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Lichen Species in the North of Karacabey County, Bursa Province, Turkey

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Abstract: A total of seventy eight lichen species, which belongs to twenty families in *Ascomycotina*, are listed for Karacabey county, Bursa Province. 28 of which are new records for Bursa province. In addition the distribution and substrata of these species are given.

Key Words: Lichen, Flora, Karacabey, Bursa, Turkey

Bursa İli (Türkiye) Karacabey'in Kuzeyinde Tespit Edilen Liken Türleri

Özet: Bursa ili Karacabey yöresinde yapılan bu çalışmada *Ascomycotina* sınıfı içerisinde 20 familyaya ait 78 liken türü tespit edilmiştir. Bunların 28'i Bursa için yeni kayıttır. Tespit edilen türlerin yayılış alanları ve substratları da verilmiştir.

Anahtar Sözcükler: Liken, Flora, Karacabey, Bursa, Türkiye.

Introduction

The interest in this important plant section of lichens has been increasing steadily because of lichens' potential application as a bioindicator for air pollution (1-3).

Distribution of lichens in Turkey is still largely unknown since research on the subject has not been extensive.

The studies on lichens in Bursa were performed by foreign researchers for the first time (4-6). Öztürk, Özdemir and Güvenç further extended the studies on lichens in Bursa (7-9). Pisut, in his study in 1970, reported a few lichen species for Karacabey (10).

Hence this paper is aimed to be a supplementary work to the investigations done for Lichen Flora of Turkey.

Except Taşlık, Çarık and Kulakpınarı, the whole study area is completely covered by dense forests from almost sea level to the summit of the mountains, the vegetation types seen in the forests are dominated by *Carpinetum*, *Castanetum*, *Pinetum* and *Quercetum* (11).

In Taşlık the prevailing geographical feature was observed to be a rocky ground with very little vegetation. On the other hand in Çarık and Kulakpınarı Macchie was only vegetation mostly seen during the investigation.

For all stations in the habitated areas at low altitudes there are agricultural fields located around the main roads. The soil type in this region was observed to be calcareous and siliceous rock.

Materials and Methods

The samples were collected between 05.02.1996-13.02.1997 from 8 different stations in the north of Karacabey county, Bursa Province (Table 1).

The study area is situated between lat 40°15'00"-40°25'57" N and long 28°18'00"-28°27'00" E (Figure 1).

After giving a collection number to each one of the samples collected, they were stored by putting them into paper purses and envelopes.

A stereo microscope, light microscope, and a color identification method using various reactives and flora books were used in the identification of the samples (12-14).

After being identified, the lichen species as herbarium specimens were placed in the herbarium of the Biology Department, Fatih Education Faculty, Karadeniz Technical University.

Results

A total of seventy-eight lichen species belonging to the twenty families in *Ascomycotina* were defined. 28 of which are new records for Bursa province.

An asterisk (*) is indicated the new record for Bursa province.

Table 1. Localities

1. Boğazköy, 02.02.1997, 08.02.1997, 09.02.1997, 10.02.1997, 40°22'56" N 28°25'40" E, 05-25 m.
2. Taşlık, 05.02.1996, 13.02.1996, 05.02.1997, 13.02.1997, 40°15'30" N 28°22'20" E, 05-25 m.
3. Kulakpınarı, 17.02.1996, 28.04.1996, 24.08.1996, 26.08.1996, 27.01.1997, 40°17'50" N 28°21'30" E, 05-25 m.
4. Çarık, 17.02.1996, 24.08.1996, 27.01.1997, 40°17'00" N 28°23'35" E, 05-25 m.
5. Akçasusurluk, 18.02.1996, 29.04.1996, 03.02.1997, 40°18'15" N 28°24'18" E, 05-25 m.
6. Bayramdere, 19.02.1996, 18.08.1996, 20.08.1996, 21.08.1996, 22.08.1996, 25.08.1996, 27.08.1996, 28.01.1997, 07.02.1997, 08.02.1997, 11.02.1997, 40°23'00" N 28°22'12" E, 05-25 m.
7. Yeniköy, 17.08.1996, 23.08.1996, 29.01.1997, 04.02.1997, 06.02.1997, 40°24'25" N 28°21'27" E, 05-25 m.

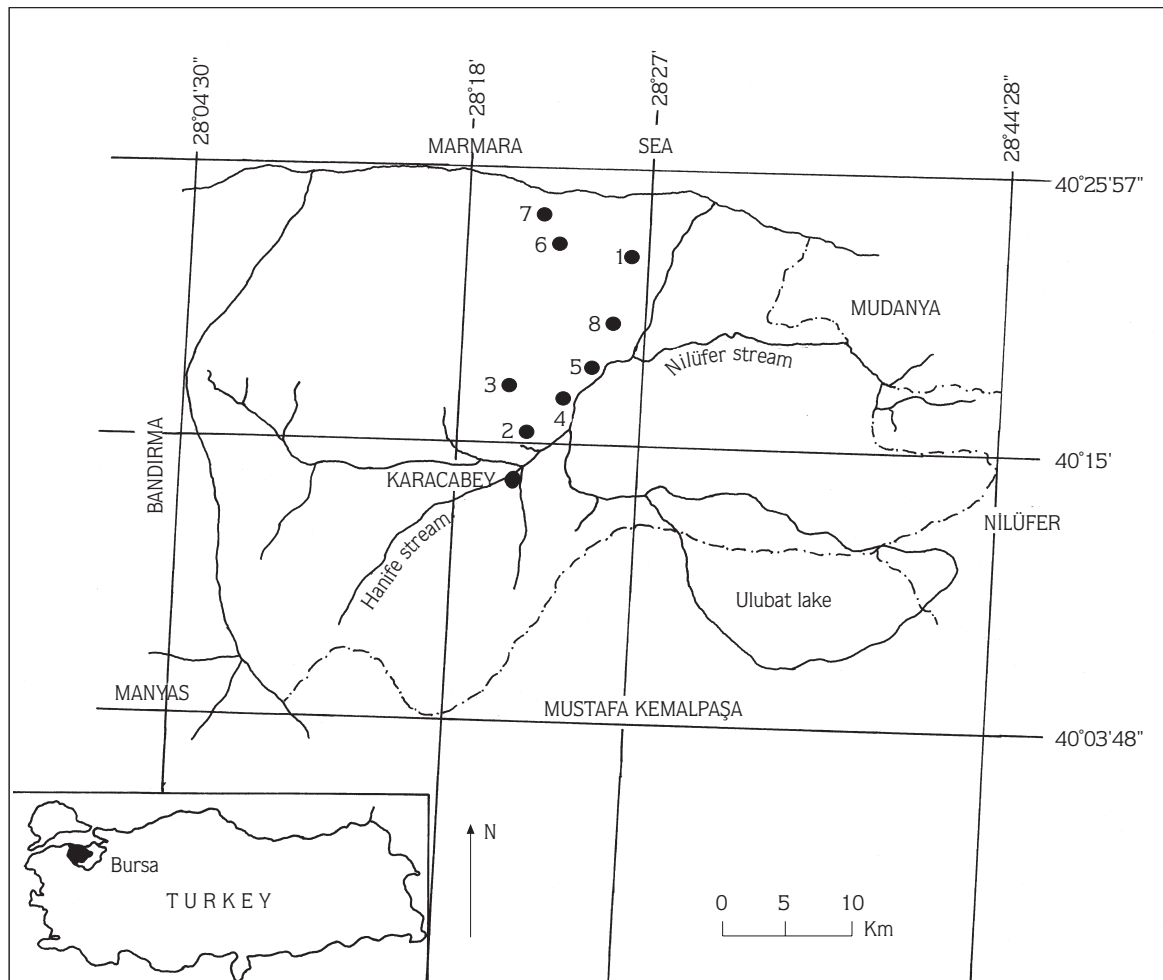


Figure 1. Study area

LIST OF TAXA

- * *Acarospora fuscata* (Nyl.) Arnold
Taşlık, 05.02.1997, 07 m., on siliceous rock. Yazıcı 0718.
- Aspicilia caesiocinerea* (Nyl. ex Malbr.) Arnold
Kulakpınarı, 24.08.1996, 15 m., on siliceous rock; Çarık, 17.02.1996, 15 m., on calcareous rock. Yazıcı 0701.
- Aspicilia calcarea* (L.) Mudd.
Taşlık, 05.02.1997, 07 m., on calcareous rock; Ekmekçi, 07.02.1996, 15 m., on calcareous rock. Yazıcı 0707.
- Aspicilia cinerea* (L.) Körb.
Kulakpınarı, 26.08.1996, 13 m., on siliceous rock. Yazıcı 0709.
- Aspicilia contorta* (Hoffm.) Krempelh.
Kulakpınarı, 24.08.1996, 13 m., on siliceous rock. Yazıcı 0719.
- * *Caloplaca flavescens* (Huds.) J.R. Laundon
Taşlık, 05.02.1996, 10 m., on calcareous rock; Kulakpınarı, 27.01.1997, 13 m., on calcareous rock; Ekmekçi, 07.02.1997, 10 m., on calcareous rock. Yazıcı 0702.
- Caloplaca flavovirescens* (Wulfen) Dalla Torre & Sarnth
Bayramdere, 11.02.1997, 20 m. on siliceous rock; Taşlık, 05.02.1996, 15 m., on siliceous rock. Yazıcı 0703.
- Caloplaca holocarpa* (Hoffm.) Wade
Taşlık, 05.02.1996, 10 m., on calcareous rock. Yazıcı 0710.
- * *Caloplaca xantholyta* (Nyl.) Jat.
Taşlık, 05.02.1996, 07 m., on calcareous rock. Yazıcı 0792.
- Candelariella aurella* (Hoffm.) Zahlbr.
Çarık, 17.02.1996, 13 m., on calcareous rock; Kulakpınarı, 24.08.1996, 15 m., on calcareous rock; Bayramdere, 18.08.1996, on siliceous rock; Yeniköy, 17.08.1996, 20 m., on calcareous rock; Boğazköy, 02.02.1997, 15 m., on siliceous rock. Yazıcı 0724.
- Candelariella coralliza* (Nyl.) H. Magn.
Bayramdere, 27.08.1996, 25 m., on siliceous rock; Çarık 27.01.1997, 14 m., on siliceous rock; Yeniköy, 04.02.1997, 22 m., on siliceous rock; Akçasusurluk, 03.02.1997, 18 m., on siliceous rock. Yazıcı 0715.
- Candelariella vitellina* (Hoffm.) Müll. Arg
Taşlık, 05.02.1996, 12 m., on siliceous rock; Akçasusurluk, 18.02.1996, 17 m., on calcareous rock; Ekmekçi 07.02.1997, 13 m., on siliceous rock. Yazıcı 0721.
- * *Cetrelia olivetorum* (Nyl.) W. Club. & C. Culb.
Bayramdere, 21.08.1996, 20 m., on mosses, Yazıcı 0770.
- * *Cladonia bellidiflora* (Ach.) Schear.
Bayramdere, 20.08.1996, 20 m., on soil. Yazıcı 0784.
- * *Cladonia cervicornis* (Ach.) Flot.
Bayramdere, 18.08.1996, 20 m., on mosses; Ekmekçi, 15 m., 17.02.1997, on mosses; Taşlık, 05.02.1997, 07 m., on mosses. Yazıcı 0786.
- Cladonia chlorophaea* (Flörke ex Somm.) Spreng.
Bayramdere, 11.02.1997, 20 m., on soil. Yazıcı 0722.
- * *Cladonia coccifera* (L.) Willd.
Bayramdere, 20.08.1996, 20 m., on soil. Yazıcı 0787.
- Cladonia fimbriata* (L.) Fr.
Bayramdere, 20.08.1996, 20 m., on soil. Yazıcı 0799.
- * *Cladonia floerkeana* (Fr.) Flörke
Bayramdere, 20.08.1996, 20 m., on soil. Yazıcı 0791.
- Cladonia foliacea* (Huds.) Willd.
All stations except agricultural and settlement area, 07-25 m., on soil and mosses. Yazıcı 0704.
- Cladonia pyxidata* (L.) Hoffm.
Bayramdere, 08.02.1997, 10-25 m., on soil; Boğazköy, 10.02.1997, 17-20 m., on soil; Yeniköy, 23.08.1996, 13-17 m., on soil; Ekmekçi, 07.02.1997, 15 m., 20 m., on soil Yazıcı 0706.
- Cladonia rangiformis* Hoffm.
All stations except agricultural and settlement areas, 07-25 m., on soil and mosses. Yazıcı 0705.
- * *Cladonia subcervicornis* (Vain.) Kernst.
Bayramdere, 18.08.1996, 20 m., on mosses and soil; Kulakpınarı, 24.08.1996, 15 m., mosses; Taşlık, 05.02.1997, 07 m., on mosses and soil; Yeniköy, 23.08.1996, 13-17 m., on soil and mosses; Ekmekçi, 07.02.1997, 15 m., on soil and mosses. Yazıcı 0790.
- * *Collema auriforme* (With.) Coppins & J.R. Laundon
Taşlık, 13.02.1997, 07 m., on soil; Çarık, 17.02.1996, 13 m., on soil; Akçasusurluk, 29.04.1996, 10 m., on soil. Yazıcı 0717.
- * *Collema cristatum* (L.) Weber ex Wigg.
Taşlık, 13.02.1996, 07 m., 10 m., on calcareous rocks. Yazıcı 0718.
- * *Collema flaccidum* (Ach.) Ach.
Bayramdere, 18.08.1996, 20 m., on damp siliceous rock. Yazıcı 0783.
- * *Diploschistes caesioplumbeus* (Nyl.) Vainio
Taşlık, 05.02.1997, 07 m., on siliceous rock. Yazıcı 0789.
- * *Diploschistes muscorum* (Scop.) R. Sant.
Kulakpınarı, 28.04.1996, 15 m., on soil. Yazıcı 0728.
- Diploschistes ocellatus* (Vill.) Norman
Taşlık, 13.02.1997, 07 m., on siliceous rock. Yazıcı 0720.
- Diploschistes scruposus* (Schreber) Norman
Çarık, 27.01.1997, 13 m., on siliceous rock; Kulakpınarı, 28.04.1996, 13 m., on siliceous rock; Bayramdere, 19.02.1997, 17

m., on siliceous rock; Ekmekçi, 07.02.1997, 10 m., on calcareous rock; Yeniköy, 23.08.1996, 15 m., on calcareous rock. Yazıcı 0712.

Evernia prunastri (L.) Ach.

Kulakpınarı, 28.04.1996, 15 m., on *Quercus sp.*; Bayramdere, 11.02.1997, 20 m., on calcareous rock and *Castanea sp.*; Boğazköy, 10.02.1997, 17 m., on *Castanea sp.* and *Quercus sp.*; Ekmekçi, 20.08.1996, 15 m., on *Quercus sp.* Yazıcı 0734.

Hypogymnia physodes (L.) Nyl.

Bayramdere, 11.02.1997, 20 m., on mosses. Yazıcı 0745.

Hypogymnia tubulosa (Schaerer) Havaas

Bayramdere, 11.02.1997, 20 m., on mosses; Boğazköy, 10.02.1997, 18 m., on mosses. Yazıcı 0730.

Lacanora campestris (Schaer.) Hue

Bayramdere, 11.02.1997, 20 m., on *Castanea sp.*, *Tilia sp.* and *Quercus sp.*; Çarık, 24.08.1996, 15., on calcareous rock; Yeniköy, 17.08.1996, 20 m., on *Castanea sp.*, Ekmekçi, 07.02.1997, 20 m., on *Quercus sp.* Yazıcı 0759.

Lacanora dispersa (Pers.) Sommerf.

Taşlık, 05.02.1997, 07 m., on calcareous rock. Yazıcı 0795.

Lacanora muralis (Schreber) Rabenh.

All stations, 7-25 m., on calcareous rocks. Yazıcı 0741.

* **Lacanora pulicaris** (Pers.) Ach.

Bayramdere, 20.08.1996., 20 m., on *Tilia sp.* Yazıcı 0800.

Lecidella elaeochroma (Ach.) Hazsl.

Bayramdere, 11.02.1997, 17 m., on *Castanea sp.*; Boğazköy, 10.02.1997, 17 m., on *Castanea sp.* and *Tilia sp.*; Ekmekçi, 07.02.1997, 17 m., on *Tilia sp.* Yazıcı 0742.

* **Lepraria incana** (L.) Ach.

Çarık, 24.08.1996, 15 m., on *Quercus sp.*, Bayramdere, 19.02.1996, 16 m., on *Quercus sp.* and calcareous rock; Akçasusurluk, 29.04.1996, 15 m., on

calcareous rock; Yeniköy, 23.08.1996, 20 m., on *Quercus sp.* and calcareous rock. Yazıcı 0746.

* **Leptogium cyanescens** (Rabenh.) Körb.

Bayramdere, 19.02.1996, 20 m., on mosses. Yazıcı 0760.

Leptogium lichenoides (L.) Zahlbr.

Bayramdere, 19.02.1996, 20 m., on mosses. Yazıcı 0765.

Lobothallia radiosa (Hoffm.) Hafellner

Taşlık, 05.02.1997, 10 m., on calcareous rock; Çarık, 24.08.1996, 15 m., on calcareous rock. Yazıcı 0711.

Ochrolechia parella (L.) A. Massal.

Taşlık, 05.02.1997, 07 m., on calcareous rock. Yazıcı 0781.

* **Pannaria rubiginosa** (Ach.) Bory

Bayramdere, 21.08.1996, 22 m., on *Tilia sp.* Yazıcı 0714.

Parmelia acetabulum (Necker) Duby

Bayramdere, 18.08.1996, 20 m., on mosses; Kulakpınarı, 24.08.1996 15 m., on *Quercus sp.* Yazıcı 0793.

Parmelia caperata (L.) Ach.

Kulakpınarı, 26.08.1996, 15 m., on siliceous rock; Çarık, 17.02.1996, 15 m., on siliceous rock.; Bayramdere, 08.02.1997, 20 m., on siliceous rock; Yeniköy, 23.08.1996, 20 m., on siliceous rock and *Alnus sp.*; Akçasusurluk, 18.02.1996, 15 m., on siliceous rock, *Populus sp.* and *Alnus sp.*; Ekmekçi, 20.08.1996, 05-25 m., on siliceous rock. Yazıcı 0762.

Parmelia conspersa (Ach.) Ach.

Çarık, 27.01.1997, 15 m., on siliceous rock; Bayramdere, 08.02.1997, 17 m., on siliceous rock; Taşlık, 05.02.1997, 07 m., on siliceous rock; Akçasusurluk, 29.04.1996, 17 m., on siliceous rock; Boğazköy, 10.02.1997, 15 m., on siliceous rock. Yazıcı 0772.

Parmelia exasperata de Not

Taşlık, 05.02.1997, 07 m., on calcareous rock; Çarık, 27.01.1997, 13 m., on calcareous rock. Yazıcı 0776.

* **Parmelia loxodes** Nyl.

Kulakpınarı, 24.08.1996, 15 m., on siliceous rock; Taşlık, 05.02.1997, 07 m., on siliceous rock. Yazıcı 0782.

Parmelia pastillifera (Harm.) Schub. & Klement.

Bayramdere, 19.02.1996, 20 m., on *Tilia sp.* Yazıcı 0769.

Parmelia perlata (Hudson) Ach.

Bayramdere, 19.02.1996, 20 m., on *Quercus sp.* and *Castanea sp.*; Çarık, 17.02.1996, 15 m., on *Quercus sp.*; Yeniköy, 23.08.1996, 20 m., on *Quercus sp.*; Boğazköy, 10.02.1997, 15 m., on *Quercus sp.* Yazıcı 0761.

Parmelia pulla Ach.

Kulakpınarı, 24.08.1996, 15 m., on siliceous rock; Çarık, 27.01.1997, 15 m., on siliceous rock; Taşlık, 05.02.1997, 07 m., on siliceous rock. Yazıcı 0788.

Parmelia quercina (Wild.) Vain.

Kulakpınarı, 24.08.1996, 15 m., on *Quercus sp.* Yazıcı 0794.

Parmelia sulcata Taylor

Bayramdere, 08.02.1997, 20 m., on *Castanea sp.*; Yeniköy, 17.08.1996, 20 m., on *Castanea sp.* and *Quercus sp.*; Boğazköy, 08.02.1997, 15 m., on *Quercus sp.* Yazıcı 0763.

Parmelia tiliacea (Hoffm.) Ach.

Çarık, 26.08.1996, 15 m., on *Quercus sp.*; Bayramdere, 19.02.1996, 15 m., on siliceous rock and mosses. Yazıcı 0775.

* **Peltigera canina** (L.) Willd.

Bayramdere, 08.02.1997, 20 m., on mosses; Boğazköy, 09.02.1997, 20 m., on mosses; Yeniköy, 06.02.1997, 20 m., on mosses. Yazıcı 0729.

* **Peltigera lactucifolia** (With.) J.R. Laundon

Bayramdere, 19.02.1996, 22 m., on mosses. Yazıcı 0747.

* **Peltigera malacea** (Ach.) Funck

Bayramdere, 11.02.1997, 22 m., on

mosses; Ekmekçi, 22.08.1996, 22 m., on mosses; Akçasusurluk, 29.04.1996, 15 m., on mosses. Yazıcı 0740.

* *Peltigera membranacea* (Ach.) Nyl.

Yeniköy, 17.08.1996, 20 m., on mosses. Yazıcı 0726.

Peltigera polydactylon (Necker) Hoffm.

Boğazköy, 10.02.1997, 18 m., on mosses; Yeniköy, 17.08.1996, 22 m., on mosses. Yazıcı 0727.

* *Pertusaria amara* (Ach.) Nyl.

Bayramdere, 12.02.1997, 22 m., on *Castanea sp.* Yazıcı 0744.

Petusaria pertusa (Weigel) Tuck.

Bayramdere, 07.02.1997, 20 m., on siliceous rock, *Tilia sp.* and *Castanea sp.*, Yazıcı 0716.

Physcia adscendens (Fr.) H. Olivier

All stations, 5-20 m., on siliceous and calcareous rocks, *Quercus sp.*, *Tilia sp.*, *Castanea sp.*, *Populus sp.* and on fence. Yazıcı 0771.

Physcia aipolia (Ehrh. ex Humb.) Hampe

Çarık, 24.08.1996, 05 m., on *Quercus sp.* Yazıcı 0798.

Physcia caesia (Hoffm.) Fűr.

Kulakpınarı, 26.08.1996, 15 m., on calcareous rock and mosses; Bayramdere, 08.02.1997, 07 m., 20 m., on calcareous rock; Taşlık 05.02.1997, 07 m., on

calcareous rock; Ekmekçi, 07.02.1997, 15 m., on calcareous rock; Yeniköy, 17.08.1996, 15 m., on calcareous rock. Yazıcı 0773.

* *Physcia stellaris* (L.) Nyl.

Bayramdere, 11.02.1997, 10 m., on fence. Yazıcı 0748.

Physcia tenella (Scop.) DC.

Bayramdere, 19.02.1997, 10 m., on *Populus sp.*, *Tilia sp.*, *Salix sp.* and fence; Akçasusurluk, 18.02.1996, 10 m., on *Populus sp.* Yazıcı 0777.

Placynthium nigrum (Hudson) Gray

Taşlık, 05.02.1997, 07 m., on siliceous rock. Yazıcı 0774.

* *Porpidia cinereoatra* (Ach.) Hertel & Knoph

Bayramdere, 20.08.1996, 22 m., on siliceous rock; Ekmekçi, 20.08.1996, 20 m., on siliceous rock; Yeniköy, 23.08.1996, 20 m., on siliceous rock. Yazıcı 0713.

* *Porpidia crustulata* (Ach.) Hertel & Knoph

Bayramdere, 18.08.1996, 20 m., on siliceous rock; Akçasusurluk, 18.02.1996, 20 m., on siliceous rock; Kulakpınarı, 28.04.1996, 15 m., on siliceous rock. Yazıcı 0743.

Ramalina farinacea (L.) Ach.

Kulakpınarı, 27.01.1997, 15 m., on *Quercus sp.*; Bayramdere, 28.01.1997, 20 m., on *Cistus creticus*, *Castanea sp.*, *Quercus*

sp. and on siliceous rock Yeniköy, 29.01.1997, 20 m., on *Quercus sp.* Ekmekçi, 07.02.1997, 19 m., on *Quercus sp.* Yazıcı 0750.

Ramalina fastigiata (Pers.) Ach.

Bayramdere, 25.08.1996, 22 m., on *Castanea sp.* Yazıcı 0749.

Rhizocarpon geographicum (L.) DC.

Kulakpınarı, 24.08.1996, 15 m., on siliceous rock; Çarık, 24.08.1996, 15 m., on siliceous rock. Yazıcı 0752.

Squamarina cartilaginea (With.) P. James

Taşlık, 05.02.1997, 7-15 m., on calcareous rocks. Yazıcı 0758.

Toninia sedifolia (Scop.) Timdal

Taşlık, 05.02.1997, 07 m., on soil. Yazıcı 0725.

* *Trapelia coarctata* (Sm.) M. Choisy

Bayramdere, 18.08.1996, 20 m., on calcareous rock. Yazıcı 0755.

Xanthoria calcicola Oxner

Kulakpınarı, 24.08.1996, 15 m., on calcareous rock; Çarık, 27.01.1997, 15 m., on calcareous rock; Taşlık, 05.02.1997, 07 m., on calcareous rock. Yazıcı 0757.

Xanthoria parietina (L.) Th. Fr.

In all stations 07-25 m., on calcareous and siliceous rocks, *Populus sp.*, *Castanea sp.*, *Alnus sp.*, and Yazıcı 0756.

Findings

A total of 58 species belong to Lecanorales. 15 of which belong to the family of *Parmeliaceae*.

Of the species, 33 are foliose, 33 are crustose and 12 are fruticose. 23 of the species were understood to be living as epiphytic only, 32 as saxicolous, 9 as terricolous, 3 as epiphytic and terricolous and 11 lives epiphytic and saxicolous. It is determined that 11 of the epiphytic lichen species live only on mosses and from saxicolous species, 15 prevail on siliceous rock, 13 on calcareous and 4 on both type of rock.

Xanthoria parietina, *Physcia adscendens*, *Lecanora muralis*, *Cladonia foliacea* and *Cladonia rangiformis* were

defined in all stations. *Cladonia foliacea* and *Cladonia rangiformis* were observed to grow on soil and mosses at altitudes of 7 to 25 m., remote from residential areas and agricultural fields.

In Taşlık, saxicolous and fruticose lichen species only were seen on soil, mosses and rocks since there are only rocks, mosses and soil.

A large number of *Squamarina cartilaginea* and *Collema cristatum* were determined on calcareous rocks in Taşlık. *Cladonia pyxidata* was found densely on soil in the forest in Bayramdere, Boğazköy, Yeniköy and Ekmekçi.

As regards to choosing substrata, *Xanthoria parietina* and *Physcia adscendens* were understood to be the least sensitive and were found to live mostly together on 7 different substrata at altitudes of 7 to 25 m. in all stations. *Physcia adscendens* and *Xanthoria parietina* of epiphytic lichen species were generally found in the agricultural fields on trees and rocks. In Çarık and Kulakpınarı, plenty of *Parmelia quercina* was observed on the branches of *Quercus sp.* It is also determined that in studied stations. *Lecanora muralis* only grew on calcareous rocks.

The five different species belonging to *Peltigera* genus were found to be abundant on the mosses in the forests in Bayramdere, Boğazköy, Yeniköy and Ekmekçi, *Evernia prunastri* was observed to grow on deciduous trees.

As a result, the substrata features of the species are consistent with the literature findings.

Discussion

In Bursa, most of the previous studies on lichens have been conducted in Gemlik, Armutlu, Mudanya and Uludağ

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