marked with ⁽¹⁾

1. *Agaricus arvensis* Schaeff. – 2 (on soil, in open place above the dam); 3 (along the catchment under *Populus nigra*); 8 (in *Robinia pseudoacacia* culture); 10 (in meadow, near deciduous forest of *Quercus* sp.); 11 (in meadow with *Paliurus spina-christi*); 12 (in meadow with *Paliurus spina-christi*); 13 (in meadow with *Paliurus spina-christi*); 22 (in meadow); 29 (in meadow, above wild vines); 31 (on sandy soil, in almond culture).

2. *A. campestris* L.: Fr. – 2 (in open meadow above the dam); 3 (along the catchment under *Populus nigra*); 8 (in *Robinia pseudoacacia* culture); 9 (in meadow above oak forest); 11 (in meadow with *Paliurus spina-christi*); 13 (in meadow with *Paliurus spina-christi*); 17 (on sandy soil); 25 (in rocky meadow); 26 (in rocky meadow); 29 (in pasture); 34 (in oak forest); 33 (in thickets to road).

3. ⁽¹⁾ *A. comtulus* Fr. – 29 (in pasture); 12 (in meadow with *Paliurus spina-christi*); 13 (in meadow with *Paliurus spina-christi*).

4. ⁽¹⁾ *A. cupreobrunneus* (F.H. Møller) Pilát – 14 (on sandy soil); 27 (on stony meadow).

5. ⁽¹⁾ *A. macrocarpus* (F.H. Møller) F.H. Møller – 4 (in meadow near deciduous forest); 18 (in meadow near deciduous forest); 27 (in thickets to mounds); 31 (in almond culture).

6. *Agaricus sylvicola* (Vittad.) Lev. – 15 (on soil, in mixed oak and beech forests).

7. ⁽¹⁾ *A. xanthodermus* Genev. – 2 (on soil, under *Populus nigra*); 7 (in oak forest, in the ravine under the dry lake); 8 (in culture of *Robinia pseudoacacia*); 22 (in meadow); 34 (roadside, in bushes).

8. *Amanita caesarea* (Scop. : Fr.) Pers. – 4 (on soil, in oak forest); 15 (on soil, in mixed oak and beech forests); 24 (on soil, roadside, in oak forest).

9. ⁽¹⁾ *A. pantherina* (D.C. : Fr.) Krombh. – 31 (on soil, in oak forest); 32 (on soil, in oak forest).

10. *A. rubescens* Pers. : Fr. – 24 (on soil, roadside, in oak forest); 28 (on soil, in thickets).

11. ⁽¹⁾ *A. vittadinii* (Moretti) Vittad. – 4 (in meadow near deciduous forest).

12. ⁽¹⁾ *Agrocybe molesta* (Lasch) Singer – 11 (on soil, in meadow with *Paliurus spina-christi*); 13 (in meadow with *Paliurus-spina christi*).
13. ⁽¹⁾ *A. praecox* (Pers. : Fr.) Fayod – 2 (on soil, in open place above the dam); 8 (on soil, in the *Robinia pseudoacacia* culture).
14. *Boletus aereus* Bull. : Fr. – 15 (on soil, in mixed oak and beech forests); 24 (in oak forest, in oak forest).
15. *B. appendiculatus* Schäeff. – 15 (on soil, in mixed oak and beech forests).
16. *B. chrysenteron* Bull. : Fr. – 1 (on soil, in mixed forest); 4 (in oak forest); 32 (on soil, in oak forest).
17. *B. edulis* Bull. : Fr. – 15 (on soil, in mixed oak and beech forests); 24 (on soil, in mixed forest), 31 (on soil, in oak forest); 24 (on soil, in oak forest); 18 (on soil, in mixed forest).
18. ⁽¹⁾ *B. luridus* Schaeff. : Fr. – 31 (on soil, in oak forest); 33 (on soil, in oak forest); 15 (on soil, in mixed oak and beech forests).
19. *Bovista plumbea* Pers. : Pers. – 3 (along the catchment under *Populus nigra*); 13 (in meadow with *Paliurus spina-christi*); 26 (in rocky meadow); 29 (in pasture, above wild vines).
20. *Calocybe gambosa* (Fr. : Fr.) Donk – 3 (along the catchment under *Populus nigra*); 18 (in mixed oak and beech forests).
21. ⁽¹⁾ *Calvatia gigantea* (Batsch : Pers.) Lloyd – 4 (in meadow near deciduous forest); 18 (on sandy soil, along deciduous forest).
22. ⁽¹⁾ *Calvatia utriformis* (Bull. : Pers.) Jaap. – 3 (on soil, along the catchment under *Populus nigra*); 13 (in meadow with *Paliurus spina-christi*); 21 (in meadow, in thickets).
23. *Cantharellus cibarius* Fr. – 2 (on soil, in deciduous forest); 6 (on soil, in mixed forest); 26 (on soil, in deciduous forest).
24. ⁽¹⁾ *Chlorophyllum agaricoides* (Czern.) Vellinga – 29 (in pasture); 30 (in pasture).
25. *Chlorophyllum rachodes* (Vittad.) Vellinga – 3 (along the catchment under *Populus nigra*); 29 (in pasture); 30 (in pasture).
26. *Clathrus ruber* [P. Micheli ex] Pers. : Pers. – 5 (nearly the *Pinus nigra* culture); 6 (on sandy soil, in deciduous forest).
27. ⁽¹⁾ *Clitocybe gibba* (Pers. : Fr.) P. Kumm. – 1 (on soil, in mixed forest); 4 (on soil, in deciduous forest); 31 (on soil, in oak forest); 34 (in oak forest).
28. ⁽¹⁾ *C. rivulosa* (Pers. : Fr.) P. Kumm. – 4 (in deciduous forest); 6 (in mixed forest).
29. *Clitopilus rhodophilus* (Bres.) Singer. – 31 (on soil, in oak forest near almond culture).
30. ⁽¹⁾ *Conocybe apala* (Fr. : Fr.) Arnolds – 2 (on soil, in deciduous forest); 26 (on soil, in deciduous forest); 29 (in meadow above wild vines).
31. ⁽¹⁾ *Conocybe subovalis* Kühner & Watling – 13 (in meadow with *Paliurus spina-christi*); 21 (in meadow nearly deciduous forest).
32. ⁽¹⁾ *Coprinellus micaceus* (Bull. : Fr.) Vilgalys, Hopple & Jacq. Hohnson. – 7 (on soil, in mixed forest, in the ravine under the dry lake); 31 (on soil, in oak forest near almond culture).
33. *Coprinopsis atramentaria* (Bull. : Fr.) Redhead, Vilgalys & Moncalvo – 4 (on manure near deciduous forest); 29 (in meadow above wild vines).
34. ⁽¹⁾ *Coprinopsis nivea* (Pers. : Fr.) Redhead, Vilgalys & Moncalvo – 31 (on horse excrement nearly oak forest and almond culture).
35. ⁽¹⁾ *Coprinus comatus* (O.F. Müll. : Fr.) Pers. – 2 (on soil, in open meadow); 8 (in *Robinia pseudoacacia* culture); 29 (on soil, in meadow above wild vines).
36. ⁽¹⁾ *Cortinarius cotoneus* Fr. – 1 (on soil, in mixed forest); 15 (on soil, in mixed oak and beech forests); 31 (on soil, in oak forest near almond culture).
37. ⁽¹⁾ *C. infractus* (Pers. : Fr.) Fr. – 6 (in deciduous forest); 32 (in oak forest).
38. ⁽¹⁾ *C. torvus* (Fr. : Fr.) Fr. – 4 (on soil, in deciduous forest); 32 (on soil, in oak forest); 33 (on soil, in oak forest).
39. ⁽¹⁾ *Craterellus cornucopiooides* (L. : Fr.) Pers. – 11 (in meadow with *Paliurus spina-christi*); 12 (in meadow with *Paliurus spina-christi*); 14 (on soil, in thickets).
40. ⁽¹⁾ *Crepidotus mollis* (Schaeff. : Fr.) Staude – 1 (on wood of deciduous trees, in mixed forest); 31 (on wood, in oak forest near almond culture); 32 (on wood, in oak forest); 33 (on soil, in oak forest).
41. ⁽¹⁾ *C. variabilis* (Pers. : Fr.) P. Kumm. – 6 (in meadow, above the deciduous forest); 9 (on wood, above the oak forest).
42. ⁽¹⁾ *Crinipellis scabella* (Alb. & Schwein.: Fr.) Murrill – 12 (on litter, in thickets with *Paliurus spinachristi*); 29 (on litter, in thickets with *Quercus sp.*); 31 (on litter, in oak forest).

43. ⁽¹⁾ *Cyathus olla* (Batsch. : Pers) Pers – 31 (on litter, in oak forest).

44. *Daedalea quercina* (L. : Fr.) Pers. – 6 (on wood, above the mixed forest); 15 (on wood, in mixed oak and beech forests); 31 (on wood, in oak forest near almond culture).

45. ⁽¹⁾ *Entoloma clypeatum* (L. : Fr.) P. Kumm. – 4 (on soil, in deciduous forest); 5 (along *Pinus nigra* culture).

46. ⁽¹⁾ *E. incanum* (Fr. : Fr.) Hesler – 5 (on soil along *Pinus nigra* culture).

47. *E. sinuatum* (Bull. ex Pers. : Fr.) P. Kumm. – 31 (on soil, in oak forest).

48. ⁽¹⁾ *Exidia plana* (F.H. Wigg.) Donk. – 28 (on rotten wood of deciduous trees); 34 (on wood of *Quercus robur* L., in oak forest).

49. *Fistulina hepatica* (Schaeff. : Fr.) With. – 6 (on wood, in mixed forest); 15 (on wood, in mixed oak and beech forests); 31 (at the base of *Quercus pubescens*).

50. ⁽¹⁾ *Flammulina velutipes* (Curtis : Fr.) Singer – 1 (on wood, in mixed forest); 24 (on wood of deciduous trees, in oak forest).

51. *Fomes fomentarius* (L.) J. Kickx f. – 1 (on wood, in mixed forest); 24 (on wood of deciduous trees, in oak forest).

52. ⁽¹⁾ *Ganoderma adspersum* (Schulzer) Donk – 27 (on wood, in oak forest); 32 (on wood of deciduous trees, in oak forest).

53. *G. lucidum* (Curtis : Fr.) P. Karst. – 19 (at the base of *Quercus* sp.); 31 (on *Quercus robur*); 34 (at the base of *Quercus* spp., in oak forest).

54. *G. resinaceum* Bond. – 6 (on wood, in mixed forest); 20 (on wood, in deciduous forest).

55. *Geastrum corollinum* (Batsch) Hollòs – 10 (in deciduous forest); 31 (on sandy soil near oak and almond forest).

56. *G. striatum* Fr. – 3 (in soil, under *Populus nigra*); 26 (in meadow along deciduous forest).

57. ⁽¹⁾ *G. pectinatum* Pers. : Pers. – 6 (in mixed forest); 22 (in meadow); 30 (in pasture).

58. ⁽¹⁾ *G. triplex* Jungh. – 5 (on litter from needles, in *Pinus nigra* culture).

59. ⁽¹⁾ *Geopora arenicola* (Lév.) Kers – 12 (on sandy soil, in meadow under *Paliurus spinachristi*).

60. ⁽¹⁾ *Gymnopus dryophilus* (Bull. : Fr.) P. Murille – 19 (on litter, in deciduous forest); 20 (on litter, in deciduous forest).

61. ⁽¹⁾ *Gymnopus peronatus* (Bolton : Fr.) Antonín, Halling & Noordel. – 5 (on soil nearly

Pinus nigra culture); 28 (on litter, in mixed forest; in thickets).

62. *Hericium cirrhatum* (Pers. : Fr.) Nikol. – 10 (on decaying wood, in oak forest).

63. *Hygrocybe conica* (Schaeff. : Fr.) P. Kumm. – 1 (on soil, in grasslands near mixed forest); 5 (on soil, nearly *Pinus nigra* culture).

64. ⁽¹⁾ *Hygrocybe virginea* (Wulfen : Fr.) P.D. Orton & Watling – 6 (on soil, in grasslands); 30 (in meadow).

65. ⁽¹⁾ *Hypopholloma fasciculare* (Huds. : Fr.) P. Kumm. – 5 (on soil, in *Pinus nigra* culture).

66. *Inocybe asterospora* Quél. – 9 (on soil, among mosses near oak forest); 16 (in thickets).

67. *I. rimosa* (Bull. : Fr.) P. Kumm. – 1 (on soil, in mixed forest); 5 (in *Pinus nigra* culture).

68. ⁽¹⁾ *Lactarius azonites* (Bull.) Fr – 6 (on soil, in mixed forest); 32 (on soil, in oak forest); 35 (on soil, in oak forest).

69. ⁽¹⁾ *L. chrysorrheus* Fr. – 31 (on soil, in oak forest near almond culture); 32 (on soil, in oak forest).

70. *L. controversus* (Pers. : Fr.) Fr – 15 (on soil, in mixed oak and beech forests); 32 (on soil, in oak forest).

71. *L. deliciosus* (L. : Fr.) Gray – 5 (on soil, in *Pinus nigra* culture); 18 (on soil, in mixed oak and beech forests).

72. *L. piperatus* (L. : Fr) Pers. – 18 (on soil, in mixed oak and beech forests); 32 (on soil, in oak forest).

73. *L. volemus* (Fr. : Fr.) Fr. – 15 (on soil, in mixed oak and beech forests); 32 (on soil, in oak forest).

74. ⁽¹⁾ *Laetiporus sulphureus* (Bull. : Fr.) Mürrill – 2 (in the base of *Quercus* spp., in deciduous forest); 6 (on *Carpinus betulus* L., in mixed forest).

75. *Leccinum auranthiacum* (Bull.) Gray. – 6 (in mixed forest, under beech trees); 15 (on soil, in mixed oak and beech forests).

76. ⁽¹⁾ *Lepiota cristata* (Bolton. : Fr.) P. Kumm. – 31 (on soil, in oak forest near almond culture).

77. ⁽¹⁾ *L. erminea* (Fr. : Fr.) P. Kumm. (= *Lepiota alba* (Bres.) Sacc.) – 21 (on pasture with many manure); 22 (on soil, in meadow).

78. *Lepista flaccida* (Sowerby : Fr.) Pat. – 6 (on soil, in mixed forest); 32 (on soil, in oak forest).

79. ⁽¹⁾ *L. personata* (Fr. : Fr.) Cooke – 21 (on soil, in meadow); 29 (in meadow).

80. *Leucopaxillus lepistoides* (Maire) Singer – 4 (on soil, in meadow nearly deciduous forest).
81. ⁽¹⁾ *Lycoperdon echinatum* Pers. : Pers – 6 (in mixed forest); 10 (in deciduous forest).
82. ⁽¹⁾ *L. lividum* Pers – 33 (on sandy soil, in meadow with *Populus nigra*, along the Veleka river).
83. ⁽¹⁾ *L. perlatum* Pers. : Pers. – 12 (on soil, in meadow with *Paliurus spina-christi*); 21 (in meadow near deciduous forest); 35 (on soil, in oak forest).
84. ⁽¹⁾ *L. pyriforme* Schaef. : Pers. – 9 (on decaying tree stumps, of oak tree in deciduous forest from *Quercus* spp.); 10 (on well-rotted fallen branches, in oak tree in deciduous forest).
85. ⁽¹⁾ *Lyophyllum decastes* (Fr. : Fr.) Singer – 9 (on decaying tree stumps, of oak tree in deciduous forest from *Quercus* spp.).
86. *Macrolepiota excoriata* (Schaeff. : Fr.) Wasser – 3 (on soil, in meadow); 21 (on soil, in meadow); 29 (on soil, in meadow above wild vines).
87. *M. procera* (Scop. : Fr.) Singer – 4 (on soil, in meadow nearly deciduous forest); 8 (on soil, in *Robinia pseudoacacia* culture); 22 (on soil, in meadow); 23 (on soil, in meadow); 32 (on soil, nearly oak forest).
88. *Marasmius oreades* (Bolton : Fr.) Fr. – 21 (on soil, in meadow); 26 (on soil, in meadow); 29 (in meadow above wild vines); 30 (on soil, in pasture); 35 (in meadow nearly oak forest).
89. *M. rotula* (Scop. : Fr.) – 6 (on fallen twigs of deciduous trees in mixed forest); 31 (on dead wood of oak tree in deciduous forest); 32 (on fallen twigs of deciduous trees in deciduous forest).
90. ⁽¹⁾ *Meripillus giganteus* (Pers. : Fr.) P. Karst. – 8 (on dead stump, in *Robinia pseudoacacia* culture).
91. ⁽¹⁾ *Myriostoma coliforme* (With. : Pers.) Corda – 35 (on sandy soil, in meadow with *Populus nigra*, along the Veleka river; two fruiting bodies).
92. ⁽¹⁾ *Octospora humosa* (Fr. : Fr.) Dennis – 32 (on soil, among mosses in oak forest).
93. ⁽¹⁾ *Panaeolus sphinctrinus* (Fr.) Qué. – 8 (on excrement, in *Robinia pseudoacacia* culture); 21 (on excrement, in meadow); 25 (on excrement, in stony meadows).
94. ⁽¹⁾ *Peziza repanda* Pers. – 16 (on soil, among mosses along deciduous forest from); 29 (on soil, in pastures over wild vines).
95. *Phallus impudicus* L. : Pers. – 8 (on soil, in *Robinia pseudoacacia* culture); 32 (on soil, in oak forest).
96. *Phellinus ferruginosus* (Schrad. : Fr.) Pat. – 32 (on living tree, in oak forest).
97. *Phellinus torulosus* (Pers. : Fr.) Bourdot & Galzin – 15 (on living beech tree, in mixed forest).
98. ⁽¹⁾ *Pholiota populnea* (Pers. : Fr.) Kuyper & Tjall.-Beuk. – 35 (on dead stump from *Populus nigra*, along the Veleka river).
99. ⁽¹⁾ *Pleurotus eryngii* (DC. : Fr.) Qué. – 2 (in meadow); 21 (in meadow); 22 (in meadow); 29 (in pasture).
100. *Pleurotus ostreatus* (Jacq. : Fr.) P. Kumm. – 35 (on dead wood from *Populus nigra*, along the Veleka river); 32 (on stump of deciduous tree, in oak forest).
101. ⁽¹⁾ *Pluteus cervinus* (Schaeff.) P. Kumm. – 31 (on dead wood); 32 (on stump of deciduous tree, in oak forest).
102. ⁽¹⁾ *Polyporus brumalis* (Pers. : Fr.) Fr. – 16 (on dead wood, in deciduous forest); 31 (on dead wood, in forest to almonds culture).
103. ⁽¹⁾ *Polyporus leptcephalus* (Jacq. : Fr.) Fr. – 4 (on dead wood, nearly oak forest); 32 (on dead wood, in oak forest).
104. ⁽¹⁾ *Poronia punctata* (L.) Fr. – 30 (on horse manure (excrement), in pastures; numerous fruiting bodies).
105. *Psathyrella candolleana* (Fr. : Fr.) Maire – 3 (on wood of poplar culture); 16 (on wood of deciduous trees, in deciduous forest).
106. *Psathyrella corrugis* (Pers. : Fr.) Konrad & Maubl. (= *Psathyrella gracilis* (Fr. : Fr.) Qué.) – 4 (on dead wood, nearly oak forest).
107. ⁽¹⁾ *Pycnoporus cinabarinus* (Jacq. : Fr.) P. Karst. – 14 (on dead wood); 32 (on wood, in oak forest).
108. *Russula delica* Fr. – 18 (on soil, in mixed oak and beech forests)
109. *R. fellea* (Fr. : Fr.) Fr. – 6 (on soil, in mixed forest); 32 (on soil, in oak forest).
110. *R. grisea* (Pers. : Fr.) – 15 (on soil, in mixed oak and beech forests); 18 (on soil, in mixed oak and beech forests).

111. *R. foetens* (Pers. : Fr.) Fr. – 15 (on soil, in mixed oak and beech forests); 32 (on soil, in oak forest).

112. *R. maculata* Quéll. & Rose – 15 (on soil, in mixed oak and beech forests); 18 (on soil, in mixed oak and beech forests).

113. ⁽¹⁾ *R. ochroleuca* (Pers.) Fr. – 4 (on soil, in deciduous forest).

114. *R. turci* Bres. – 31 (on soil, in oak forest); 32 (on soil, in oak forest).

115. *R. vesca* Fr. – 7 (on soil, in oak forest); 17 (on soil, in deciduous forest); 31 (on soil, in oak forest).

116. *R. virescens* (Schaeff.) Fr. – 7 (on soil, in oak forest); 17 (on soil, in deciduous forest).

117. *R. xerampelina* (Schaeff.) Fr. – 17 (on soil, in deciduous forest).

118. *R. virescens* (Schaeff.) Fr. – 7 (on soil, in oak forest); 17 (on soil, in deciduous forest).

119. ⁽¹⁾ *R. xerampelina* (Schaeff.) Fr. – 17 (on soil, in deciduous forest).

120. *Schizophyllum commune* Fr. : Fr. – 4 (on log of deciduous tree, in deciduous forest); 31 (on log of deciduous tree, in oak forest); 32 (on dead wood, in oak forest).

121. *Stereum hirsutum* (Willd. : Fr.) Gray – 4 (on wood of deciduous tree, in deciduous forest), 6 (on wood of deciduous tree, in deciduous forest); 18 (on wood of deciduous tree, in mixed oak and beech forests); 31 (on stump of deciduous tree, in oak forest).

122. ⁽¹⁾ *S. rugosum* (Pers. : Fr.) Fr. – 32 (on dead wood, in oak forest); 34 (on dead wood, in oak forest).

123. ⁽¹⁾ *Stropharia coronilla* (Bull. : Fr.) Fr. – 5 (on soil, in grasslands); 30 (on dirt road along the pasture); 31 (in meadow).

124. *S. semiglobata* (Batsch. : Fr.) Quéll. – 4 (on soil, in meadow nearby deciduous forest).

125. *Suillus luteus* (L. : Fr.) Roussel. – 5 (on soil, in *Pinus nigra* culture).

126. *Trametes hirsuta* (Wulfen : Fr.) Pilát – 18 (on dead wood of deciduous tree, in mixed forest).

127. *Trametes versicolor* (L. : Fr.) Lloyd – 6 (on dead wood of deciduous tree, in mixed forest; on stump of deciduous tree, in oak forest).

128. ⁽¹⁾ *Tulostoma brumale* Pers. : Pers. – 14 (on sandy soil); 30 (on dirt road along the pasture).

129. ⁽¹⁾ *T. melanocyclum* Bres. – 12 (on soil, in meadow with *Paliurus spina-christi*); 25 (on soil, in stony meadows).

130. ⁽¹⁾ *Vascellum pratense* (Pers. : Pers.) Kreisel – 14 (on sandy soil, in stony meadow); 25 (in stony meadow); 26 (on soil, in stony meadow); 29 (on soil, in pasture above wild vines); 35 (on sandy soil, roadside).

131. *Xerula radicata* (Relhan. : Fr.) Dörfelt – 6 (on stump of deciduous tree, in oak forest).

General species richness

During the present mycological study of the Mt Strandzha, 131 species were collected. Sixty-nine species are new for the Mt Strandzha floristic region (Dimitrova & Gyosheva, 2009; Denchev & Petrova, 2005; Denchev & Assyov, 2010). Of the total number of identified species, 38 are lignicolous and 93 terricolous. The predominant part of species belongs to the class *Agaricomycetes* (8 orders, 35 families, 67 genera, and 127 species), other part belongs to the *Pezizomycetes* (2 orders, 3 families, 4 genera, and 4 species). The orders Agaricales, Polyporales, and Russulales dominated by the number of species, namely Agaricales (73), Russulales (23), Polyporales (12), followed by Boletales (6), Geastrales and Auriculariales (5 each). Most species were from the families: *Russulaceae* (18), *Agaricaceae* (17), *Lycoperdaceae* (8), *Polyporaceae* (9), *Boletaceae* and *Strophariaceae* (6 each), *Geastraceae*, *Marasmiaceae* and *Psathyrellaceae* (5 each), followed by *Amanitaceae*, *Clitocybaceae*, and *Hydnaceae* – with 4 each. The rest families have a few species. The greatest number of macromycetes species were identified from the genera *Russula* (12), *Agaricus* (7), *Lactarius* (6), *Boletus* (5), *Geastrum* and *Lycoperdon* (4 each). All other genera have a small number, less than four species each. (Fig. 2).

Of the registered species, 33 are edible wild fungi of economic importance used for food by people, most of them from the genera *Agaricus*, *Boletus*, *Calocybe*, *Clitocybe*, *Cantharellus*, *Lactarius*, *Lepista*, *Macrolepiota*, *Russula*, etc.: *Agaricus arvensis*, *A. campestris*, *A. macrocarpus*, *Agaricus sylvicola*, *Amanita rubescens*, *Armillaria mellea*, *Boletus appendiculatus*, *Boletus edulis*, *Boletus chrisenteron*, *Bovista plumbea*, *Calocybe gambosa*, *Calvatia gigantea*, *Calvatia utriformis*, *Cantharellus cibarius*, *Clitocibe gibba*, *Coprinus comatus*, *Craterellus cornucopioides*, *Lactarius piperatus*, *Laetiporo-*

Fungal diversity in Mediterranean and sub-Mediterranean plant communities of Strandzha Mountain, Bulgaria

rus sulphureus, Leccinum aurantiacum, Lepista personata, Lycoperdon perlatum, Macrolepiota excoriata, Macrolepiota procera, Chlorophyllum rhacodes, Marasmius oreades, Oudemansiella radicata, Pleu-

rotus ostreatus, Polyporus squamosus, Russula delicata, R. vesca, Russula virescens, and Suillus luteus.

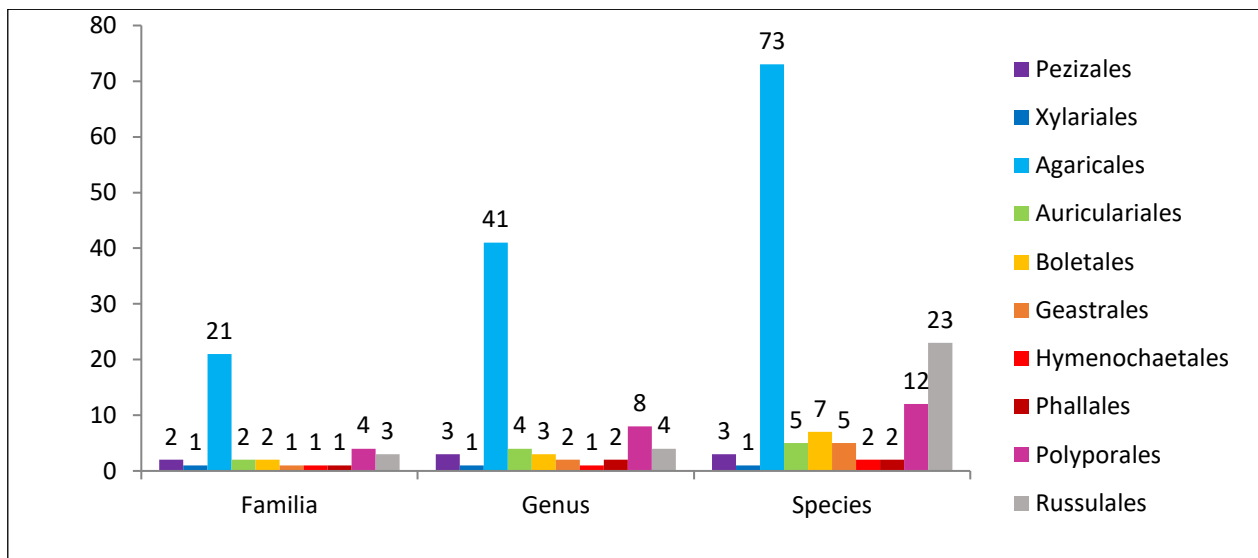


Fig. 2. General species richness.

Fungi of seven ecological-trophic groups were discovered in different plant communities on the territory of the Mt Strandzha floristic region: Mr (mycorrhizal fungi) -44; LeS (wood saprotrophs)

- 33; Hu (humus saprotrophs) - 30; coprotrophs - 8; LeP (wood parasites) - 7; St, LeS (leaf debris saprotrophs) - 7; St (litter saprotrophs) - 2. (Fig. 3).

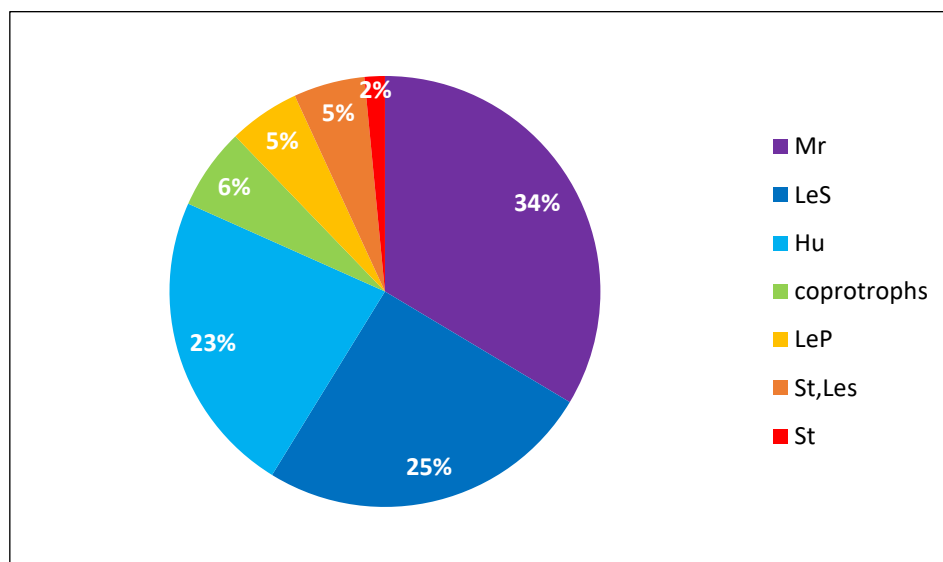


Fig. 3. Arrangement of the fungal species in ecological-trophic groups.

Wood saprotrophs and mycorrhizal fungi prevailed among the studied taxa. A high level of lignicolous fungal diversity was registered in dif-

ferent deciduous communities, and Pine and Poplar plantations in the area. Four of them (*Armillaria mellea, Fomes fomentarius, Phellinus torulosus* and

Phellinus ferruginosus) are parasites, which seriously affect the sanitary status of the forest (Natcheva & Gyosheva, 2016; Gospodinov et al., 2018).

The greatest diversity of fungi was found in wooded areas - oak and mixed oak and beech forests (85), followed by those in meadow and pastures - (39), while the rest of the investigated associations (azonal vegetation near the rivers, etc.) are characterised by a few number of species

(7) (Fig. 4). The predominant part of steppe, xerothermic and thermophilous fungi (humus saprotrophs, mycorrhizal fungi and coprotrophs) prevail among the meadow and pastures: 26 species. This is characteristic of Mediterranean and Sub-Mediterranean areas (Parmasto & Parmasto, 1997; Zervakis et al., 2004; Venturella et al., 2011; Venturella, 2020).

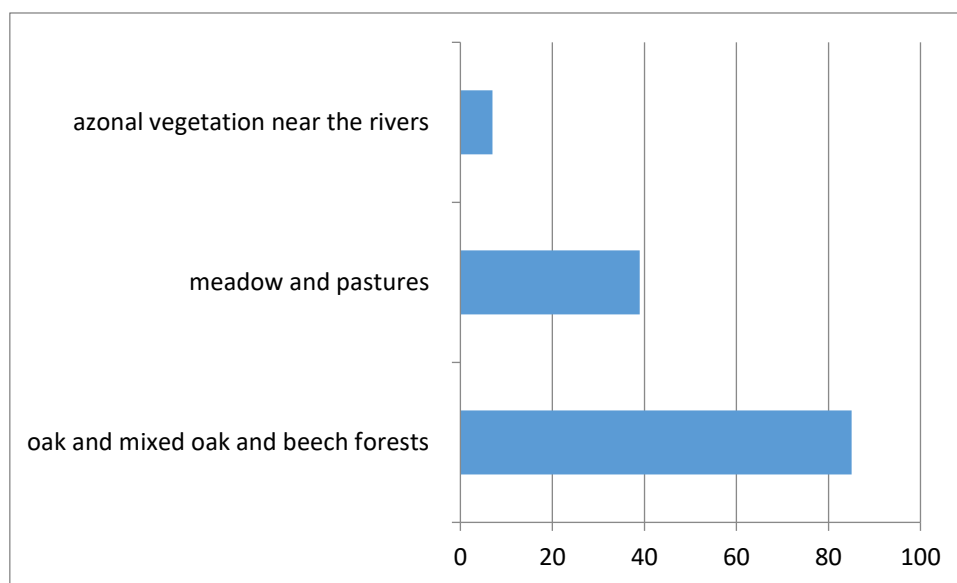


Fig. 4. Number of species in researched plant communities.

Consequently, the fungal diversity of Mt Strandzha appears to be diverse and with an interesting composition of species with Mediterranean and sub-Mediterranean affinities (e.g. *Agaricus comtulus*, *A. cupreobrunneus*, *Chlorophyllum agaricoides*, *Entoloma incanum*, *Geastrum corollinum*, *G. pectinatum*, *G. striatum*, *Geopora arenicola*, *Hygrocybe conica*, *H. virginea*, *Lepiota erminea*, *Leucopaxillus lepistoides*, *Myriostoma coliforme*), as well as gasteroid fungi from genera *Bovista*, *Calvatia*, *Conocybe*, *Coprinopsis*, *Coprinellus*, *Entholoma*, *Lycoperdon*, *Tulostoma* etc.).

The species composition of the macromycetes in the Mt Strandzha includes of fungi in the Mediterranean and sub-Mediterranean area and xerothermic grasslands of some neighboring and European countries: Macedonia (Karadelev, 2000, 2002, 2018; Ivančević & Karadelev, 2009; Karadelev & Rusevska, 2013a,b; Ivančević & Karadelev, 2013; Serbia and Kosovo (Lukić, 2008; Ivančević & Karadelev, 2009; Katanić et al., 2015; Akata, 2017, Ramshaj et al., 2021), Romania

(Tănase & Pop, 2005), Turkey (Akata et al., 2010, Sesli & Denchev, 2005, 2010, 2014, Solak et al., 2015), Greece (Zervakis et al., 2004; Polemis et al., 2020), Poland (Łuszczynski, 2006; Stasińska, 2008; Jaworska et al., 2012), Russia and Ukraine (Vasilkov, 1953, Vassileva, 1973, Wasser et al., 1977), Italy (Laganá et al., 1999, 2001, 2002; Venturella et al., 2011, Venturella, 2020), as well as species with high conservation value (Sesli & Denchev, 2005, 2010, Karadelev & Rusevska, 2013a,b), etc.

Conservation importance

Seven species of conservation importance (*Agaricus macrocarpus*, *Amanita caesarea*, *A. vittadinii*, *Clathrus ruber*, *Chlorophyllum agaricoides*, *Geastrum triplex*, and *Poronia punctata*) included in the Red List of Fungi in Bulgaria (Gyosheva & al. 2006) and Red Data Book of the Republic of Bulgaria (Peev et al., 2015) were recorded during the field studies (Table 1). Five of them (*Agaricus macrocarpus*, *Amanita vittadinii*, *Chlorophyllum agaricoides*, *Geastrum triplex* and *Poronia punctata*) are

new to Mt Strandzha floristic region. The species *Amanita caesarea* and *Clathrus ruber* possibly are not rare species for the country. The earlier records for each of these species are in 10 floristic regions (Denchev & Assyov, 2010; Lacheva, 2009, 2014, 2015a, Uzunov et al., 2016).

The fungi *Agaricus macrocarpus* and *Amanita vittadinii* it seems they are also not that rare species (Denchev & Assyov, 2010; Lacheva, 2006, 2011, 2012a, 2012b, 2013, 2014, 2015a,b; Lacheva & Gyosheva, 2012, Lacheva & Radoukova, 2014).

Table 1. Macromycetous species and their conservation status in Bulgaria. Legend: (EN) Endangered, (VU) Vulnerable, (NT) Near Threatened.

Species	Red List of fungi in Bulgaria (Gyosheva et al., 2006)	Red Data Book of the Republic of Bulgaria (Peev et al., 2015)
<i>Agaricus macrocarpus</i> (F.H. Møller) F.H. Møller	(EN)	(EN)
<i>Amanita caesarea</i> (Scop. : Fr.) Pers.	VU	VU
<i>A. vittadinii</i> (Moretti) Vittad.	VU	VU
<i>Clathrus ruber</i> [P. Micheli ex] Pers. : Pers.	NT	NT
<i>Chlorophyllum agaricoides</i> (Czern.) Vellinga	EN	EN
<i>Geastrum triplex</i> Jungh.	VU	VU
<i>Poronia punctata</i> (L.) Fr.	VU	VU

Other rare and noteworthy species found during this study

Other interesting species found in Mediterranean and Sub-Mediterranean plant communities of study region are the following:

(1) *Agaricus cupreobrunneus* (F.H. Moler) Pilát – rare species reported for the first time in Bulgaria from Thracian Lowland and Toundzha Hilly Country (Lacheva, 2006). Later, the same author again reports it from Sredna Gora Mt (Lacheva, 2011) and Tracian Lowland (Lacheva, 2015b). This is the first record for Mt Strandzha floristic region.

(2) *Clitopilus rhodophyllus* (Bres.) Singer. – rare species reported only once from Mt Strandzha (Denchev & Assyov, 2010). This is new localitie for Mt Strandzha floristic region.

(3) *Geastrum corollinum* (Batsch) Hollòs – rare species reportet on the fourth locality in Bulgaria. So far known from the Black Sea coast (Kuthan & Kotlaba, 1981), Mt Strandzha (Kuthan & Kotlaba, 1989) and Toundzha Hilly Country (Lacheva, 2015a).

(4) *G. pectinatum* Pers. : Pers. – reported for the fourth time in Bulgaria. So far known from the Black Sea coast (Kuthan & Kotlaba, 1981), Pirin Mts (Denchev et al., 2006 and Toundzha Hilly Country (Lacheva, 2015a).

(5) *G. striatum* Fr. – this species is perhaps more widespread, but so far it has been known only from following fourth localities: Black Sea coast (Kuthan & Kotlaba, 1981), Znepole region (Burzakov, 1932), Vitosha region (Hinkova, 1955) and Toundzha Hilly Country (Lacheva, 2015a).

(6) *G. triplex* Jungh. – this species has been reported in Bulgaria from the Black Sea coast (Kuthan & Kotlaba, 1981), Vitosha region (Hinkova, 1965), Central Rhodopi Mts (Hinkova, 1965), Toundzha Hilly Country (Lacheva, 2015a) and Pirin Mt (Gyosheva & Nedelin, 2016).

(7) *Geopora arenicola* (Lév.) Kers – this species is rare and has been reported in Bulgaria from the Northern Black Sea coast (near Galata village) (Hinkova, 1961). Later, (Assyov et al., 2012) reported the species from Thracian Plain (Besaparski Ridove) and two localities in Toundzha Hilly Country (Lacheva, 2015a);

(8) *Myriostoma coliforme* – this is a rare species on a European level and is one of the 33 fungal species listed in the proposal for inclusion of fungi in the Appendix I of the Bern Convention (Dahlberg & Croneborg, 2003; Alexov et al., 2012). It is chosen for monitoring within the frame of the National Biodiversity and Protected Areas Monitoring System (Denchev, 2006). In Bulgaria this is a

very rare species that has been found occasionally. The most recent encounter of the species dates back to 1983 (Stoichev & Dimcheva, 1988).

According to Denchev & Assyov (2010), four previous findings of the fungus are known so far from the Black Sea coast, Northeastern Bulgaria, Southern Valley of River Struma and Western Sredna Gora Mts. Later, the species is reported from Northern Pirin Mts (Blagoevgrad town and Vlahi village) (Alexov et al., 2012) and Central Rhodopes (above the Kuklen village, Plovdiv distr.) (Lacheva & Gyosheva, 2012; Lacheva, 2015b). For the last time, this species is reported from the Zlatopol village (Haskovo region), Iskar town (Pleven region) and Kozloduy town (Vratsa region) (<https://manatarka.org/myriostoma-coliforme/>).

Myriostoma coliforme has not yet been evaluated for inclusion in the Red List of Fungi in Bulgaria (Gyosheva et al., 2006), but nonetheless it is a rare species that is worthy of protection.

(9) *Psathyrella corrugis* (Pers. : Fr.) Konrad & Maubl. (= *Psathyrella gracilis* (Fr. : Fr) Quel.) – rare species, according to Denchev & Assyov (2010) four previous findings of the fungus are known so far from the Sofia region, Vitosha region, Pirin Mts, Mt Strandzha. The species has also been reported for Mt Sakar (Toundzha Hilly Country) from Lacheva (2015a). This is new records for the Mt Strandzha floristic region.

(10) *Tulostoma melanocyclum* Bres. – The species was reported from Black Sea coast and Valley of River Strouma (Denchev & Assyov, 2010) and Toundzha Hilly Country (Lacheva, 2015a). This is the first record for Mt Strandzha floristic region.

Conclusions

The literary analysis, as well as the current research on the Mediterranean and sub-Mediterranean plant communities of Mt Strandzha floristic region shows a relatively large species diversity of fungi. The following species are in the Red List of Fungi in Bulgaria and Red Data Book of the Republic of Bulgaria: *Agaricus macrocarpus*, *Amanita caesarea*, *A. vittadinii*, *Clathrus ruber*, *Chlorophyllum agaricoides*, *Geastrum triplex* and *Poronia punctata*. Ten (10) species are rare and noteworthy for the country. The fungus *Myriostoma coliforme* is rare or threatened in Bulgaria and Europe. Of the

registered species, 33 are edible wild fungi used for food by people.

In conclusion, it should be highlighted that besides being extremely important for the plant and animal conservation, Mt Strandzha is equally important for the conservation of fungal diversity. The conducted study enriches the available information on the fungal diversity not only of Strandzha Mountain, but also on the fungal diversity of the Mediterranean and sub-Mediterranean plant and mushroom communities in Bulgaria.

Targeted and systematic mycological studies are needed to establish the actual fungal diversity in the area. In the course of these studies, many new records are expected for the territory, which would enrich the mycological data for the country as a whole. Observations on the traditions and lifestyle of the local population regarding edible wild mushrooms would provide an opportunity to clarify the ethnomycological characteristics of the people in this region.

Acknowledgements

This study is financed by the European Union-NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria, project № BG-RRP-2.004-0001-C01.

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Received: 18.10.2025
Accepted: 29.11.2025