



Geliş(Received) : 05.04.2013
Kabul(Accepted): 08.10.2013

Araştırma Makalesi

Macrofungi of Burdur Province

Mehmet Halil SOLAK¹, Hakan ALLI²,
Mustafa İŞILOĞLU², Halil GÜNGÖR², Erbil KALMIŞ³

¹Program of Elementary Science Education, Faculty of Education, Muğla Sıtkı Koçman University, Kötekli, Muğla-Turkey

²Department of Biology, Faculty of Science, Muğla Sıtkı Koçman University, Kötekli, Muğla-Turkey

³Department of Bioengineering, Faculty of Engineering, Ege University, İzmir-Turkey

Abstract: In this study, an attempt has been made to determine macrofungal specimens collected from Burdur in 2006-2008. After field and laboratory studies, 35 taxa belonging to 17 families and 2 divisions were identified. 3 taxa belong to *Ascomycota* and 32 to *Basidiomycota*. Two of them; *Inocybe maculipes* J. Favre and *Tricholoma portentosum* var. *lugdunense* Bon. are new records for Turkey.

Key words: Biodiversity, macrofungi, new records, Burdur, Turkey

Burdur İlinin Makrofungusları

Özet: Çalışmada 2006-2008 yılları arasında Burdur'dan toplanan mantar örneklerinin belirlenmesi amaçlanmıştır. Arazi ve laboratuvar çalışmaları sonrasında 17 familya ve 2 bölüme ait 35 takson belirlenmiştir. Bunlardan üç tanesi *Ascomycota* bölümüne aitken 32 tanesi *Basidiomycota*'ya aittir. İki tanesi; *Inocybe maculipes* J. Favre ve *Tricholoma portentosum* var. *lugdunense* Bon Türkiye için yeni kayıttır.

Anahtar kelimeler: Biyoçeşitlilik, makrofungus, yeni kayıtlar, Burdur, Türkiye.

Introduction

Burdur is a province located in the southwestern part of Turkey, bordered Antalya to the south, Afyon, Denizli and Isparta to the north, Denizli to the west, Isparta to the east (Figure 1). Burdur has a gateway climate between Central Anatolia, Aegean and Mediterranean regions. But much more influenced by continental climate. Burdur is a natural habitat for a number of trees such as *Pinus brutia* Ten., *P. nigra* J.F.Arnold, *P. pinea* L., *Liquidambar orientalis* Mill., *Quercus* L. spp. and *Juniperus* L. spp.

There is only one study on the macrofungi of Burdur and it is about *Entoloma clypeatum* (L.) P.Kumm poisoning (İşiloğlu et al., 2011). So this

is the first study on macrofungal biodiversity of Burdur Province.

Studies on Turkish mycota are going on. However, not all of the fungal diversity growing in different parts of Turkey has been determined. In published 457 studies 2388 macromycete taxa recorded studies from Turkey until the end of 2008 (Solak et al. 2007; Sesli and Denchev 2008). During the following 5-years period, some new records have been given by Akata et al. (2011a, 2011b), Akata (2012), Akata et al. (2012), Aktaş et al. (2009), Aktaş et al. (2010), Alkan et al. (2012), Allı et al. (2011), Allı et al. (2012), Castellano and Türkoğlu (2012), Doğan and Aktaş (2010), Gücin et al. (2010), Güngör et al. (2013 a, 2013b),

Corresponding author: hgng1@gmail.com.tr



Kaşık et al. (2012), Kaya (2009a, 2009b), Kaya et al. (2010), Sesli and Helfer (2013), Solak et al. (2009), Uzun et al. (2010), Watling et al. (2010), Yaratanakul et al. (2012). With these kinds of studies, about 985 studies were done on Turkish Macromycetes, so total number stands at around 2900 taxa. About 497 studies of the total number were on macrofungal systematic.

The current study aims to contribute to the knowledge of Turkish macromycota by adding new records.

Materials and methods

The specimens were collected from different localities of Burdur Province between 2006 and 2008. The field studies were conducted mostly in autumn and spring, because of suitable climatic conditions for growth of fungi. During field studies

morphological and ecological characteristics of the macrofungi were recorded and photographed. After field studies, specimens were taken to the laboratory for further studies. Specimens were identified using the literature on macrofungi by Breitenbach and Kränzlin (1984-2000), Brensinsky and Besl (1990), Cappelli (1984), Ellis and Ellis (1990), Knudsen and Vesterholt (2008), Kränzlin (2005), Marchand (1971-1986), Moser (1983), Pacioni (1985), Phillips (2006), Riva (1988), Watling and Gregory (1987, 1989). New records were checked with the relevant literature: Allı et al. (2011), Demirel et al. (2010), Doğan et al. (2005), Doğan et al. (2012), Kaya (2009), Sesli and Denchev (2008), Solak et al. (2007), Türkoğlu ve Yağız (2012).

The identified specimens are kept at the fungarium of Muğla Sıtkı Koçman University.



Figure 1. Map of the research area



Results

In this study 35 taxa belonging to 17 families were identified. These taxa are presented with their localities, habitats, collection dates, and accession numbers. Nomenclature is given according to Index Fungorum (Accession date 18.3.2013).

List of Taxa

ASCOMYCOTA

Helvellaceae Fr.

1. *Helvella acetabulum* (L.) Quél.

Syn: *Paxina acetabulum* (L.) Kuntze

Yeşilova, Güney, Horozköy, in pine forest, 13.4.2007, *Solak* 3130. Inedible.

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

Yeşilova, Güney, Horozköy, in pine forest, 13.4.2007, *Solak* 3129; Yeşilova, near Salda lake, in pine forest, 13.4.2007, *Solak* 3138. Poisonous.

Morchellaceae Rchb.

3. *Morchella conica* Krombh

Yeşilova, near Salda lake, in pine forest, 13.4.2007, *Solak* 3136. Edible.

BASIDIOMYCOTA

Agaricaceae Chevall.

4. *Bovista plumbea* Pers.

Yeşilova, near Salda lake, in pine forest, 13.4.2007, *Solak* 2293. Edible.

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

Yeşilova, Yarışlı village, under poplar and walnut trees, 3.11.2007, *Solak* 3230; Yeşilova, Yarışlı village, under walnut trees, 25.10.2008, *Solak* 3797. Edible.

6. *Coprinopsis nivea* (Pers.) Redhead, Vilgalys & Moncalvo

Syn: *Coprinus latisporus* P.D. Ort

Yeşilova, Hacılar village, in meadows, 27.10.2006, *Solak* 2299. Inedible.

7. *Cystoderma granulosa* (Batsch) Harmaja

Syn: *Cystoderma granulosum* (Batsch) Fayod

Ağlasun, Doğandere village, in pine forest, 25.10.2008, *Solak* 3824. Inedible.

8. *Lycoperdon excipuliforme* (Scop.) Pers.

Syn: *Calvatia excipuliformis* (Pers.)

Perdeck

Yeşilova, Güney, Horozköy, in pine forest, 3.11.2007, *Solak* 3222. Edible.

9. *Lycoperdon lividum* Pers.

Yeşilova, near Salda lake, in pine forest, 13.4.2007, *Solak* 3135; Yeşilova, Güney, Horozköy, in pine forest, 3.11.2007, *Solak* 3223. Inedible.

10. *Lycoperdon pyriforme* Schaeff.

Yeşilova, Güney, Horozköy, in pine forest, 3.11.2007, *Solak* 3225. Edible.

Bolbitiaceae Singer

11. *Conocybe semiglobata* Kühner & Watling

Yeşilova, Güney, Horozköy, in pine forest, 3.11.2007, *Solak* 3227. Inedible.

Geastraceae Corda

12. *Geastrum fimbriatum* Fr.

Syn: *Geastrum sessile* Fr.

Yeşilova, Güney, Horozköy, in pine forest, 13.04.2007, *Solak* 3131. Inedible.

Gomphidiaceae Maire ex Jülich

13. *Chroogomphus rutilus* (Fr.) O.K. Miller Ağlasun, Doğandere village, in pine forest, 25.10.2008, *Solak* 3805. Edible.

Inocybaceae Jülich

14. *Inocybe maculipes* J. Favre (Figure 2)

Cap to 2 cm, hemispherical to spherical, surface dull, radially fibrillose, covered with white arachnoid veil remnants when young, later ocher-brown, center white for a long time, margin crenate. Flesh whitish, when cut slowly browning, odor spermatic, taste mild. Lamellae white, grey brown, narrowly attached edges whitish. Stipe 2.5-3 cm cylindrical, solid, surface whitish when young, later light ocher and spotting dark brown, fibrillose, apex white-pruinose. Spores elliptical to amygdaliform, smooth, yellow-brown, thick walled, 9-13 × 5-6 µm. Cystidia 50-70 × 15-20 µm, cylindrical to fusiform, with crystals. Grows in alpine pastures and meadows (Breitenbach and Kärnzlin, 2000; Moser, 1983).

Yeşilova, Güney, Horozköy, in pine forest, in meadows, 13.04.2007, *Solak* 3127. Poisonous.

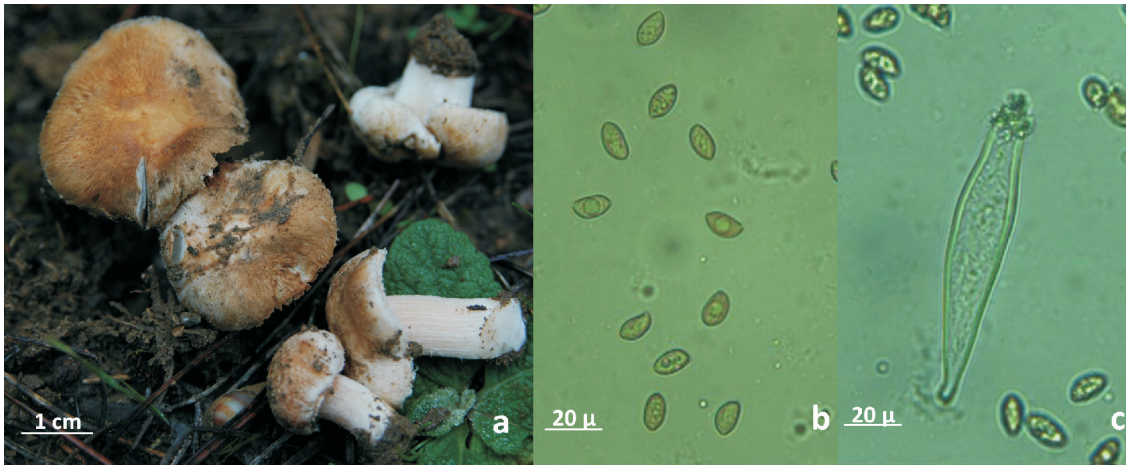


Figure 2. *Inocybe maculipes* a. Fruiting bodies b. spores c. cystidia

15. *Inocybe queletii* Konrad
Yeşilova, near Salda lake, in pine forest,
27.10.2006, *Solak* 2297. Poisonous.

Meruliaceae Rea

16. *Bjerkandera adusta* (Willd.) P. Karst.
Yeşilova, Yarışlı village, on poplar,
25.10.2008, *Solak* 3799. Inedible.

Mycenaceae Roze

17. *Mycena seynii* Quéél.
Ağlasun, Doğandere village, on pine
cones, 25.10.2008, *Solak* 3804. Inedible.

Pleurotaceae Kuhner

18. *Pleurotus ostreatus* (Jacq.) P. Kumm.
Yeşilova, Yarışlı village, on poplar,
3.11.2007, *Solak* 3228; Yeşilova, Yarışlı village,
on poplar, 25.10.2008, *Solak* 3795. Edible.

Polyporaceae Fr. ex Corda

19. *Trametes trogii* Berk.
Syn: *Funalia trogii* (Berk.) Bond. & Sing.
Center, Çine village, on poplar,
25.10.2008, *Solak* 3801; Center, Çine village, on
willow, 13.5.2007, *I8376*. Inedible.

Psathyrellaceae Vilgalys, Moncalvo
& Redhead

20. *Psathyrella candolleana* (Fr.) Maire
Yeşilova, Yarışlı village, under walnut
trees, 3.11.2007, *Solak* 3229. Inedible.

Rhizopogonaceae Gäum. & C.W. Dodge

21. *Rhizopogon luteolus* Fr.
Yeşilova, near Salda lake, in pine forest,
27.10.2006, *Solak* 2292. Edible.

22. *Rhizopogon roseolus* (Corda) Th. Fr
Ağlasun, Doğandere village, in pine
forest, 25.10.2008, *Solak* 3818. Edible.

Russulaceae Lotsy

23. *Lactarius deliciosus* (L.) Gray
Ağlasun, Doğandere village, in pine
forest, 25.10.2008, *Solak* 3808. Edible.

24. *Lactarius deterrimus* Gröger

Ağlasun, Yazı village, in pine forest,
25.10.2008, *Solak* 3803. Edible.

Sclerodermataceae Corda

25. *Pisolithus arhizus* (Scop.) Rauschert
Yeşilova, Güney, Horozköy, in pine forest,
25.10.2008, *Solak* 3788; Yeşilova, near Salda
lake, in pine forest, 25.10.2008, *Solak* 3790.
Inedible.

Suillaceae Besl & Bresinsky

26. *Suillus bellini* (Inzenga) Watling
Ağlasun, Doğandere village, in pine
forest, 25.10.2008, *Solak* 3816. Edible.

27. *Suillus granulatus* (L.) Roussel

Ağlasun, Doğandere village, in pine
forest, 25.10.2008, *Solak* 3820. Edible.

Tricholomataceae R. Heim

28. *Clitocybe vermicularis* (Fr.) Quéél
Yeşilova, near Salda lake, in pine forest,
13.4.2007, *Solak* 3137. Inedible.

29. *Lepista nuda* (Bull.) Cooke

Yeşilova, Güney, Horozköy, in pine forest,
13.4.2007, *Solak* 3132. Edible.



30. *Melanoleuca cognata* var. *cognata* (Fr.) Konrad & Maubl.

Yeşilova, Güney, Horozköy, in pine forest, 13.4.2007, *Solak* 3128. Edible.

31. *Melanoleuca melaleuca* (Pers.) Murrill

Yeşilova, near Salda lake, in pine forest, 13.4.2007, *Solak* 3134. Edible.

32. *Melanoleuca paedida* (Fr.) Kühner & Maire

Yeşilova, Yarışlı village, in meadowss, 3.11.2007, *Solak* 3231. Edible.

33. *Tricholoma fracticum* (Britzelm.) Kreisel

Ağlasun, Doğandere village, in pine forest, 25.10.2008, *Solak* 3814. Inedible.

34. *Tricholoma portentosum* var. *lugdunense* Bon. (Figure 3)

Fruiting body 6-8 cm, convex-wavy, viscid, cuticle silky. Lamellae white with light

yellow reflection. Stipe cylindrical, bent, solid. Odor and taste farinaceous. Spores subglobose to elliptical, hyaline, $5.5-6.5 \times 4.5-5 \mu\text{m}$. Specimen is separated from *Tricholoma portentosum* (Fr.) Quel with white and yellow colours of pileus, especially toward the disc. Also cap cuticle completely or almost completely devoid of black fibrils (Riva, 1988).

Burdur –Isparta way 5. Km, in *Cedrus* forest, 21.4.2006. *Solak* 2107b. Unknown.

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

Yeşilova, near Salda lake, in pine forest, 21.4.2006, *Solak* 2106; Burdur –Isparta way 5. Km, in *Cedrus* forest, 21.4.2006. *Solak* 2107a; Yeşilova, near Salda lake, in pine forest, 27.10.2006, *Solak* 2289. Edible.



Figure 3. *Tricholoma portentosum* var. *lugdunense* a. Fruiting bodies b. spores



Discussion and conclusion

In this study, 35 taxa belonging to 17 families and 2 division were identified. 3 taxa belong to Ascomycota and 32 to Basidiomycota. The distribution of the taxa and their families is as follows: *Helvellaceae* 2, *Morchellaceae* 1, *Agaricaceae* 7, *Bolbitiaceae* 1, *Geastraceae* 1, *Gomphidiaceae* 1, *Inocybaceae* 2, *Meruliaceae* 1, *Mycenaceae* 1, *Pleurotaceae* 1, *Polyporaceae* 1, *Psathyrellaceae* 1, *Rhizopogonaceae* 2, *Russulaceae* 2, *Sclerodermataceae* 1, *Suillaceae* 2 and *Tricholomataceae* 8. Most of the determined species belong to the families *Tricholomataceae* (22.8%) and *Agaricaceae* (20%).

Also 18 of the determined taxa are edible, 12 are inedible, 3 are poisonous and 1 unknown.

As a result, the number of taxa reported from earlier researchers is 1. We have added 35 taxa. Thus, the number of total species reached 36 for Burdur. All of the given families were found for the first time in Burdur. However *Inocybe maculipes* and *Tricholoma portentosum* var. *lugdunense* are new records for Turkey. This study represents significant contribution to the knowledge of Turkish and Burdur's mycota.

Acknowledgements

We would like to thank TÜBİTAK (the Scientific and Technical Research Council of Turkey) for supporting this project (TBAG-104T236) financially.

References

- Akata I., Halıcı M.G., Uzun Y., *Additional macrofungi records from Trabzon province for the mycobiota of Turkey*, Turk J Bot., 35:309-314(2011a).
- Akata I., Kaya A., Uzun Y., *New Additions to Turkish Pyronemataceae*, Biological Diversity and Conservation, 4(1): 171-174(2011b).
- Akata I., Kaya A., Uzun Y., *New Ascomycete records for Turkish macromycota*, Turk J Bot., 36:420-424(2012).
- Akata I., *Strobilomyces strobilaceus (Scop.) Berk. (Boletaceae Chevall.) a new genus record for Turkish mycobiota*, Biological Diversity and Conservation, 5(1): 75-77(2012).
- Aktaş S., Öztürk C., Kaşık G., Doğan H.H., *New records for the Turkish macrofungi from Amasya province*, Turk J Bot 33:311-321(2009).
- Aktaş S., Kaşık G., Öztürk C., Alkan S., Çivril (Denizli) İlçesinde Belirlenen Makrofunguslar, 20. Ulusal Biyoloji Kongresi, 21-25 Haziran 2010, S. 477-478, Denizli(2010).
- Alkan N., Çolak Ö.F., Yaratankul M., Güngör H., Solak M.H., *Muğla İlinden Türkiye İçin Yeni Dört Makrofungus Tür Kaydı*, 21. Ulusal Biyoloji Kongresi, 3-7 Eylül 2012, S. 1197, Bornova-İZMİR(2012).
- Allı H., Işıoğlu M., Solak M.H., *New Ascomycete records for the macrofungi of Turkey*, Turk J Bot, 35:315-318(2011).
- Allı H., Çöl B., Şen İ., *Türkiye Makrofunguslarına Kütahya Yöresinden Yeni Kayıtlar*, 21. Ulusal Biyoloji Kongresi 3-7 Eylül 2012, S. 1171-1172, Bornova-İZMİR(2012).
- Breitenbach J., Kränzlin F., *Fungi of Switzerland Vols. 1-5*. Luzerne: Verlag Mykologia(1984-2000).
- Bresinsky A., Besl H., *Colour atlas of poisonous fungi*, Wolfe Publishing Ltd. Stuttgart(1990).
- Cappelli A., *Fungi Europaei, Agaricus*, Libreria editrice Biella Giovanna. Saronno, Italy(1984).
- Castellano M.A., Türkoğlu A., *New records of truffle taxa in Tuber and Terfezia from Turkey*, Turk J Bot., 36: 295-298(2012).
- Demirel K., Erdem O., Uzun Y., Kaya A., *Macrofungi of Hatila valley national park (Artvin, Turkey)*, Turk J Bot., 34:457-465(2010).
- Doğan H.H., Öztürk C., Kaşık G., Aktaş S., *A checklist of Aphylophorales of Turkey*, Pak J of Bot., 37:459-485(2005).
- Doğan H.H., Aktaş S., *Two new Ascomycetes records from Mediterranean part of Turkey*, BioDiCon, 3(1): 83-86(2010).
- Doğan H.H., Aktaş S., Öztürk C., Kaşık G., *Macrofungi distribution of Cöcökdere Valley (Arslankoy, Mersin) Turk J Bot*, 36:83-84(2012).
- Ellis M.B., Ellis J.P., *Fungi without Gills (Hymenomycetes and Gasteromycetes)*, Chapman and Hall. London(1990).



- Gücin F., Kaya A., Soylu M.K., Uzun Y., *Picoa Vittad.*, a new truffle genus record for Turkey. *BioDiCon*, 3(3):23-25(2010).
- Güngör H., Allı H., Işıloğlu M., *Three new macrofungi records for Turkey*, *Turk J Bot*, 37: 411-413 (2013a).
- Güngör H., Işıloğlu M., Coşkun F., Yaranakul Güngör M., *Türkiye Mikotası için Üç Yeni Makrofungus Kaydı*, *Mantar Dergisi*, 4(1):7-10(2013b).
- Işıloğlu M., Baş Sermenli H., Şenol A., İşler M., *Entoloma mushroom poisonings in Mediterranean Turkey*, *Turk J Bot*, 35:247-249(2011).
- Kaşık G., Öztürk C., Aktaş S., Alkan S., *Türkiye Makrofungus Listesine İlave İki Yeni Kayıt*, 21. Ulusal Biyoloji Kongresi, 3-7 Eylül 2012, S. 1170-1171, Bornova-İZMİR(2012).
- Kaya A., *Macromycetes of Kahramanmaraş province (Turkey)*. *Mycotaxon*, 108:31-34(2009a).
- Kaya A., *Macrofungi of Huzurlu High Plateau (Gaziantep-Turkey)*, *Turk J Bot*, 33:429-437(2009b).
- Kaya A., Uzun Y., Keleş A., Demirel K. *Three coprinoid macrofungi taxa, new to Turkey*, *Turk J Bot.*, 34: 351-354(2010).
- Knudsen H., Vesterholt J., *Fungi Nordica, Nordsvamp*, Copenhagen(2008).
- Kränzlin F., *Fungi of Switzerland. Vol. 6*, Verlag Mykologia. Luzern(2005).
- Marchand A., *Champignons du nord et du midi. Vols 1-9*, Societe Mycologique des Pyrenees Mediterraneennes, Perpignan, France(1971-1986).
- Moser M., *Keys to Agarics and Boleti*, Gustav Fischer, Stuttgart(1983).
- Pacioni G., *Mushrooms and Toadstools*, MacDonald, London(1985).
- Phillips R., *Mushrooms*, Pan Macmillan Ltd., London(2006).
- Riva A., *Tricholoma (Fr.) Staude. Fungi Europaei 3*, Edizioni Candusso, Alassio(1988).
- Sesli E., Denchev CM (2008). *Checklists of the myxomycetes, larger ascomycetes, and larger basidiomycetes in Turkey*. *Mycotaxon* 106: 65-67. + [complete version, 1-145, new version uploaded in January 2013].
- Sesli E., Helfer S., *New fungal records for the Turkish Mycota from Trabzon*, *Turk J Bot.*, 37:414-417(2013)
- Solak M.H., Işıloğlu M., Kalmış E., Allı H., *Macrofungi of Turkey Checklist*, Üniversiteliler ofset, İzmir(2007).
- Solak MH, Allı H, Işıloğlu M., Kalmış E., *Some new records of Inocybe (Fr.) Fr. from Turkey*. *Turk J Bot* 33: 65-69(2009).
- Türkoğlu A., Yağız D., *Contributions to the macrofungal diversity of Uşak Province*, *Turk J Bot*, 36: 580-589(2012).
- Uzun Y., Demirel K., Kaya A., Gücin F., *Two new genus records for Turkish mycota*, *Mycotaxon*, 111:477-480(2010).
- Watling R., Gregory N.M., *British fungus flora Agaricus and Boleti 5: Strophoriaceae & Coprinaceae*, Royal Botanic Garden, Edinburgh(1987).
- Watling R., Gregory N.M., *British fungus flora. Agaricus and Boleti 6: Crepidotaceae, Pleurotaceae and other pleurotoiid agarics*, Royal Botanic Garden, Edinburgh(1989).
- Watling R., Işıloğlu M., Baş Sermenli H., *Observations on the Bolbitiaceae 31. Conocybe volviradicata sp. nov.*, *Mycotaxon*, 114:145-149(2010).
- Yaranakul M., Güngör H., Alkan N., Çolak Ö.F., Solak M.H., *Muğla İliinden Dört Yeni Cortinarius (Cortinariaceae, Basidiomycetes) Türü Kaydı*, 21. Ulusal Biyoloji Kongresi, 3-7 Eylül 2012, S. 1309, Bornova-İZMİR(2012).