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A study of wood decaying macrofungi of the western Black Sea Region, Turkey

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Abstract — This study was based on specimens of macrofungi collected on field trips to the region between 1998 and 2000. A list of 80 species belonging to *Ascomycotina* and *Basidiomycotina* has been compiled and 7 species were added to the Turkish mycoflora as new records.

Key words — lignicolous, saprophytic, parasitic

Introduction

Since the western Black Sea Region has a mild oceanic climate, wood-decaying fungi can be found throughout the year. Coniferous broad leaf forests cover large areas of the region, providing good growing conditions and substrate for wood rotting fungi. Trees growing in sheltered valleys and near streams are particularly suitable habitats for these fungi. A list of wood decaying fungi from Turkey has been published by Baytop (1994). Other studies were carried out by a number of workers in various parts of Turkey (Pilat 1932, 1933; Lohwag 1957, 1964; Selik 1973; Kotlaba 1976; Sümer 1977, 1982; Abatay 1983, 1985). One of these studies (Sümer 1982) also covered parts of the western Black Sea Region, especially Bolu district. Because of the ecological properties of the area and the scarcity of data, especially in respect of wood decaying macrofungi, we decided to carry out a detailed study to determine the occurrence and distribution of these organisms in the entire western Black Sea Region. The area consists of seven provinces (Bolu, Düzce, Karabük, Kastamonu, Sinop, Zonguldak, and Bartın; see fig. 1), and represents the largest study area of this kind in Turkey to date. It was also intended to make a contribution to the mycoflora of Turkey as a whole.

Collection localities:

Bolu:

1. Bolu; around Abant lake, 1330m; 31°18' E – 40°44' N
2. Bolu; Akçaalan village, 1000m; 31°26' E – 40°40' N
3. Bolu; Gerede, around Aktaş village, 1370-1400m; 32°20' E – 40°41' N

4. Bolu; Gölcük district, 950m; 31°37' E – 40°44' N
5. Bolu; Mengen Çubukköy village, 700-800m; 32°05' E – 40°59' N
6. Bolu; Mengen, Kıyaslar village, 700-800m; 32°05' E – 40°58' N
7. Bolu; Mengen, Dirgine forestry managements highway 4th km, 700m; 32°05' E – 40°58' N
8. Bolu; Yeniçağa, Ericek village, 1100m; 31°56' E – 40°47' N
9. Bolu; Yolçatı village, 760-800m; 31°29' E – 40°43' N
- Düzce:**
10. Düzce; Akçakoca, Çiçekpınar District, 210m; 31°07' E – 41°05' N
- Karabük:**
11. Karabük; Eflani, Yağlıca village, 880m; 32°51' E – 41°23' N
12. Karabük; Eskipazar, Imamlar village, 1000m; 32°29' E – 40°51' N
13. Karabük; Safranbolu, Akören village, 350m; 32°47' E – 41°14' N
14. Karabük; Safranbolu, Gürleyik district, 825 m; 32°42' E – 41°15' N
- Kastamonu:**
15. Kastamonu; Araç, İğdir village, 550-570m; 33°08' E – 41°14' N
16. Kastamonu; Araç, Pelitören village, 1050m; 33°19' E – 41°18' N
17. Kastamonu; Araç, Sarcılar village, 600-620m; 33°14' E – 41°11' N
18. Kastamonu; Araç, Taşpınar village, 1150m; 33°30' E – 41°17' N
19. Kastamonu; Çatalzeytin-Devrekani highway 20th km, 880m; 34°05' E – 41°49' N
20. Kastamonu; Daday, Ballıdağ mountain, 1200-1570m; 33°23' E – 41°33' N
21. Kastamonu; Daday, Ballıdağ mountain, near Senatorium, 1150m; 33°23' E – 41°31' N
22. Kastamonu-İlgaz highway 40th km, İlgaz mountain, 1650m; 33°44' E – 41°03' N
23. Kastamonu; Pınarbaşı, Karafasil village, 970m; 33°11' E – 41°34' N
24. Kastamonu; Taşköprü, Akseki village, 800-900m; 34°12' E – 41°40' N
25. Kastamonu; Taşköprü, Alamabatak village, 650m; 33°57' E – 41°29' N
26. Kastamonu; Taşköprü, Alatarla village, 650m; 34°00' E – 41°29' N
27. Kastamonu; Taşköprü, Cördük village, 640-650m; 34°15' E – 41°34' N
28. Kastamonu; Taşköprü, Elekdağı mountain, 1100m; 34°21' E – 41°26' N
29. Kastamonu; Taşköprü, near city centre, 630m; 34°13' E – 41°31' N
30. Kastamonu; Taşköprü, Tepedelik village, 740m; 34°15' E – 41°37' N
31. Kastamonu; Taşköprü, Yeniler village; 980m; 34°17' E – 41°26' N
32. Kastamonu; Bulacık village, 1100m; 33°47' E – 41°20' N
33. Kastamonu; Ümitköy village, 1100m; 33°48' E – 41°15' N
- Sinop:**
34. Sinop; Ayancık, Akgöl highway fork, 1280m; 34°38' E – 41°41' N
35. Sinop; Boyabat, Bürnük village, 1210m; 34°51' E – 41°37' N
36. Sinop; Centre, Abalı village, 30-40m; 34°59' E – 42°01' N
37. Sinop; Centre, Soğuksu village, 1240m; 34°55' E – 41°44' N
38. Sinop; Centre, Hamsilos bay, 10-20m; 35°03' E – 42°04' N
39. Sinop; Centre, Sarıkum bay, 10m; 34°55' E – 42°01' N
- Zonguldak:**
40. Zonguldak; Çaycuma, Karakoç village, 100m; 32°09' E – 41°31' N
41. Zonguldak; Devrek, Ataköy village, 380m; 31°57' E – 41°09' N
42. Zonguldak; Devrek, Ayvadere district, 300m; 31°57' E – 41°08' N
43. Zonguldak; Devrek, Gürbüzler village, 400m; 31°58' E – 41°09' N

44. Zonguldak; Ereğli- Zonguldak highway 3rd km, 80m; 31°26' E – 41°17' N
 45. Zonguldak; Esenlik picnic area, 170m; 31°48' E – 41°27' N
 46. Zonguldak; Gökçeşey, near city centre, 350m; 32°09' E – 41°18' N
Bartın:
 47. Bartın; Amasra, Kalaycı village, 200m; 32°33' E – 41°48' N
 48. Bartın-Amasra highway 3rd km, 60m; 32°20' E – 41°41' N

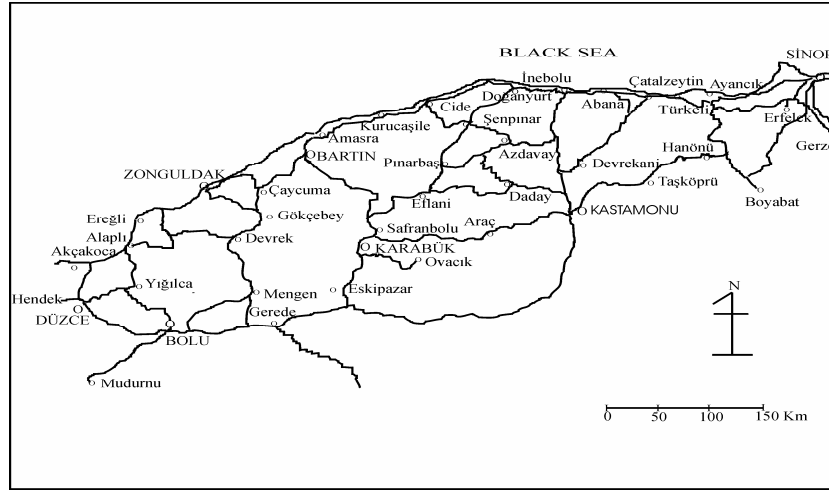


Figure 1: Map of the study area.

Materials and Methods

Specimens were collected during field work 1998-2000. The morphological properties and ecological conditions of the specimens were recorded in the field, and samples were taken to the laboratory for microscopical examination and the preparation of herbarium voucher specimens. We used the following literature for identification: Phillips (1981), Marchand (1971-1986), Breitenbach & Kränzlin (1984-1991, Michael et al. (1983-1988), and Dähncke (1993). Voucher specimens are kept at Selçuk University, Education Faculty Herbarium (KNYA).

Results

Our study recovered 80 species of wood decaying fungi. Of these 25 were recovered from coniferous trees, 51 from broadleaved trees, and 3 from either broadleaved or coniferous trees and one from litter. A total of 11 species were identified as primary parasites. Particularly rare and unusual findings were: *Hericium erinaceus*, *Trametes gibbosa*, *Crucibulum laeve*. Conversely, *Schizophyllum commune* was the most common species. *Armillaria borealis*, *Lentaria delicata*, *Pholiota lenta*, *Pluteus tricuspidatus*, *Pluteus umbrosus*, *Tremella encephala* and *Xerula pudens* are new records for the Turkish mycoflora.

LIST OF TAXA

ASCOMYCOTINA

Bisporella citrina (Batsch) Korf & S.E. Carp.: On dead wood of deciduous trees, June 1999, locality 31.

BASIDIOMYCOTINA

Agrocybe cylindracea (DC.) Maire: Parasitic on willows, June 1998 and April 1999-2000, localities 29 & 38.

Antrodia xantha (Fr.) Ryvarden: On dead wood of conifers, not common, October 1999, locality 35.

**Armillaria borealis* Marxm. & Korhonen: On wood of conifers, collected once in October 1998, locality 20.

Armillaria mellea (Vahl) P. Kumm.: On wood of conifer and broadleaved trees, very common, July, October and November 1998; November 2000, Localities 14, 20, 31, & 36.

Armillaria ostoyae (Romagn.) Herink: On pine stumps or trunks, collected once in June 1999, locality 9.

Armillaria tabescens (Scop.) Emel: On dead wood of broadleaved, common, October 1998, localities 9, 10 & 41.

Baeospora myosura (Fr.) Singer: On pine cones, November 2000, locality 21.

Calocera viscosa (Pers.) Fr.: On rotten wood of *Abies bornmuelleriana*, very common, July 1999 and November 2000, localities 4 & 20.

Creolophus cirrhatus (Pers.) P. Karst.: Collected from dead wood of *Quercus* trees, June 1999, locality 45.

Crucibulum laeve (Huds.) Kambly: On buried wood of *Abies bornmuelleriana*, rare but possibly overlooked, June 1999, locality 37.

Dacrymyces variisporus McNabb: On dead wood of *Abies bornmuelleriana*, collected once in November 1999, locality 3.

Gyromitra gigas (Krombh.) Cooke: Collected from conifer stumps. April 1999, locality 20.

Exidia glandulosa (Bull.) Fr.: On dead wood of broadleaved trees, collected once in October 1999, locality 34.

Exidia truncata Fr.: On dead stumps of *Quercus*, collected once in June 1999, locality 31.

Flammulina velutipes (Curtis) Singer: On dead wood of broadleaved trees, collected once in November 1999, locality 7.

Fomes fomentarius (L.) J. Kickx f.: Parasitic on wood of *Fagus* and *Salix*, common, perennial, localities 4, 26 & 36.

Fomitopsis pinicola (Sw.) P. Karst.: On wood of *Abies bornmuelleriana*, common, all year, locality 3.

Ganoderma adspersum (Schulzer) Donk: Parasitic on *Quercus* and *Fagus*, all year, localities 4, 36 & 38.

Ganoderma applanatum (Pers.) Pat.: Very common on stumps of *Quercus* and *Fagus*, all year, localities 14, 31, 35 & 36.

Ganoderma lucidum (Curtis) P. Karst.: On roots of broadleaved trees, all year, localities 4, 5, 14, 30, 35 & 36.

Ganoderma resinaceum Boud.: Parasitic on *Quercus* and other hard woods, collected once in May 1999, locality 17.

Gymnopilus penetrans (Fr.) Murrill: On *Abies bornmuelleriana* debris, collected once in November 1999, locality 7.

Hapalopilus rutilans (Pers.) P. Karst.: On dead wood of broadleaved trees, collected once in October 1998, locality 43.

- Hericium erinaceus* (Bull.) Pers.: A rare species collected from stumps of *Fagus*, July 1998, locality 35.
- Hypholoma capnoides* (Fr.) P. Kumm.: On conifer stumps, June 1998-1999, November 2000, localities 1, 18 & 20.
- Hypholoma fasciculare* (Huds.) P.Kumm.: Very common on stumps of conifer and broadleaved trees, localities 1, 4, 9, 10, 14 & 43.
- Hypholoma sublateritium* (Schaeff.) Quél.: Less common, on broadleaved stumps, localities 14 28 & 42.
- Inonotus hispidus* (Bull.) P. Karst.: Parasitic on trunks and branches *Fagus*, collected once in August 1999, locality 4.
- **Lentaria delicata* (Fr.) Corner: On dead branches of *Quercus*, collected once in October 1998, locality 5.
- Lenzites betulina* (L.) Fr.: Parasitic on *Quercus* and *Fagus*, localities, 4; 5; 42 & 43.
- Marasmius alliaceus* (Jacq.) Fr.: On dead branches of *Fagus*, collected once in May 1998, locality 4.
- Marasmius androsaceus* (L.) Fr.: On dead twigs of conifers, May and November 1998, localities 4 & 14.
- Meripilus giganteus* (Pers.) P. Karst.: Fr.: On willow stumps, collected once in April 2000, locality 26.
- Mycena abramsii* (Murrill) Murrill: On dead branches of *Quercus*, collected once in May 1998, locality 15.
- Mycena crocata* (Schrad.) P. Kumm.: On dead twigs of fir trees, May 1998 and November 2000, localities 4 & 20.
- Mycena galopus* (Pers.) P. Kumm.: On decaying conifer stumps, localities 1, 5, 33 & 41.
- Omphalotus olearius* (DC.) Singer: On dead stumps of *Quercus*, collected once in June 1999, locality 44.
- Oudemansiella mucida* (Schrad.) Höhn.: On dead wood of *Fagus*, collected once in June 1999, locality 36.
- Panus conchatus* (Bull.) Fr.: On trunks of *Quercus*, collected once in June 1999, locality 45.
- Perenniporia medulla-panis* (Jacq.) Donk: On dead wood of *Quercus*, June 1998 and November 1999, localities 2 & 3.
- Phellinus hartigii* (Allesch. & Schnabl) Pat.: Parasitic on *Abies bornmuelleriana* woods, not common, all year, localities 3 & 20.
- Phellinus nigricans* (Fr.) P. Karst.: On dead or severe damaged trunks of elm, collected once in July 1998, locality 36.
- Phellinus tremulae* (Bondartsev) Bondartsev & Borissov: Parasitic or saprophytic on *Quercus*, all year, collected once in June 1999, locality 12.
- Pholiota astragalina* (Fr.) Singer: On dead stumps of conifers, November 2000, localities 20 & 42.
- Pholiota aurivella* (Batsch) P.Kumm.: Parasitic on willow trees, collected once in November 1998, locality 14.
- Pholiota flavida* (Schaeff.) Singer: On dead stumps of conifers, collected from different localities, localities 1, 9 & 14.
- **Pholiota lenta* (Pers.) Singer: On dead stumps of pine trees, collected once in November 2000, locality 16.
- Pholiota tuberculosa* (Schaeff.) P. Kumm.: One collection from a dead branches of *Quercus*, in November 1999, locality 6.
- Phyllotopsis nidulans* (Pers.) Singer: On *Fagus* wood, collected once in July 1998, locality 36.
- Pleurotus ostreatus* (Jacq.) P. Kumm.: On stumps of *Abies bornmuelleriana* and *Salix* sp. woods, 1998-1999, localities, 3, 7, 14 & 29.

- Pleurotus pulmonarius* (Fr.) Quél.: On stumps of *Fagus* wood, collected once in October 1999, locality 36.
- Pluteus leoninus* (Schaeff.) P. Kumm.: One collection from a dead stump of *Fagus*, June 1999, locality 36.
- Pluteus salicinus* (Pers.) P. Kumm.: On dead willow stumps, April 2000, locality 39.
- **Pluteus tricuspoidatus* Velen.: On rotten *Pinus nigra* trunk, collected once in July 2000, locality 24.
- **Pluteus umbrosus* (Pers.) P. Kumm.: On decaying broadleaved wood, collected once in August 1999, locality 9.
- Polyporus arcularius* (Batsch) Fr.: On dead branches of *Quercus*, collected once in 1999, locality 15.
- Polyporus brumalis* (Pers.) Fr.: On dead branches of *Quercus*, 1998-1999, localities 11, 13 & 14.
- Polyporus ciliatus* Fr.: On rotten wood of broadleaved trees, June and November 1999, localities 5 & 36.
- Polyporus squamosus* (Huds.) Fr.: Parasitic on broadleaved trees, June and November 1999, localities 4 & 45.
- Polyporus varius* (Pers.) Fr.: On dead wood of *Quercus* and *Fagus*, 1998, 2000, localities 2, 3, 8, & 36.
- Pycnoporus cinnabarinus* (Jacq.) P. Karst.: On dead wood of broadleaved trees and rarely on conifers, 1998-1999, localities 4, 5, 31 & 36.
- Schizophyllum commune* Fr.: On stumps and trunks of conifer and broadleaved trees, very common, 1998-2000, localities 22, 25, 36, 38, 45 & 48.
- Sparassis crispa* (Wulfen) Fr.: On pine stumps, collected once in October 1999, locality 20.
- Steccherinum ochraceum* (Pers.) Gray: On dead wood of *Fagus*, collected once in October 1999, locality 36.
- Stereum hirsutum* (Willd.) Pers.: On branches of *Quercus*, collected once in November 1998, locality 14.
- Stereum ochraceoflavum* (Schwein.) Sacc.: On dead branches and stump of *Quercus*, November 1998 and April 2000, localities 14 & 38.
- Stereum sanguinolentum* (Alb. & Schwein.) Fr.: On dead wood of conifers, all year, localities 4, 8, 14, 30, 32 & 35.
- Thelephora spiculosa* (Fr.) Fr.: On dead twigs or leaf litter, collected once in November 2000, locality 40.
- Trametes gibbosa* (Pers.) Fr.: On dead wood of broadleaved trees, rare species collected once in October 1998, locality 43.
- Trametes hirsuta* (Wulfen) Pilát: On dead wood of on *Quercus*, all year, localities 4, 5, 27, 46 & 47.
- Trametes pubescens* (Schumach.) Pilát: On dead wood of *Fagus*, 1998, 2000, localities 2, 14, 23 & 38.
- Trametes versicolor* (L.) Lloyd: On dead wood of *Quercus* and *Fagus*, 1998-1999, throughout the year, common, localities 4, 5 & 36.
- **Tremella encephala* Willd.: On dead wood of fir trees, collected once in November 1999, locality 3.
- Tremella mesenterica* Retz.: On dead branches of *Quercus* trees, collected once in November 1999, locality 5.
- Tricholomopsis rutilans* (Schaeff.) Singer: On stumps of conifers, November 1998-1999, localities 6 & 14.
- Volvariella bombycina* (Schaeff.) Singer: On decaying *Fagus* wood, June and July 1998, localities 4 & 36.

Xerula melanotricha Dörfelt: On or near rotten stumps or roots of *Abies bornmuelleriana* and *Pinus* sp., localities 4, 20, 35 & 36.

Xerula radicata (Relhan) Dörfelt: On or near dead stumps of *Fagus*, common, localities 4, 6, 14, 19, 35, 36 & 44.

**Xerula pudens* (Pers.) Singer: On buried *Quercus* wood, May 1998 and July 1999, locality 4.

Discussion

This study recovered 80 species of wood decaying macrofungi from the western Black Sea Region of Turkey. They belong to the two divisions Ascomycotina (2 species) and Basidiomycotina (78 species). Several species were living on dead tree-stumps, trunks, branches, leaf or needle litter and are decaying them. This contributes significantly to nutrient recycling in nature. Some live as parasites on live trees and cause organic product loss and structural damage to host trees. *Armillaria mellea*, *A. ostoyae*, *A. tabescens*, *Fomes fomentarius*, *Ganoderma lucidum*, *Fomitopsis pinicola*, and *Lenzites betulina* are particularly important as parasitic species. Similar studies in neighbouring regions have shown comparable findings with the data obtained in this study. Previous to this study the following species had been reported from the area and neighbouring regions: Lohwag (1964) reported *Stereum*, *Ganoderma* and *Phellinus* species from Belgrad forest. Sümer (1982) reported *Stereum*, *Ganoderma*, *Polyporus*, *Trametes* and *Mycena* species from the western Black Sea Region as wood decaying species. Abatay (1983) recorded *Trametes*, *Polyporus* and *Stereum* species as wood parasites from the eastern Black Sea Region. He (1988) also reported some other species such as *Armillaria*, *Pholiota* and *Polyporus* species growing in different ecological conditions. Niemalâ and Uotila (1977) reported some lignicolous fungi on wood in Turkey. Allı and Işiloğlu (2000) reported 34 parasitic macrofungi in Muğla province. Although previous reports agree with our findings, they were not as detailed as our research. Furthermore, our research area is larger than that of other researchers, consequently contributing more records.

The wood decay fungi *Pleurotus ostreatus* and *P. pulmonarius* are known as edible mushrooms that are collected and consumed by local people. The other edible wood-decay fungi are not recognised or valued locally.

With this study, seven wood-decay species are added to the Turkish mycoflora as new records.

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