



## A new lichen record for Turkey and contributions to lichens of İğneada (Kırklareli)

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### Abstract

In this study, a list of 35 lichen taxa is reported from İğneada located in the Thrace region of Turkey in the province of Kırklareli. Among the identified taxa, 32 are epiphytic lichens collected on a variety of (11) tree species and 3 are terricolous. *Arthonia anombrophila* Coppins & P.James is a new record for Turkish lichen mycota and 13 lichen taxa are new for Kırklareli province.

**Key words:** Lichen, Epiphytic, Kırklareli, Thrace, Turkey

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### Türkiye için yeni bir liken kaydı ve İğneada (Kırklareli) likenlerine katkılar

### Özet

Bu çalışmada Türkiye'nin Trakya bölgesinde yer alan Kırklareli iline bağlı İğneada'dan kaydedilen 35 liken türünün listesi rapor edilmiştir. Tespit edilen türlerden 32 tanesi çeşitli (11) ağaç türlerinin kabukları üzerinden, 3 tanesi ise toprak üzerinden toplanmıştır. *Arthonia anombrophila* Coppins & P.James Türk liken mikotası için yeni bir kayıt olup 13 liken taksonu ise Kırklareli ilinden ilk defa kaydedilmiştir.

**Anahtar kelimeler:** Liken, Epifitik, Kırklareli, Trakya, Türkiy.

### 1. Introduction

Lichens are known as unique symbiotic associations of alga or/and cyanobacteria with fungi. Since they are slow-growing poikilohydric organisms, they may be very sensitive to microclimatic changes and may be used as long-term indicators of environmental conditions (Nash III, 2008). Fabiszewski and Szczepańska (2010) in a recent study evaluated ecological (climatic and edaphic factors) indicator values for each of 360 lichen species in Poland. Epiphytic lichens may contribute to the biological diversity of forests including species that are highly sensitive to environmental changes, especially to sulphur dioxide (Hawksworth and Rose, 1970), dust (Branquinho et al., 1999), heavy metals (Garty, 2001) and radionuclides (Feige et al., 1990). Therefore, epiphytic lichen diversity also has been used as indicator of forest health (Çobanoğlu and Sevgi, 2009).

Even though lichenological studies in Turkey in the last decades have been raised in acceleratory numbers of publications as seen in the list of Çobanoğlu (2011), in addition to the lists of John (1992, 1995), the lichen mycota has not been completed yet. Some places are still lacking data on lichen biodiversity.

In the research area, "İğneada" and the vicinity, the oldest lichen records are based on the only publication by Cobanoglu (2005), which is about the collection of H.Demiriz, in the herbarium of ISTF, including five species collected on *Fagus* and *Quercus* in the forests on the road to Demirköy-İğneada in 1958. In the province of Kırklareli, four other publications are present about lichen mycota; Szatala (1940), Türk Özdemir and Güner (1995), Özdemir Türk and Güner (1998) and Çobanoğlu (2005).

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In the present study, it is aimed to contribute data for the lichen diversity, in particularly with the epiphytic species, for the research area as well as for Turkish lichen mycota.

## 2. Materials and methods

Studying area is floodplain forests located at Demirköy-İğneada in the province of Kırklareli. February is the coldest month of the year, while the hottest month is August. The annual temperature difference is 17.7 °C. The climate can be characterized as maritime climate. The average temperature is 17.4°C within the period of vegetation (April - November), and tetraterm (May-August) is 20.5 °C. Annual rainfall is around 800 mm. While the most intense rainfall occurs in the months of October to March, more than half of the rainfall (445 mm) is during vegetation period (April - November). According to Thorntwaite evaluation the climate system of the region is characterized with the formula C2 B 'sb' 4 (Kavgacı, 2007, Kavgacı et al., 2010). The water deficit is compensated by high, plenty and continuously fed ground water in flooded forests (Pamay, 1967). According to systematics of the forest communities, 6 vegetation types were identified in İğneada (Kavgacı, 2007).

The epiphytic samples were picked on trunks and twigs of 11 tree species in 13 sites (Table 1) in the forest area on the date 21-23.06.2005. The lichen material were investigated in detailed under stereomicroscope (Olympus SZ40) taking required anatomical sections, applying spot tests with chemicals and identified by the first author using several books and keys (Brodo et al., 2001; Purvis et al., 1992; Smith et al., 2009; Wirth, 1995).

Identified lichen samples were stored with numbers GÇ.2296–GÇ.2330 in the Herbarium of Faculty of Science and Letters (MUFE) at Marmara University, and the some species duplicates in the Herbarium of Faculty of Forestry (ISTO) at İstanbul University.

Table 1. Geographic and ecological information about the lichen-collecting sites in İğneada

| Site Number | Sampled Trees and abbreviations used for the substrata   | GPS Coordinates (N=North, E=East) | Date of Collecting         | Aspect     | Altitude (m) |    |
|-------------|--|-----------------------------------|----------------------------|------------|--------------|----|
| 1           | <i>Fraxinus angustifolia</i> Vahl.<br><i>Populus alba</i> L.<br>Sandy soil                         | Fr<br>Po<br>Ss                    | 58°10'30 N - 46° 30'370' E | 21.06.2005 | South        | 3  |
| 2           | <i>Fraxinus angustifolia</i> Vahl.<br><i>Juglans regia</i> L.                                      | Fr<br>Ju                          | 58° 19'58 N - 46° 28'809 E | 21.06.2005 | North East   | 4  |
| 3           | <i>Acer trautvetteri</i> Medw.   | At                                | 58° 03'11 N - 46° 29'786 E | 21.06.2005 | East         | 10 |
| 4           | <i>Acer trautvetteri</i> Medw.<br><i>Quercus petraea</i> Liebl.                                    | At<br>Qp                          | 58° 07'44 N - 46° 29'875 E | 21.06.2005 | East         | 10 |
| 5           | <i>Quercus frainetto</i> Ten.  | Qf                                | 58° 27'46 N - 46° 27'873 E | 22.06.2005 | West         | 5  |
| 6           | <i>Fraxinus angustifolia</i> Vahl.   | Fr                                | 57° 91'96 N - 46° 35'167 E | 22.06.2005 | East         | 5  |
| 7           | <i>Acer campestre</i> L.<br><i>Fraxinus angustifolia</i> Vahl.                                     | Ac<br>Fr                          | 58° 06'27 N - 46° 39'433 E | 22.06.2005 | South East   | 5  |
| 8           | <i>Carpinus betulus</i> L.<br><i>Fraxinus angustifolia</i> Vahl.<br><i>Ulmus laevis</i> Pall.      | Ca<br>Fr<br>Ul                    | 58° 12'89 N - 46° 28'059 E | 22.06.2005 | North        | 20 |
| 9           | <i>Carpinus betulus</i> L.   | Ca                                | 57° 98'89 N - 46° 31'728 E | 22.06.2005 | North West   | 25 |
| 10          | <i>Quercus petraea</i> Liebl.  | Qp                                | 58° 11'17 N - 46° 26'875 E | 23.06.2005 | West         | 55 |
| 11          | <i>Acer campestre</i> L.<br><i>Fraxinus angustifolia</i> Vahl.<br><i>Quercus frainetto</i> Ten.    | Ac<br>Fr<br>Qf                    | 58° 22'75 N - 46° 38'766 E | 23.06.2005 | South East   | 5  |
| 12          | <i>Acer campestre</i> L.<br><i>Carpinus betulus</i> L.<br><i>Fraxinus angustifolia</i> Vahl.       | Ac<br>Ca<br>Fr                    | 57° 99'27 N - 46° 34'357 E | 23.06.2005 | East         | 5  |
| 13          | <i>Alnus glutinosa</i> (L.) Gaertner<br><i>Fraxinus angustifolia</i> Vahl.<br><i>Salix alba</i> L. | Al<br>Fr<br>Sa                    | 58° 18'39 N - 46° 30'030 E | 23.06.2005 | North East   | 3  |

## 3. Results

The list of identified lichens cites 35 taxa in 20 genera, sampled on mainly tree substrata in order to contribute lichen records from the research area, in alphabetical order in the section 3.1. New records for the province of Kırklareli are signified with plus sign (+) and for Turkey with an asterisk (\*) in the list. Names of the lichen taxa were followed by the author names, collecting site numbers with abbreviated names of substrata in parenthesis. The full names of tree substrata and the abbreviations used for substrate types of the epiphytic taxa in the collecting sites are shown in Table 1. In addition, for those lichens having an earlier record in Kırklareli province in the other four papers, citations are also specified under each taxon in the list of lichen taxa.

Nomenclature mainly follows Index Fungorum (www.indexfungorum.com). Author names are abbreviated according to Brummitt and Powell (1992).

### 3.1. List of Lichen Taxa

1. *Anaptychia ciliaris* (L.) Körb. 6(Fr), 8(Fr). (Özdemir Türk and Güner, 1998; Szatala, 1940; Türk Özdemir and Güner, 1995)
2. \**Arthonia anomobrophila* Coppins & P.James 4 (Qp), 6 (Fr).
3. +*Arthonia atra* (Pers.) A.Schneid. 1(Fr), 2(Fr), 4(At), 6(Fr), 7(Ac, Fr), 8(Ca, Fr), 9(Ca), 11(Ac), 12(Ac, Fr).
4. +*Arthonia cinnabarina* (DC.) Wallr. 8(Fr).
5. +*Bacidia biatorina* (Körb.) Vain. 8(Ca), 12(Fr).
6. +*Bacidia laurocerasi* (Delise ex Duby) Zahlbr. 7(Fr), 8(Fr), 9(Ca), 11(Fr), 12(Fr).
7. +*Bacidia rosella* (Pers.) De Not. 1(Fr), 9(Ca).
8. +*Bacidia rubella* (Hoffm.) A.Massal. 1(Fr), 2(Fr), 5(Qf), 7(Ac, Fr), 8(Fr), 12(Ac, Fr), 13(Fr).
9. +*Caloplaca flavorubescens* (Huds.) J.R. Laundon 2(Fr).
10. *Cetraria aculeata* (Schreb.) Fr. 1(Ss). (Özdemir Türk and Güner, 1998)
11. +*Cladonia convoluta* (Lam.) Cout. 1(Ss).
12. *Cladonia rangiformis* Hoffm. 1(Ss). (Özdemir Türk and Güner, 1998; Szatala, 1940; Türk Özdemir and Güner, 1995)
13. *Evernia prunastri* (L.) Ach. 3(At), 4(Qp), 5(Qf), 11(Fr, Qf). (Çobanoğlu, 2005; Özdemir Türk and Güner, 1998; Szatala, 1940; Türk Özdemir and Güner, 1995)
14. *Flavoparmelia caperata* (L.) Hale 4(Qp), 5(Qf), 11(Qf). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
15. *Lecanora argentata* (Ach.) Malme 2(Fr). (Çobanoğlu, 2005)
16. *Lecanora carpinea* (L.) Vain. 8(Ca), 9(Ca), 12(Ca). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
17. *Lecanora chlarotera* Nyl. 1(Fr), 6(Fr), 7(Fr), 8(Ca, Fr), 10(Qp). (Türk Özdemir and Güner, 1995)
18. +*Lecanora saligna* (Schrad.) Zahlbr. 4(Qp), 5(Qf).
19. *Lecidella elaeochroma* f. *elaeochroma* (Ach.) M.Choisy 5(Qf), 8(Ca), 9(Ca), 10(Qp), 11(Fr, Qf), 12(Ca). (Çobanoğlu, 2005; Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
20. *Melanohalea exasperatula* (Nyl.) O.Blanco, A.Crespo, Divakar, Essl., D.Hawksw. & Lumbsch 3(At), 4(At), 8(Ca), 9(Ca), 11(Fr). (Özdemir Türk and Güner, 1998)
21. *Parmelia sulcata* Taylor 3(At), 4(At), 5(Qf), 8(Ca), 11(Fr, Qf), 13(Fr). (Çobanoğlu, 2005; Özdemir Türk and Güner, 1998; Szatala, 1940; Türk Özdemir and Güner, 1995)
22. *Pertusaria amara* f. *amara* (Ach.) Nyl. 6(Fr), 8(Fr). (Türk Özdemir and Güner, 1995)
23. *Pertusaria albescens* var. *albescens* (Huds.) M.Choisy & Werner 3(At), 4(At), 8(Ca, Fr). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
24. +*Pertusaria leioplaca* DC. 7(Fr), (Ca).
25. *Phaeophycia orbicularis* (Neck.) Moberg 1(Fr), 2(Fr), 3(Ac), 7(Fr). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
26. +*Phlyctis agelaea* (Ach.) Flot. 3(At), 7(Ac, Fr), 8(Ca, Fr), 9(Ca), 11(Ac, Q), 12(Ac, Ca, Fr).
27. *Physcia adscendens* (Th.Fr.) H.Olivier 1(Fr), 2(Fr), 5(Qf), 8(Ca, Fr), 9(Ca), 10(Qp), 11(Ac), 12(Ac, Fr), 13(Fr). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
28. *Physcia aipolia* (Ehrh. ex Humb.) Fuernr. 1(Fr), 5(Qf), 8(Fr), 12(Fr). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
29. *Physconia grisea* (Lam.) Poelt 1(Fr), 11(Qf), 12(Fr). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
30. +*Ramalina canariensis* J. Steiner 2(Fr), 6(Fr).
31. *Ramalina farinacea* (L.) Ach. 1(Fr), 2(Fr), 3(At), 4(At, Qp), 5(Qf), 6(Fr), 7(Fr), 8(Ca, Fr), 9(Ca), 10(Qp), 11(Ac, Fr, Qf), 12(Ac, Ca, Fr). (Çobanoğlu, 2005; Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
32. *Ramalina fastigiata* (Pers.) Ach. 12(Fr). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
33. *Ramalina fraxinea* (L.) Ach. 7(Fr). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
34. *Tephromela atra* var. *atra* (Huds.) Hafellner 4(At). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)
35. *Xanthoria parietina* (L.) Th.Fr. 2(Fr), 5(Qf), 6(Fr), 8(Fr), 11(Fr), 12(Fr). (Özdemir Türk and Güner, 1998; Türk Özdemir and Güner, 1995)

## 4. Conclusions and discussion

İğneada floodplain forests and the vicinity with rich ecosystem diversity need exhaustive investigation on the vegetation which is especially important for ecosystem-reliant management (Kavgacı, 2007). Consequently it is valuable to define diversity of lichens enrich cryptogamic flora of the area.

The diversity of epiphytic lichens is quite rich for such a small area, with 32 lichen taxa reported on 11 tree species, in addition to 3 terricolous taxa collected somehow in the research area. The identified lichens are represented with 18 crustose, 9 fruticose and 8 foliose morphological forms. *Arthonia anomobrophila* Coppins & P.James collected on *Q. petraea* and *F. angustifolia* is a new record for Turkish lichen mycota. In addition, 13 lichen taxa, *Bacidia* genus (4 species), *Arthonia cinnabarina*, *Caloplaca flavorubescens*, *Cladonia convoluta*, *Lecanora saligna*, *Pertusaria leioplaca*, *Phlyctis agelaea* and *Ramalina canariensis* are new to the province of Kırklareli, recorded for the first time in this study.

As an unusual case for substrate preference of the crustose lichen species *Tephromela atra* var. *atra* (Huds.) Hafellner, which is usually grow on siliceous rocks, it is collected on bark of *A. trautvetteri* in the research area.

*Arthonia atra*, *Bacidia rubella*, *Phlyctis agelaea*, *Physcia adscendens* and *Ramalina farinacea* are common and very frequent on many tree species in the area.

When the distribution of number of lichen species into the sampled tree species were considered, it is obvious that the richest tree is *F. angustifolia* with the highest lichen diversity and is followed by *C. betulus* and *Q. frainetto* (Figure 1). It was reported by Oran and Öztürk (2011) that a relatively higher numbers of epiphytic lichens occurred on *Q. frainetto* and *Q. petraea* among 10 species of *Quercus* in the Marmara region. Those trees of all deciduous species bear different number of lichens probably due to having different properties in microenvironment, in bark scaling, in fungal infection and invertebrate grazing, in addition to other environmental circumstances in macroenvironment (illumination). The lichen diversity was significantly correlated with the presence of old broad-leaved trees in habitat variables that indicate occurrence of natural forest conditions and also factors of stand and site in forests (Coppins and Coppins, 2002).

The epiphytic lichen diversity of the research area is reported for the first time in the present paper. The presented data is pretty important to save lichen database for conservation of the species and for monitoring environmental changes in future, as well.

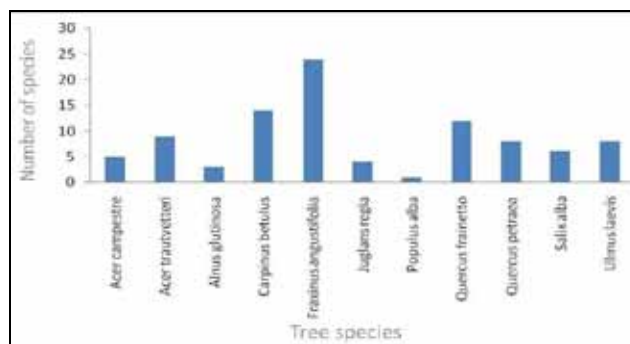


Figure 1. Distribution of number of lichen species into sampled trees species.

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