Introduction

The Myxomycetes are extraordinary living organisms. Members of this class produce fructifications of incredibly varied forms, colours and sizes. Therefore, many mycologists are interested in myxomycetes. Turkey is an ideal location to study myxomycetes because it has natural and profuse vegetation and macro- and microclimates. The first records of myxomycetes were by Lohwag (1957, 1964), who worked on macrofungi. Härkönen & Uotila (1983), Härkönen (1987) and Lado (1994) published new records for Turkey in subsequent years. The number of myxomycete taxa known worldwide is about 1000 (Ergül & Oran, 2005). The first compilation of studies conducted on myxomycetes in Turkey was published by Ergül & Dülger (2000) under the title "Myxomycetes of Turkey". They reported around 102 taxa of myxomycetes in their report. Later, Sesli & Denchev (2005) made a compilation of myxomycetes and macromycetes in Turkey and about 177 taxa of myxomycetes were reported.

The purpose of this study was to determine the members of Myxomycetes in Kestel forest (Kadınhanı, Konya).

Description of Research Area

Kestel forest, the study area, lies within Konya province and is bordered by the towns of Kadınhanı and Ladik-Sarayönü to the north, Derbent to the south-east and Selçuklu to the south-west. The elevation is between 1250 and 1767 m. It extends 35 km in the east-west direction and 25 km in the north-south direction. The location where the study was performed, which is mostly a rugged area, is surrounded by Cimboz Hill (1438 m), Yapraklıbafl Hill (1767 m), Kale Hill (1548 m), and Arıtafl› Hill (1753 m). The area has a semi-dry and very cold Mediterranean climate. The vegetation of the area comprises trees such as Pinus nigra J.F.Arnold, Quercus pubescens Willd. and Juniperus oxycedrus. Salix sp. and Populus sp. are found near Ketele stream.

Materials and Methods

The materials were collected from Kestel forest (Kadınhanı, Konya) during fieldwork at different times in 2003 and 2004, especially in spring and autumn months.

During the fieldwork, samples were collected from decayed tree bark, branches and logs, and the bark,
leaves and needles of living trees in the forest and on the
stream banks. It was ensured that materials that might
contain spores and plasmodium developed sporophores
through the moist chamber technique (Gilbert & Martin,
1933). Natural and other samples were dried in petri
dishes in laboratories. The microscopic (for example,
spore size and ornamentation and the morphology of
capillitium) and macroscopic (for example, the form, size
and colour of the sporophore, stalk length) properties of
all the samples were determined. Then the samples that
were made ready for identification were identified with
the aid of the taxonomic literature, namely Martin &
Stephenson & Stempen (1994), Oran & Ergül (2004),
Citation of the names of authors presented is
standardised according to the Authors of Fungal Names
(Kirk & Ansell, 1992). Afterwards, the completed
samples of myxomycetes were attached to cardboard and
kept in cardboard containers. These samples are currently
kept at Selçuk University Fungarium, Mushroom
Research and Application Centre (Konya).

Results
As a result of field and laboratory work, 32 taxa of
Myxomycetes of 11 genera were determined. The taxa
collected from the location of the study are listed below.

Myxomycetes
Ceratiomyxales
Ceratiomyxaceae
1. Ceratiomyxa fruticulosa (Müll.) T.Macbr.
Near Yavşanlı slope, alt. 1300 m, on decaying log of
Pinus nigra L., 26.10.2003, GDemirel 62; near Hasanağa
slope, on fallen barks and twigs of Pinus nigra, alt. 1300
m, 18.04.2004, GDemirel 90b,112b; Keçiyatağı slope,
ke Ketele stream on decaying log of Pinus nigra, alt.
1350 m (natural), GDemirel 134; 140; 144a; 145.
3. Cribraria cancellata (Batsch) Nann.-Bremek. var.
cancellata (Batsch) Nann.-Bremek.
Cimboz hill, on decaying wood of Pinus nigra, alt.
1350 m, 19.10.2003, GDemirel 22c; Keçiyatağı slope,
on dead trunk of Pinus nigra, alt. 1400 m, 26.06.2004,
Gdemirel 134; 140; 144a; 145.
4. Cribraria cancellata (Batsch) Nann.-Bremek. var.
fusca (Lister) Nann.-Bremek.
Cimboz hill, on decaying wood of Pinus nigra, alt.
1350 m, 19.10.2003, GDemirel 45c.
5. Cribraria intricata Schrad.
Near Hasanağa slope, on decaying log of Pinus nigra,
al. 1200 m, 18.04.2004, GDemirel 112a.
6. Cribraria vulgaris Schrad.
Near picnic area, on decaying wood of Pinus nigra, alt.
1200 m, 19.10.2003, GDemirel 21a.
Enteridiaceae
7. Lycogala epidendrum (L.) Fr.
Near picnic area, on decaying wood of Pinus nigra, alt.
1200 m (natural), 19.10.2003, GDemirel 14; near
Ketele stream on debris of Pinus nigra, alt. 1200 m
(natural), 26.10.2003, GDemirel 71; 26.06.2004,
Gdemirel 150 (natural).
Liceaceae
8. Licea minima Fr.
Keçiyatağı slope, on decaying wood of Pinus nigra, alt.
1400 m, 26.06.2004, GDemirel 129; on dead trunk of
Pinus nigra, 26.06.2004, GDemirel 150b.
Keçiyatağı slope, on decaying wood of Pinus nigra, alt.
1400 m, 26.06.2004, GDemirel 150d.
10. Licea sp.
Description: Sessile sporangia, gregarious, globose,
black and iridescent, 0.5 mm in diameter. Peridium
transparent. Spores black in mass, lilac-brown by
transmitted light, warted, 9 to 11 µm in diameter.
Near Ketele stream, on decaying wood of Pinus nigra,
al. 1200 m, 05.10.2003, GDemirel 8b.
Physarales
Physaraceae

11. *Badhamia macrocarpa* (Ces.) Rostaf.
Near Ketele stream, on decaying wood of *Pinus nigra*, alt. 1200 m, 05.10.2003, GDemirel 8a.

12. *Badhamia panicella* (Fr.) Rostaf.
Near Ketele stream, on decaying bark of *Populus* sp. L., alt. 1200 m, 19.10.2003, GDemirel 60b.

13. *Physarum auriscalpium* Cooke
Cimboz hill, on decaying log of *Pinus nigra*, alt. 1300 m, 19.10.2003, GDemirel 28.

Near Hasanağa slope, on decaying wood of *Pinus nigra*, alt. 1300 m, 19.10.2003, GDemirel 28.

Trichiales

Trichia

Near Hasanağa slope, on fallen bark and twigs of *Pinus nigra*, alt. 1300 m, 18.04.2004, GDemirel 73; GDemirel 113; GDemirel 116.

16. *Arcyria globosa* Schwein.
Near Yavşanlı slope, on decaying wood of *Pinus nigra* (natural), alt. 1300 m, 18.04.2004, GDemirel 61a.

Near Ketele stream, on fallen debris of *Pinus nigra*, alt. 1200 m (natural), 26.10.2003, GDemirel 61.

18. *Arcyria magna* Rex
Near Hasanağa slope, on decaying wood of *Pinus nigra*, alt. 1300 m (natural), 18.04.2004, GDemirel 76.

Keçiýatağı slope, on decaying log of *Pinus nigra*, alt. 1350 m (natural), 28.07.2003, GDemirel 1a; near Yavşanlı slope, near picnic area, on decaying log of *Pinus nigra*, alt. 1250 m, 05.10.2006, GDemirel 12b; 1910.2003, GDemirel 16; near Hasanağa slope, on fallen debris of *Pinus nigra*, alt. 1300 m, 18.04.2004, GDemirel 90a.

Near Yavşanlı slope, on decaying wood of *Pinus nigra*, alt. 1300 m, 19.10.2003, GDemirel 49.

21. *Arcyria stipata* (Schwein.) Lister
Near picnic area, Ketele stream, on decaying wood of *Pinus nigra*, alt. 1200 m, 26.10.2003, GDemirel 65.

Near Yavşanlı slope, picnic area, on decaying wood of *Pinus nigra*, alt. 1200 m, 19.10.2003, GDemirel 18a.

Near Ketele stream, on fallen debris of *Pinus nigra*, alt. 1200 m, 26.10.2003, GDemirel 61b.

24. *Trichia lutescens* Lister
Cimboz hill, on decaying wood of *Pinus nigra*, alt. 1350 m, 19.10.2003, GDemirel 22b, GDemirel 45a, GDemirel 58a.

Near Yavşanlı slope, on decaying wood of *Pinus nigra*, alt. 1250 m (natural), 26.10.2003, GDemirel 63; Hasanağa slope, on decaying wood of *Pinus nigra*, alt. 1300 m, 18.04.2004, GDemirel 110d.

*Description*: Sessile or occasionally short stalked sporangia, crowded together, cylindrical to ovoid, 0.5-1 mm in diameter, yellowish brown. Peridium persistent, membranous. Capillitium yellow, 4-10 (15) µm in diameter, widely spaced spiral bands, tips acute or branched and numerous free end. Spores yellow in mass, pale yellow by transmitted light, rough warted, 10 to 12 µm in diameter.

Cimboz hill, on decaying wood of *Pinus nigra*, alt. 1300 m, 19.10.2003, GDemirel 58b.

Stemonitales

Stemonitaceae

27. *Comatricha laxa* Rostaf.
Keçiýatağı slope, on decaying log of *Pinus nigra*, alt. 1350 m, 28.07.2003, GDemirel 1b.

28. *Comatricha lurida* Lister
Cimboz hill, on fallen twigs of *Salix* sp., alt. 1350 m, 19.10.2003, GDemirel 29.
Figure 1. The research area (1/250,000).
Near Hasanağa slope, on fallen bark and twigs of Pinus nigra, alt. 1300 m, 18.04.2004, GDemirel 79b; Hasanağa slope, near source, on decaying wood of Pinus nigra, alt. 1200 m, 26.06.2004, GDemirel 150c.

30. Comatricha pulchella (C.Bab.) Rostaf.
Keçiyatağı slope, on fallen debris of Pinus nigra, alt. 1230 m, 28.07.2003, GDemirel 2; Yavşanlı slope, near picnic area, on decaying log of Pinus nigra, alt. 1200 m, 05.10.2003, GDemirel 3a, GDemirel 12a; near Ketele stream, on decaying log of Pinus nigra, alt. 1200 m, 26.10.2003, GDemirel 66; near Hasanağa slope, on fallen bark and twigs of Pinus nigra, alt. 1300 m, 18.04.2004, GDemirel 79c; GDemirel 80; GDemirel 81; GDemirel 90c; Keçiyatağı slope, on decaying log of Pinus nigra, alt. 1350 m, 26.06.2004, GDemirel 126; GDemirel 141.

Near Hasanağa slope, on fallen twigs of Pinus nigra, alt. 1300 m, 18.04.2004, GDemirel 100b; GDemirel 104a; GDemirel 111.

32. Stemonitis smithii T.Macbr.
Yavşanlı slope, near picnic area, on decaying wood of Pinus nigra, alt. 1300 m, 19.11.2003, GDemirel 18b.

Discussion
The vegetation and climatic conditions of Kestel forest are favourable for the growth of myxomycetes. The list of species and the number of samples, their localities and substrates are shown in Table 1.

According to the data obtained, 32 taxa of myxomycetes belonging to 7 families and 11 genera were determined. The families with the highest number of taxa are Trichiaceae (37.5%), Stemonitaceae (18.8%) and Cribrariaceae (15.6%). These families are followed by Physaraceae (12.5%), Liceaceae (9.4%), Enteridiaceae (3.1%) and Ceratiomyxaceae (3.1%).

In conclusion, the most widespread families are Trichiaceae, Stemonitaceae and Cribrariaceae. These families constitute 71.9% of the taxa of myxomycetes in the study area.

The taxonomic states of the families of Trichiaceae and Stemonitaceae in Turkey found in other studies (Oran & Ergül, 2004; Ocak & Hasenekoğlu, 2005) show similarity to the results of our study.

There are some species that were both found growing naturally and were grown in the moist chamber, namely Ceratiomyxa fruticulosa, Arcyria globosa, Arcyria nutans, and Trichia varia. Cribraria argillacea, Lycogala epidendrum, Arcyria incarnate, and Arcyria magna were only found growing naturally on substratum. Ceratiomyxa fruticulosa, Cribraria argillacea, Arcyria nutans, and Comatrichia pulchella are the most common species observed (Table 1). Comatrichia lurida (on fallen twigs of Juniperus sp.) and Badhamia panicea (on decaying bark of Populus sp.) are observed only as single specimens (Table 1). Other taxa except for Comatrichia lurida and Badhamia panicea are observed on conifers (Table 1).

On the other hand, according to habitat, taxa of Liceales, Trichiales and Stemonitales usually grow on coniferous wood (Martin & Alexopoulos, 1969). The taxa of these order distributions show a parallelism with habitat in our research area, because the most widespread trees in Kestel forest are coniferous.

Materials were also gathered from the Kelhasan and Kale hills, which were among the stations within the study area. However, no changes were observed although the moist chamber technique was also applied to these materials.

Acknowledgement
This study was supported by the Selçuk University Scientific Research Projects (BAP) (project no: 2004/86).
Table 1. The species of Myxomycetes in the research area, their sample number, localities and substrates.

<table>
<thead>
<tr>
<th>taxa</th>
<th>number of sample</th>
<th>number of localities</th>
<th>substrates</th>
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<tr>
<td>Arcyria cinerea</td>
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<td>2</td>
<td>c, e</td>
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<td>1, 6</td>
<td>b, h</td>
</tr>
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<td>A. incarnata</td>
<td>1</td>
<td>4</td>
<td>h</td>
</tr>
<tr>
<td>A. magna</td>
<td>1</td>
<td>2</td>
<td>b</td>
</tr>
<tr>
<td>A. nutans</td>
<td>4</td>
<td>1, 2, 3</td>
<td>a, h</td>
</tr>
<tr>
<td>A. pomiformis</td>
<td>1</td>
<td>1</td>
<td>b</td>
</tr>
<tr>
<td>A. stipata</td>
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<td>b</td>
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<tr>
<td>Badhamia macrocarpa</td>
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<td>4</td>
<td>b</td>
</tr>
<tr>
<td>B. panicea</td>
<td>1</td>
<td>4</td>
<td>i</td>
</tr>
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<td>Ceratiomyxa fruticulosa</td>
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<td>b, g</td>
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<td>a</td>
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<td>C. vulgaris</td>
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<td>3</td>
<td>a</td>
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<td>2</td>
<td>b, d, e</td>
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<tr>
<td>C. pulchella</td>
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<td>1, 2, 3, 4</td>
<td>h, a, d, e</td>
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<td>Lycogala epidendrum</td>
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<td>4, 5</td>
<td>b, h</td>
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<td>4</td>
<td>b</td>
</tr>
<tr>
<td>L. minima</td>
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<td>3</td>
<td>b, g</td>
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</tr>
<tr>
<td>P. nutans</td>
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<td>Trichia sp.</td>
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<tr>
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<td>1</td>
<td>b</td>
</tr>
<tr>
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</table>

Abbreviations: Type of substrates a = coniferous decaying log, b = coniferous decaying wood, c = coniferous decaying bark, d = coniferous fallen bark, e = coniferous fallen twig, f = fallen wood, g = dead trunk, h = debris, i = poplar decaying bark, j = juniper fallen twigs; localities number 1. Yavşanlı Slope, 2. Hasanaga Slope, 3. Keçiyataçı Slope, 4. Near Ketele Stream, 5. Picnic Area, 6. Cimboz Hill.
References


