Floristic Lichen Records from Uşak Province, Turkey

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Abstract: A contribution to the lichen flora of Turkey presented. A total of 123 lichen species belonging to Ascomycotina are reported from 7 different localities in Uşak Province in the Aegean Region of Turkey. Of these, 115 are new for Uşak Province. For every each species, the habitat pattern and distribution data are presented.

Key words: Biodiversity, biota, flora, lichenized fungi, Banaz

INTRODUCTION

Large parts of Turkey are still relatively unexplored with regards to their lichen biota. Recently, however, much research on lichens has been carried out in various regions in the country (e.g., Çobanoğlu and Akdemir, 2004; Çobanoğlu and Sevgi, 2006; Güvenç et al., 2006; Halıcı et al., 2005, 2007; John and Breuss, 2004; Kinaloğlu, 2007, 2008; Oral and Özçakar, 2006; Türk, 2003; Tufan et al., 2005; Yıldız et al., 2002).

 Altogether only 24 different lichen species are reported so far from Uşak province and its lichen flora should be considered as very poorly known (Ludwig, 1866; Szatava, 1960; Türk and John, 2005).

This present study aims at improving the knowledge of the lichen flora of Turkey and in particular of Uşak Province (Fig. 1).

MATERIALS AND METHODS

Study area: Uşak province is located in the Aegean Region in the west of Turkey. This province is surrounded Izmir, Denizli, Kutahya and Afyon provinces (Fig. 1).

This Mediterranean climate is predominant in the area and characterized by hot and dry summer and cold and snowfall winter.

The total rainfall per year 557 mm (Fig. 2) and the distribution of rainfall according to season is W.S.A.S. (Winter, Spring, Autumn, Summer). This is the first type of East Mediterranean rain Regime (Akman, 1999).

The annual mean temperature is 12.5 °C, the maximum mean temperature of the hottest month is 23.6°C (July) and the minimum mean temperature of the coldest month is 2.4°C (January).

Fig. 1: The study area. Stations indicated by No. (1-7)

Quercus cerris, Q. infectoria, Pinus brutia and Pinus sylvestris as abundant trees in the study area. These trees provide suitable ecological habitats for corticolous lichen species (Atalay and Mortan, 1997).

The main rock types of the study area are marl, dolomite, limestone, conglomerate and travertine of Neogene age (Dubertret, 1964). Dominant soil groups are red and brown soils.

Lichens were collected from 4 different stations in Banaz, 2 stations in Karahalili districts and 1 station in NE of city centre of Uşak Province in 2008 (Table 1). The specimens were identified with aid of various flora and identification keys (Brodo et al., 2001; Purviss et al., 1992; Wasser and Nevo, 2005; Wirth, 1995). The lichen samples are kept in the herbarium of Faculty of Sciences and Arts, Giresun University, Giresun.

Brunn and Powell (1992) in use of authors’ names and abbreviations.

RESULTS

In this study, 293 lichen samples were collected from 7 different localities of Uşak Province. The identification of the lichen specimens was made with the aid of several literature and in total 123 lichenized taxa were determined. The taxa are listed in alphabetical order followed by the collection locality number and substrata.

Acarospora cervina A. Massal., Loc. 2, 3, 5, 6 and 7: on calcareous rock.
A. fuscata (Nyl.) Arnold, Loc. 5: on calcareous rock, Loc. 2: on siliceous rock.
A. glauocarpa (Wahlen. ex Ach.) Körb., Loc. 6: on calcareous rock.
A. maurospora (Hepp) A. Massal. ex Bagl., Loc. 5, 7: on calcareous rock.
A. umbilicata Bagl., Loc. 3, 6, 7: on calcareous rock.
Aspicilia calcaria (L.) Mudd., Loc. 2, 3, 4, 5, 6 and 7: on calcareous rock.
A. cinerea (L.) Körb., Loc. 2: on siliceous rock.
A. corticola (Hofm.) Kremp, Loc. 7: on calcareous rock., Loc. 2: on siliceous rock.
A. desertorum (Kremp.) Mereschk., Loc. 2: on siliceous rock.
A. intermedius (Nyl.) Arnold, Loc. 2: on siliceous rock.
Bryoria fuscofuscata (Gyeln.) Brodo and D. Hawksw., Loc. 1, 4: on Pinus sp.
Caloplaca aloecida (A. Massal.) Mig., Loc. 6, 7: on calcareous rock.
C. arenaria (Pers.) Müll. Arg., Loc. 5, 6 and 7: on calcareous rock.
C. cerina (Bth. ex Hedw.), Th. Fr., Loc. 4, 5: on Pinus sp., Loc. 3: on Quercus sp., Loc. 2: on mosses.
C. cerina var. chloroleuca (Sm.) Th. Fr., Loc. 2: on mosses.
C. cinnamomea (Nyl.) Flagey, Loc. 4, 5 and 7: on Quercus sp., Loc. 3: on Salix sp.
C. cinnamomea var. cinnamomea (Ehrh.) Poelt, Loc. 4, 5: on Pinus sp., Loc. 1, 3: on Quercus sp.
C. coronata (Kremp. ex Körb.) J. Steiner, Loc. 2: on calcareous rock.
C. cremulata (Wth.) J.R. Laundon, Loc. 2: on calcareous rock.
C. flavescens (Huds.) J.R. Laundon, Loc. 3, 5 and 6: on calcareous rock.
C. flavusellum (Huds.) J.R. Laundon, Loc. 1, 5: on Quercus sp.
C. flavusellum (Wulfen) D.T. and Sarnth., Loc. 3: on calcareous rock.
C. holocarpa (Ach.) Wade (Ach.) A.E. Wade, Loc. 2, 4: on calcareous rock., Loc. 2: on Salix sp.
C. lactea (A.Massal) Zahlbr., Loc. 2, 3 and 6: on calcareous rock.
C. variabilis (Pers.) Müll. Arg., Loc. 2, 5, 6 and 7: on calcareous rock.
Catillaria chalybaea (Borrer) A. Massal., Loc. 6: on calcareous rock.
Candelariella aurella (Hoffm.) Zahlbr., Loc. 2, 3, 5, 6 and 7: on calcareous rock.

C. medians (Nyl.) A.L. Sm., Loc. 3, 6 and 7: on calcareous rock.

C. vitellina (Hoffm.) Mull.Arg., Loc. 2, 6, 7: on calcareous rock, Loc. 3: on Salix sp., Loc. 1: on Quercus sp.

Catapygnum pilosellum Breuss, Loc. 3: on soil.

C. squamulosum (Ach.) Breuss, Loc. 3, 6: on soil.

Cladonia fimbricata (L.) Fr., Loc. 1, 4, 6: on soil.

C. foliacea (Huds.) Willd., Loc. 3, 5: on soil.

C. pyxidata (L.) Hoffm., Loc. 1, 3, 4: on soil.

C. rangiformis Hoffm., Loc. 3, 6: on soil.


C. flaccidum (Flagy.) Zahlbr., Loc. 2, 4: on mosses, Loc. 3, 5: on Quercus sp.

C. subflaccidum Degel., Loc. 1, 5: on Pinus sp.

C. tenax (Sw.) Ach., Loc. 3, 6: on soil.

Diplocladon alborutum (Hoffm.) Flot., Loc. 2, 5: on calcareous rock

D. epipodium (Ach.) Arnold, Loc. 2, 3, 6, 7: on calcareous rock.

Diploschistes gypsaceus (Ach.) Zahlbr., Loc. 3: on calcareous rock.

D. ocellatus (Vill.) Normann, Loc. 3, 6, 7: on calcareous rock.

Endocarpon pusillum Hedw., Loc. 3: on calcareous rock.

Evernia prunastri (L.) Ach., Loc. 4, 5: on Pinus sp., Loc. 1, 4, 5: on Quercus sp.

Hypogymnia physodes (L.) Nyl., Loc. 1, 4, 5: on Quercus sp.

Lecanora albella (Pers.) Ach., Loc. 4, 5: on Pinus sp., Loc. 1, 4, 5: on Quercus sp.

L. alborescens (Hoffm.) Branth and Rostr., Loc. 1, 3: on calcareous rock.

L. argentea (Ach.) Malme, Loc. 4, 5: on Pinus sp., Loc. 1, 4, 5: on Quercus sp.

L. commestris (Schaer.) Hue, Loc. 2, 5: on calcareous rock.

L. crenulata Hook., Loc. 2: on calcareous rock.

L. dispersa (Pers.) Sommerf., Loc. 2, 3 and 6: on calcareous rock.

L. hagenii (Ach.) Ach., Loc. 5, 7: on Quercus sp., Loc. 2, 3: on Salix sp.

L. rubicola (L.) Zahlbr., Loc. 2: on siliceous rock.

L. sambuci (Pers.) Nyl., Loc. 3: on Quercus sp.

L. subcarpinea Szatala, Loc. 4, 5: on Pinus sp., Loc. 3: on Salix sp.

Lecidella carpathica Körb., Loc. 2: on siliceous rock.

L. elaeochroma (Ach.) M. Choisy, Loc. 1, 3, 4, 5 and 6: on Quercus sp.

Leptogium cornuculatum (Hoffm.) Minisk, Loc. 2: on calcareous rock, Loc. 3: on soil.

Lobothallia radiosa (Hoffm.) Hafellner, Loc. 1, 2, 3, 6 and 7: on calcareous rock.

Melanella exasperata (De Not.) Essl., Loc. 1, 3, 4 and 5: on Quercus sp.

M. subaurifera (Nyl.) Essl., Loc. 1: on Salix sp.

Myxobilinia lurida (Ach.) Hafellner and Türk, Loc. 3, 6: on soil.

Parmelia saxatilis (L.) Ach., Loc. 2: on calcareous rock.

Parmelia sulcata Taylor, Loc. 2: on calcareous rock, Loc. 4, 5: on Quercus sp.

Parmelia pastillifera (Harm.) Hale, Loc. 2: on calcareous rock.

P. riliaceae (Hoffm.) Ach., Loc. 1, 2: on calcareous rock.


P. collina (Ach.) Schrad., Loc. 1, 4: on mosses.

P. praetextata (Flörke ex Sommerr.) Zopf, Loc. 1, 4: on soil.

P. amara (Ach.) Nyl., Loc. 1, 4, 7: on Quercus sp.

Pertusaria aspergilla (Ach.) J.R. Laundon, Loc. 7: on calcareous rock.

P. lactea (L.) Arnold, Loc. 2, 5: on siliceous rock.

Phaeophyscia orbicularis (Neeck.) Moberg, Loc. 4, 5: on Quercus sp., Loc. 1, 3: on Salix sp.

P. pusillioides (Zahlbr.) Essl., Loc. 1, 5: on Quercus sp.

Physcia ascendentis (Fr.) H. Olivier, Loc. 1, 3 and 5: on Quercus sp.

P. aipolia (Ehrh. ex Humb.) Hampe, Loc. 3: on Salix sp., Loc. 1, 6: on Quercus sp.

P. caesia (Hoffm.) Fürnt., Loc. 2: on siliceous rock and on calcareous rock.

P. dubia (Hoffm.) Lettau, Loc. 2, 5: on siliceous rock.

P. semipinnata (J.F. Gmel.) Moberg, Loc. 1, 4: on Quercus sp.

P. tenella (Scop.) DC., Loc. 3, 5: on Quercus sp.

Physconia dictoria (With.) J.R. Laundon, Loc. 1, 5: on Quercus sp.

P. enterexantha (Nyl.) Poelt, Loc. 1, 4: on Pinus sp.

P. perisidiosa (Ericshen) Moberg, Loc. 3, 5: on Quercus sp., Loc. 2: on mosses and on Quercus sp.

Placocarpus schaereri (Fr.) Breuss, Loc. 7: on calcareous rock.

Placynthium nigrae (Huds.) Gray, Loc. 3, 6 and 7: on calcareous rock.

Polycladium muscicola (Sw.) Gray, Loc. 2: on mosses.


Protaparameiosis muralis (Schreb.) M. Choisy, Loc. 2, 3, 4, 5, 6: on calcareous rock.

Pseudevernia furfuracea (Ach.) var. ceratia D. Hawksw., Loc. 4, 5: on Pinus sp., Loc. 6, 7: on Quercus sp.

P. furfuracea (L.) Zopf var. furfuracea, Loc. 2: on calcareous rock, Loc. 4, 5: on Pinus sp., Loc. 6, 7: on Quercus sp.
Ramalina farinacea (L.) Ach., Loc. 3: on Salix sp., Loc. 1, 4: on Quercus sp.  
R. fraxinea (L.) Ach., Loc. 3, 5: on Quercus sp.  
Rhizocarpon badoatrum (Flörke ex Spreng.) Th.Fr., Loc. 2: on siliceous rock.  
R. geographicum (L.) DC., Loc. 2, 6: on siliceous rock.  
R. lecanorinunn Anders., Loc. 2: on siliceous rock.  
R. subgemenatun Eitner, Loc. 2, 5: on siliceous rock.  
Rinodina atroinerea (Sm. ex Hook.) Körb., Loc. 2: on siliceous rock.  
R. bischoffii (Hepp.) A.Massal., Loc. 2, 3, 5 and 7: on calcareous rock.  
R. sophodes (Ach.) A.Massal., Loc. 3, 4, 5: on Quercus sp.  
R. tsiochphi (Nyl.) Arnold, Loc. 7: on calcareous rock., Loc. 2: on siliceous rock.  
Sarcogynce clavus (DC.) Kremp., Loc. 3: on calcareous rock.  
Squamarea cartilaginea (With.) P.James, Loc. 3, 4 and 6: on soil.  
S. lentiger (Weber) Poelt, Loc. 3: on soil.  
Tephromela atra (Huds.) Hafellner, Loc. 1, 5: on calcareous rock.  
Toninia sedifolia (Scop.) Timdal, Loc. 3, 6: on soil.  
T. toniniana (Massal) Zähln., Loc. 5: on soil.  
Usnea florida (L.) Weber ex F.H.Wigg., Loc. 1, 4: Pinus sp.  
Verrucaria calciseda DC., Loc. 3, 6 and 7: on calcareous rock.  
V. fiscellia (Turner) W inde, Loc. 7: on calcareous rock.  
V. hochstetteri Fr., Loc. 7: on calcareous rock.  
V. muralis Ach., Loc. 3, 6: on calcareous rock.  
V. nigrescens Pers, Loc. 2, 5, 6 and 7: on calcareous rock.  
Xanthoparmelia laxodes (Nyl.) O.Blanco, A.Crespo, Elix, D.Hawksw. and Lumbsch, Loc. 2, 3, 5: on calcareous rock.  
X. somloensis (Gylen.) Hale, Loc. 1: on calcareous rock.  
X. verruculifera (Nyl.) O.Blanco, A.Crespo, Elix, D.Hawksw. and Lumbsch, Loc. 2 on siliceous rock.  
Xanthoria fuba (Hoffm.) Poelt and Pettschnig, Loc. 3: on Salix sp.  
X. parietina (L.) Th.Fr., Loc. 7: on Pinus sp., Loc. 1, 5, 6 and 7: on Quercus sp., Loc. 3: on Salix sp.  
X. polycarpa (Hoffm.) Rieber, Loc. 3, 4: on Quercus sp.  

**DISCUSSION**

In this study area all of the species were found on 8 different substrata. Of the these species, 62 are crustose (50.4%), 53 are foliose (43%) and 8 are fruticose (6.5%).

A total of 66 species were defined to be saxicolous only, 36 as epiphytic and 15 as terricolous only.

In addition, 4 species (Caloplaca holocarpa, Candelariella vitellina, Parmelia sulcata and Pseudevernia furfuracea var. furfuracea) were both epiphytic and saxicolous and 2 species (Collema crispum and Leptogium corticale) saxicolous and terricolous.

Of the 66 saxicolous lichen species, 49 prevail on calcarceous rocks, 13 on siliceous rocks and 4 on both type rocks.

Due to the dominance of calcareous rocks in localities 2, 3, 4, 5, 6, 7, as expected, calcicole lichen species, such as Acarospora cervina, Aspicilia calarea, Candelariella aurella, C. vitellina, Diplotomma epipodium, Lobothallia radiosa, Rinodina bischoffii, Protoparmeliaeppulis, Veruccaria calciseda, V. nigrescens and Xanthoparmeliae fuba were seen very common.

On the other hand, silicicole saxicolous species, such as Aspicilia cinerea, Lecanora rupicola, Rhizocarpon badoatrum, R. geographicum, R. subgemenatun and Rinodina atrcinerea were also recorded in localities 2, 5, 6.

In the localities 1, 3, 4, 5, with Pinus and Quercus communities, are mostly dominated by acidophytic epiphytic species such as Lecanora argentata, Lecidella elaeochroma, Melanella exasperata, Physcia adscendens, P. semipinnata, Pseudevernia furfuracea var. cereata and P. furfuracea var. furfuracea which grow on the acidic barks of these trees.

Caloplac cerina var, chloroleuca, Collema crispum, Peltigera collina, Polychlorium muscicola and Pycnotheca perisidiosa collected on mosses in localities 1, 2, 4.

Terricolous lichens such as Catapyrenium squamosum, Cladonia foliacea, C. rangiformis, Squamarea cartilaginea and Toninia sedifolia are mostly present in localities 3, 6.

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

In this study area, species showing the widest distribution range are:

- Aspicilia calarea (6 localities), Xanthoria parietina (6 localities), Acarospora cervina (5 localities), Candelariella aurella (5 localities), C. vitellina (5 localities), Collema cristatum (5 localities), Evernia prunastri (5 localities), Lecanora albella (5 localities), Lecidella elaeochroma (5 localities) and Lobothallia radiosa (5 localities)
They are common diverse provinces in Turkey. Besides, 3 of these, Aspicilia calcarea, Candelariella aurella and Cl. vitellina, are also common and widely distributed in Europe (Purvis et al., 1992).

The most diverse genera are Caloplaca (15 species), Lecanora (10 species) and Physcia (6 species).

The members of the genus Caloplaca and Lecanora were found all of the localities, while the members of Physcia in 6 localities.

The highest species densities were observed in localities 2 and 6.

It was determined that most lichen species identified in localities 3 and 6, while the least diversity was found in locality 4 and 6 (Table 2).

Crustose lichens were seen all of localities. Table 3 shows that the most diverse crustose lichen taxa were defined in locality 2 (28 species) and the least in locality 4 (10 species).

Generally in these areas those lichen species taxa prefer to grow mostly on deciduous and coniferous trees, on rocks and from time to time on mosses.

Caloplaca and Lecanora are the most common crustose lichen genera. They were collected all localities. Caloplaca grows on rocks, deciduous, coniferous and mosses habitats in the most part of study area.

The genus Lecanora was found mostly on rocks, deciduous and coniferous habitats in the area.

The most foliose lichen taxa were found in locality 3 (28 species) and the least in locality 7 (5 species) (Table 3).

Common foliose lichen taxa such as Collema, Physcia and Xanthoparmelia were mostly found in localities 1, 2, 3 and 5. Of these, Collema was found abundantly on rocks, deciduous, coniferous and mosses.

Physcia grows both on rocks and deciduous habitats. Genus Xanthoparmelia grows only rocks.

Five different fruticose genera defined only in total of 6 localities. These are Cladonia, Ramalina, Bryoria, Polychidium and Usnea.

Of these, Cladonia grows only on soil in localities 1, 3, 4 and 6. Ramalina were seen to grow only on deciduous habitats in localities 1, 3, 4 and 5. Bryoria and Usnea were found abundantly on coniferous habitats in locality 1, 4. Genus Polychidium were collected on mosses in locality 2.

The result includes all of the 24 lichen species known so far from Uşak province. This indicates that the lichen flora of the area was very incompletely known and that the current distribution maps of Turkish lichen show many gaps and need much further recording.

Consultation of the existing literature (Ludwig, 1866; Szatala, 1960; Türk and John, 2005) showed that all encountered species are new records for the study area and 115 species are new records for Uşak province.

Medical lichen species such as Cladonia rangiformis, Evernia prunastri, Peltigera canina, Pseudovernia furfuracea var. furfuracea, Ramalina farinacea and Xanthoria parietina were also collected in the study area.

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REFERENCES


