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## Lichen biota of Ardahan province (Turkey)

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ABSTRACT — As a result of lichenological exploration in the province Ardahan of Turkey, we report 349 taxa of lichenized, 9 of lichenicolous and 1 of non-lichenized fungi (including 7 subspecies and 6 varieties), representing 100 genera in the *Ascomycota*. *Chaenothecopsis pusilla*, *Cladonia scabriuscula*, *Lecanora caesiosora*, *Lecanora campestris* subsp. *dolomitica*, *Lecanora hybocarpa* and *Ramalina lacera* are new to Turkey. All encountered taxa are new records for Ardahan province. Localities where taxa were collected and substrata are presented.

KEY WORDS — *Ascomycetes*, biodiversity, lichens

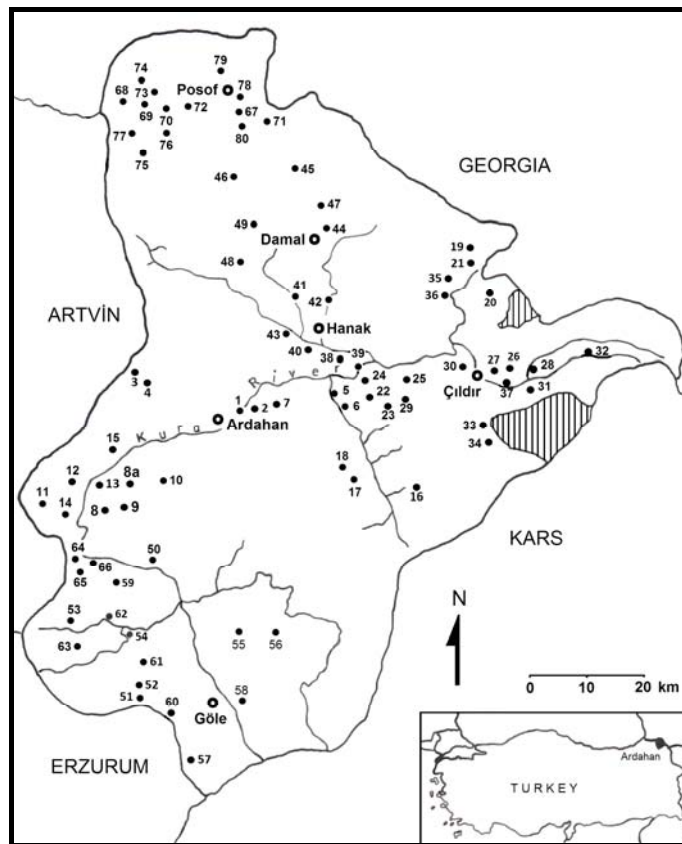
### Introduction

In recent years many new lichen taxa have been recorded for Turkey since the lichen flora is poorly known (e.g. Aptroot & Yazici 2009, Candan et al. 2010, Etayo & Yazici 2009, Halici & Aksoy 2009, Kinalioğlu 2010a,b,c, Kinalioğlu & Aptroot 2010, Senkardesler 2010, Yazici & Aslan 2009, Yazici et al. 2010a,b,c). Only eight lichenized fungi have thus far been reported from Ardahan, which is a province in the far north-east of Turkey, where Turkey borders with Georgia and Armenia (Yazici et al. 2010a,b). Evidently, this region has remained largely unexplored. The present paper is a contribution to our knowledge of the lichen flora of Turkey and provides the first substantial checklist of lichens for Ardahan region.

### Material and methods

The lichen samples were collected at 81 different localities in Ardahan between 21 July 2008 and 30 August 2009 (Table 1, Figure 1). Air dried samples were studied with a Nikon SMZ1500 stereomicroscope and a Nikon

Eclipse 80i light microscope with standard identification methods for lichenized and lichenicolous fungi (Brodo et al. 2001, Dobson 2005, Esslinger 1997, Giralt 2001, Goward et al. 1995, Poelt 1969, Poelt & Vězda 1981, Smith et al. 2009, Thomson 1984, 1997, Wasser & Nevo 2005, Wirth 1995). Thin Layer Chromatography (TLC) analyses were carried out when needed (Orange et al. 2001). Vouchers are deposited in the herbarium of the Biology Department, Faculty of Science, Karadeniz Technical University, Turkey (KTUB).



**Figure 1.** Map of Turkey showing Ardahan province and the collecting numbers

Ardahan is a mountainous region, largely situated above 2000 m elevation. It has a continental climate with warm and brief summers with

cool nights and very cold and snowy winters. The annual mean temperature is 3.7°C. The mean temperature of the hottest month is 35°C (July) and of the coldest month –37.8°C (January). Temperatures often drop to –40 °C. Average annual precipitation is 533.4 mm. Most precipitation falls in April, May and June. The annual average humidity is 71% (Akman 1999). Meadows and grasslands, covering a larger area especially in south and north of Ardahan town, are prevalent in this region. Woodlands are small, not rich, mainly consisting of *Pinus sylvestris* occurring on outskirts of the some mountains in higher parts of the city. *Salix*, *Populus*, *Pyrus*, *Prunus* are especially predominant in settlements. However, the climate is different in Posof town (Figure 1), in where rainy winters and hot summers. Rainfall is seen in every season. Average annual precipitation is 600 mm. Posof town has a rich forest cover, consisting of *Quercus*, *Pinus*, *Picea*, *Fagus*, *Carpinus*, *Ulmus*, *Corylus*, and meadow and grass on the mountains (Baytop & Denizci 1963).

## Results

The lichenological survey of Ardahan province yielded a total of 357 taxa of lichenized, 9 of lichenicolous and 1 of non-lichenized fungi. This includes 7 subspecies and 6 varieties, representing 100 genera in the *Ascomycota*. 349 lichenized and 9 lichenicolous fungi and one non-lichenized fungus are new records for Ardahan region. Six taxa, *Chaenothecopsis pusilla*, *Cladonia scabriuscula*, *Lecanora caesiosora*, *Lecanora campestris* subsp. *dolomitica*, *Lecanora hybocarpa* and *Ramalina lacera*, are new to Turkey. *Chaenothecopsis pusilla* has got apothecia, 0.4–0.8 mm tall, ± black or with stalk brown below. Ascospores 5–7 × 2 µm, 1–septate. Spot tests are negative. This species usually grows on *Alnus*, *Betula*, *Quercus*, *Pinus* etc. *Cladonia scabriuscula* is similar to *Cladonia furcata*, but surfaces of *C. scabriuscula* are scabrid especially towards the tips. Thallus K± yellow, KC–, C–, P+ red.

Thallus in *Lecanora caesiosora* areolate, white to grey; soralia on the surface of areoles. Apothecia absent. This species grows usually on siliceous rocks in well-lit areas. Thallus K+ yellow, C–, P+ yellow.

*Lecanora campestris* subsp. *dolomitica* is a member of *Lecanora subfusca*. This taxa resembles *L. campestris* subsp. *campestris*, but is distinguished by soredia in white, convex and circular soralia.

Thallus in *Lecanora hybocarpa* to 12 cm in diam., continuous or disperse, warty, granulose, white to grey. Apothecia numerous, disperse or aggregated; discs pale brown or brown, ± pruinose and ± concave. Ascospores 9–12 × 5–7 µm. It grows on bark of *Acer*, *Picea*, *Populus* in sun-exposed sites from the eu-mediterranean belt to the submediterranean belt.

That species is similar to *L. chlarotera*, but crystals not dissolving in K in thalline exciple help differentiate *Lecanora hybocarpa* from *L. chlarotera*, with crystals dissolving in K and N in thalline exciple. This species is apparently common in North America and has been reported also from Europe (e.g. England, Scotland and Spain).

*Ramalina lacera* has thallus ranging from a single convoluted lobe, erect or decumbent; branches flattened, concolorous, yellow-green, with indented margins; medulla not hollow; soralia laminal and marginal, evolving as eroded patches at first, later covering entire lobe ends. Apothecia not present. Spot tests negative. This species resembles *R. pollinaria* and *R. canariensis*, but soralia with granular soredia lip-shaped, often terminal while soredia in vesicles and occurring from the medulla in *R. canariensis*.

Nine obligately lichenicolous fungi were found: *Arthonia intexta* (in the apothecia of *Lecidella carpathica*), *Arthonia lapidicola* (on the thallus of *Caloplaca xerica*), *Endohyalina insularis* (on the thallus of *Lecanora rupicola*), *Caloplaca grimmiae* (on the thallus of *Candelariella vitellina*), *Carbonea supersparsa* (on the thallus of *Lecanora polytropa*), *Carbonea vitellinaria* (on the thallus of *Candelariella vitellina*), *Lichenostigma maureri* (on the thallus of *Usnea lapponica*), *Rimularia insularis* (on the thallus of *Lecanora rupicola*), *Rinodina epimilvina* (on the thallus of *Rinodina milvina*) and *Scoliciosporum intrusum* (on the thallus of *Aspicilia caesiocinerea*). In addition to lichen-like *Arthopyrenia punctiformis*, a non-lichenized fungus, is reported, growing on *Pyrus* sp. Additionally, two facultatively lichenicolous lichenized fungi were found: *Lecidea hypnorum* (on the thallus of *Peltigera leucophlebia*) and *Scoliciosporum umbrinum* (on the thallus of *Umbilicaria vellea*). The taxa are listed alphabetically. "+" indicate new records for Turkey, "\*" for Ardahan.

#### List of taxa

- \**Acarospora badiofusca* (Nyl.) Th. Fr. - Locality 8, 52; on calcareous rock.
- \**Acarospora cervina* (Ach.) A. Massal. - Locality 1, 30, 31, 50; on calcareous rock.
- \**Acarospora fuscata* (Nyl.) Arnold - Locality 1, 3, 8, 9, 10, 11, 14, 25, 28, 29, 30, 31, 32, 35, 36, 38, 50, 51, 52, 56, 59, 63, 66, 70, 79; on calcareous rock.
- \**Acarospora impressula* Th. Fr. - Locality 4, 22; on siliceous rock.
- \**Acarospora macrospora* (Hepp.) A. Massal. ex Bagl. - Locality 2, 4, 9, 10, 11, 20, 28, 32, 38, 50, 52, 56, 59, 62, 63, 79; on calcareous rock.
- \**Acarospora umbilicata* Bagl. - Locality 2, 12, 20, 22, 30, 38, 79; on siliceous rock.
- \**Acarospora veronensis* A. Massal. - Locality 4, 9, 10, 14, 70; on siliceous rock.

- \**Agonimia tristicula* (Nyl.) Zahlbr. - Locality 79; on mosses.
- \**Amandinea punctata* (Hoffm.) Coppins & Scheid. - Locality 2, 14; on *Pinus sylvestris*.
- \**Anaptychia ciliaris* (L.) Körb. - Locality 10, 68, 80; on *Picea orientalis* and *Pinus sylvestris*.
- \**Anaptychia crinalis* (Schleich.) Vězda - Locality 67; on *Picea orientalis*.
- \**Anaptychia setifera* (Mereschk.) Räsänen - Locality 2, 80; on *Picea orientalis* and *Pinus sylvestris*.
- Arthonia calcarea* (Turner ex Sm.) Ertz & Diederich - Locality 68; on calcareous rock.
- \**Arthonia dispersa* (Schr.) Nyl. - Locality 13, 68, 79; on *Populus* sp.
- \**Arthonia intexta* Almq. - Locality 79; in the apothecia of *Lecidella carpathica*.
- \**Arthonia lapidicola* (Taylor) Branth & Rostr. - Locality 20; on the thallus of *Caloplaca xerica*.
- \**Arthonia radiata* (Pers.) Ach. - Locality 17, 68; on *Populus* sp., *Picea orientalis* and *Carpinus* sp.
- \**Arthopyrenia punctiformis* (Schr.) A. Massal. - Locality 67; on *Pyrus* sp.
- \**Aspicilia caesiocinerea* (Nyl. ex. Malbr.) Arnold - Locality 3, 4, 8, 9, 10, 11, 14, 18, 19, 20, 25, 29, 38, 50, 51, 52, 56, 61, 62, 63, 66, 69, 70, 79; on calcareous rock.
- \**Aspicilia calcarea* (L.) Körb. - Locality 2, 10, 38, 56, 63, 79; on calcareous rock.
- \**Aspicilia cinerea* (L.) Körb. - Locality 3, 4, 10, 14, 20, 22, 33, 34, 35, 38, 48, 50, 54, 55, 56, 61, 62, 63, 64, 66, 70, 78, 79, 80; on siliceous rock.
- \**Aspicilia contorta* (Hoffm.) Körb. subsp. *contorta* - Locality 38, 45; on calcareous rock.
- \**Aspicilia contorta* (Hoffm.) Körb. subsp. *hoffmanniana* S. Ekman & Fröberg ex R. Sant. - Locality 2, 10, 26, 28, 51, 61, 79; on calcareous rock.
- \**Aspicilia desertorum* (Kremp.) Mereschk. - Locality 11, 50; on siliceous rock.
- \**Aspicilia fruticulosa* (Eversm.) Flagey - Locality 1, 14, 20, 29, 40, 50, 56, 79; on siliceous rock.
- \**Aspicilia intermutans* (Nyl.) Arnold - Locality 3, 10, 11, 38, 50, 68; on siliceous rock.
- \**Aspicilia radiosa* (Hoffm.) Poelt & Leuckert - Locality 8, 10, 20, 38, 56, 59, 63, 65, 68; on calcareous rock.
- \**Baeomyces rufus* (Huds.) Rebert. - Locality 67; on soil.
- \**Biatora vernalis* (L.) Fr. - Locality 3; on sheltered mossy calcareous rock.
- \**Bilimbia sabuletorum* (Schreb.) Arnold - Locality 79; on mosses.

- \**Bryoria bicolor* (Ehrh.) Brodo & D. Hawksw. - Locality 79; on *Pinus sylvestris*.
- \**Bryoria capillaris* (Ach.) Brodo & D. Hawksw. - Locality 79; on *Pinus sylvestris*.
- \**Bryoria fuscescens* (Gyeln.) Brodo & D. Hawksw. - Locality, 57, 60, 63, 79; on *Pinus sylvestris*.
- \**Bryoria nadvornikiana* (Gyeln.) Brodo & D. Hawksw. - Locality 79; on *Pinus sylvestris*.
- \**Buellia aethalea* (Ach.) Th. Fr. - Locality 4, 46, 51, 52, 56; on siliceous rock.
- \**Buellia badia* (Fr.) A. Massal. - Locality 3, 8, 9, 10, 14, 30, 38, 50, 52, 56, 58, 69, 70, 71, 74, 75, 76, 77, 79; on siliceous rock.
- \**Buellia disciformis* (Fr.) Mudd - Locality 63, 68; on *Pinus sylvestris* and *Populus* sp.
- \**Buellia epigaea* (Hoffm.) Tuck. - Locality 30, 47, 60; on soil.
- Buellia sequax* (Nyl.) Zahlbr. - Locality 61; on siliceous rock.
- \**Caloplaca albolutescens* (Nyl.) H. Olivier - Locality 22; on calcareous rock.
- \**Caloplaca arenaria* (Pers.) Müll. Arg. - Locality 4, 8, 9, 10, 20, 29, 38, 49, 50, 56, 63, 68, 78, 79; on siliceous rock.
- \**Caloplaca atroflava* (Turner) Mong. - Locality 3, 9, 20, 22, 25, 28, 29, 38, 50, 52, 56, 59, 63, 68, 79; on calcareous rock.
- \**Caloplaca ceracea* J.R. Laundon - Locality 14, 50, 63, 79; on siliceous rock.
- \**Caloplaca cerina* (Ehrh. ex Hedw.) Th. Fr. - Locality 7, 15, 16, 17, 53, 54, 55, 56, 68, 78, 80; on *Pinus sylvestris*, *Populus* sp., *Picea orientalis*, *Carpinus* sp., *Pyrus* sp., *Prunus* sp., *Salix* sp., *Alnus* sp. and siliceous rock.
- \**Caloplaca cerina* (Ehrh. ex Hedw.) Th. Fr. var. *chloroleuca* (Sm.) Th. Fr. - Locality 3, 26, 79; on mosses.
- \**Caloplaca cerinella* (Nyl.) Flagey - Locality 67; on *Populus* sp.
- \**Caloplaca cerinelloides* (Erichsen) Poelt - Locality 80; on *Salix* sp.
- \**Caloplaca chlorina* (Flot.) Sandst. - Locality 79; on *Populus* sp. and *Salix* sp.
- \**Caloplaca crenularia* (With.) J.R. Laundon - Locality 8, 10, 14, 20, 29, 50, 52, 61, 63, 65, 70, 71; on siliceous rock.
- \**Caloplaca crenulatella* (Nyl.) H. Olivier - Locality 14, 20; on siliceous rock.
- \**Caloplaca decipiens* (Arnold) Blomb. & Forssell - Locality 1, 5, 6, 7, 19, 80; on calcareous rock.
- \**Caloplaca ferruginea* (Huds.) Th. Fr. - Locality 12, 13, 68; on *Populus* sp. and *Carpinus* sp.

- \**Caloplaca grimmiae* (Nyl.) H. Olivier - Locality 3, 6, 7, 8, 10, 12, 13, 20, 27, 30, 31, 37, 38, 50, 52, 56, 59, 63, 70, 79; on the thallus of *Candelariella vitellina*.
- \**Caloplaca holocarpa* (Hoffm.) A.E. Wade - Locality 6, 9, 10, 14, 29, 34, 38, 50, 56, 79, 80; on *Salix* sp. *Populus* sp. and calcareous rock.
- \**Caloplaca lactea* (A. Massal.) Zahlbr. - Locality 10, 38, 56; on calcareous rock.
- \**Caloplaca oasis* (A. Massal.) Szatala - Locality 10, 38; on calcareous rock.
- \**Caloplaca pyracea* (Ach.) Th. Fr. - Locality 8, 8a, 20, 62, 80; on *Populus* sp. and *Salix* sp.
- \**Caloplaca saxicola* (Hoffm.) Nordin - Locality 1, 21, 38, 63; on calcareous rock.
- \**Caloplaca subpallida* H. Magn. - Locality 14, 56; on siliceous rock.
- \**Caloplaca tirolensis* Zahlbr. - Locality 3, 5, 56; on mosses.
- \**Caloplaca xerica* Poelt & Vězda - Locality 3, 10, 14, 20, 22, 38, 50, 52, 62, 63, 65, 68, 79; on calcareous rock.
- \**Candelaria concolor* (Dicks.) Arnold - Locality 8, 9, 20, 68, 78, 80; on *Salix* sp., *Alnus* sp., *Picea orientalis*, *Pinus sylvestris* and mosses.
- \**Candelariella aurella* (Hoffm.) Zahlbr. - Locality 4, 8, 9, 10, 11, 14, 20, 22, 30, 38, 61, 63, 78, 79, 80; on *Alnus* sp., *Picea orientalis*, *Populus* sp., *Pyrus* sp., *Salix* sp., mosses and calcareous rock.
- \**Candelariella coralliza* (Nyl.) H. Magn. - Locality 62; on calcareous rock.
- \**Candelariella reflexa* (Nyl.) Lettau - Locality 68, 78; on *Salix* sp., and *Alnus* sp.
- \**Candelariella vitellina* (Ehrh.) Müll. Arg. - Locality 3, 4, 6, 7, 8, 9, 10, 12, 13, 14, 20, 22, 25, 27, 28, 29, 30, 31, 37, 38, 50, 51, 52, 56, 59, 61, 62, 63, 66, 68, 70, 78, 79; on *Salix* sp., mosses and siliceous rock.
- \**Candelariella xanthostigma* (Pers. ex Ach.) Lettau - Locality 68, 78; on *Pyrus* sp. and *Alnus* sp.
- \**Carbonea supersparsa* (Nyl.) Hertel - Locality 9, 10, 79; on the thallus of *Lecanora polytropa*.
- \**Carbonea vitellinaria* (Nyl.) Hertel, Locality 3, 9, 10, 38, 56, 63, on the thallus of *Candelariella vitellina*.
- \**Cetraria aculeata* (Schreb.) Fr. - Locality 9, 10, 52, 56; on soil.
- \**Cetraria ericetorum* Opiz - Locality 4, 9, 10, 14, 65; on soil.
- \**Cetraria islandica* (L.) Ach. - Locality 3, 10, 14, 56; on soil and mosses.
- \**Cetraria muricata* (Ach.) Eckfeldt - Locality 10; on soil.
- \**Cetrelia cetrarioides* (Delise) W.L. Culb. & C.F. Culb. - Locality 67, 79; on *Pinus sylvestris* and *Picea orientalis*.
- \**Cetrelia olivetorum* (Nyl.) W.L. Culb. & C.F. Culb. - Locality 80; on *Picea orientalis*.
- \**Chaenotheca brunneola* (Ach.) Müll. Arg. - Locality 67, 78; on *Pinus sylvestris* and *Picea orientalis*.

- \**Chaenotheca furfuracea* (L.) Tibell - Locality 67; on *Picea orientalis*.
- \**Chaenotheca trichialis* (Ach.) Th. Fr. - Locality 80; on *Picea orientalis*.
- +*Chaenothecopsis pusilla* (A. Massal.) Alb. Schmidt - Locality 78; on *Alnus* sp.
- \**Chrysothrix candelaris* (L.) J.R. Laundon - Locality 67; on *Picea orientalis*.
- \**Cladonia cariosa* (Ach.) Spreng. - Locality 10, 11; on mosses and soil.
- \**Cladonia carneola* (Fr.) Fr. - Locality 65; on mosses.
- \**Cladonia cenotea* (Ach.) Schaer. - Locality 65; on mosses.
- \**Cladonia chlorophaea* (Flörke ex Sommerf.) Spreng. - Locality 9, 11, 39, 51, 61, 66, 68, 78; on soil and mosses.
- \**Cladonia cyathomorpha* Stirt. ex Walt. Watson - Locality 14; on mosses.
- \**Cladonia digitata* (L.) Hoffm. - Locality 63; on soil.
- \**Cladonia furcata* (Huds.) Schrad. subsp. *subrangiformis* (L. Scriba ex Sandst.) Pišút - Locality 10, 50, 65; on mosses.
- \**Cladonia humilis* (With.) J.R. Laundon - Locality 14, 56; on soil.
- \**Cladonia macilenta* Hoffm. - Locality 8, 14, 79; on *Pinus sylvestris*.
- \**Cladonia macrophylla* (Schaer.) Stenh. - Locality 78; on mosses.
- \**Cladonia ochrochlora* Flörke - Locality 66; on *Pinus sylvestris*.
- \**Cladonia pleurota* (Flörke) Schaer. - Locality 64; on mosses.
- \**Cladonia rangiformis* Hoffm. - Locality 6, 12, 13, 19, 21, 33, 34, 45, 46, 74, 75; on mosses.
- \**Cladonia rei* Schaer. - Locality 14; on mosses.
- +*Cladonia scabriuscula* (Delise) Leight - Locality 78; on soil.
- \**Clauzadea monticola* (Ach.) Hafellner & Bellem. - Locality 10, 14, 68; on calcareous rock.
- \**Collema cristatum* (L.) Weber ex F.H. Wigg. - Locality 36, 40, 41; on mosses.
- \**Collema flaccidum* (Ach.) Ach. - Locality 36, 37, 50, 67; on mosses, calcareous rock and siliceous rock.
- \**Collema furfuraceum* Du Rietz - Locality 68; on *Carpinus* sp.
- \**Collema subflaccidum* Degel. - Locality 47, 48; on siliceous rock.
- \**Collema tenax* (Sw.) Ach. - Locality 4, 20, 22, 56; on mosses and calcareous rock.
- \**Dermatocarpon miniatum* (L.) W. Mann - Locality 1, 9, 11, 20, 28, 38, 50, 55, 56, 62, 63; on calcareous rock.
- \**Dermatocarpon miniatum* (L.) W. Mann var. *complicatum* (Lightf.) Th. Fr. - Locality 38; on calcareous rock.
- \**Dimelaena oreina* (Ach.) Norman - Locality 1, 4, 8, 9, 10, 14, 22, 28, 29, 30, 38, 50, 51, 52, 59; on siliceous rock.
- \**Diploschistes muscorum* (Scop.) R. Sant. - Locality 4, 8, 10, 14, 50, 56; on mosses.
- \**Diploschistes ocellatus* (Fr.) Norman - Locality 15, 17, 19; on calcareous rock.



- \**Diploschistes scruposus* (Schreb.) Norman - Locality 10, 11, 38, 50, 79, 80; on siliceous rock.
- \**Diplotomma alboatrum* (Hoffm.) Flot. - Locality 56; on calcareous rock.
- \**Diplotomma epipolium* (Ach.) Arnold - Locality 9, 10, 22, 25, 29, 30, 38, 50, 52, 56, 59, 70, 79; on calcareous rock.
- \**Endocarpon pusillum* Hedw. - Locality 1, 38, 63; on soil.
- \**Endohyalina insularis* (Arnold) Giralt, Van den Boom & Elix - Locality 10, 22, 50; on the thallus of *Lecanora rupicola*.
- \**Evernia divaricata* (L.) Ach. - Locality 63, 66; on *Pinus sylvestris*.
- \**Evernia prunastri* (L.) Ach. - Locality 2, 9, 10, 67, 68, 78, 79; on *Pinus sylvestris* and *Picea orientalis*.
- \**Flavoparmelia caperata* (L.) Hale - Locality 78, 79, 80; on *Alnus* sp., *Pinus sylvestris* and *Populus* sp.
- \**Flavoparmelia soredians* (Nyl.) Hale - Locality 2, 9, 10, 56; on *Pinus sylvestris*.
- \**Hypogymnia farinacea* Zopf - Locality 8; on *Pinus sylvestris*.
- \**Hypogymnia physodes* (L.) Nyl. - Locality 1, 14, 38, 56, 63, 66, 67, 68, 79; on *Picea orientalis*, *Pinus sylvestris* and mosses.
- \**Hypogymnia tubulosa* (Schaer.) Hav. - Locality 2, 14, 38, 64, 67, 68; on *Picea orientalis*, *Pinus sylvestris* and mosses.
- \**Icmadophila ericetorum* (L.) Zahlbr. - Locality 68; on the decayed body of *Picea orientalis*.
- \**Immersaria athroocarpa* (Ach.) Rambold & Pietschm. - Locality 4, 5, 6, 7, 8, 10, 11, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 28, 29, 30, 38, 45, 46, 47, 50, 52, 56, 59, 61, 63, 68, 76, 77; on siliceous rock.
- \**Ionaspis lacustris* (With.) Lutzoni - Locality 20, 52, 61, 63, 68, 79; on siliceous rock.
- \**Lecania cyrtella* (Ach.) Th. Fr. - Locality 67, 79, 80; on *Salix* sp.
- \**Lecania rabenhorstii* (Hepp) Arnold - Locality 79; on calcareous rock.
- \**Lecanora albellula* (Nyl.) Th. Fr. - Locality 9, 14, 51, 56, 63, 66, 68; on *Picea orientalis* and *Pinus sylvestris*.
- \**Lecanora albescens* (Hoffm.) Branth & Rostr. - Locality 61; on calcareous rock.
- \**Lecanora allophana* (Ach.) Nyl. - Locality 80; on *Populus* sp.
- \**Lecanora argentata* (Ach.) Malme - Locality 68, 78, 79, 80; on *Alnus* sp., *Picea orientalis*, *Populus* sp. and *Salix* sp.
- \**Lecanora argopholis* (Ach.) Ach. - Locality 8, 9, 15, 16, 17, 18, 20, 26, 28, 39, 43, 44, 45, 46, 47, 52, 56, 59, 79; on siliceous rock.
- \**Lecanora bolcana* (Pollich) Poelt - Locality 3, 4, 8, 9, 10, 14, 25, 38, 50, 52, 56, 59, 62, 63, 68, 70, 79; on siliceous rock.
- +*Lecanora caesiosora* Poelt - Locality 59; on siliceous rock.
- \**Lecanora campestris* (Schaer.) Hue subsp. *campestris* - Locality 78; on calcareous rock.

- +*Lecanora campestris* (Schaer.) Hue subsp. *dolomitica* O.L. Gilbert - Locality 63, 68; on calcareous rock.
- \**Lecanora carpinea* (L.) Vain. - Locality 67, 68, 79, 80; on *Picea orientalis*, *Salix* sp., *Populus* sp., *Carpinus* sp. and *Prunus* sp.
- \**Lecanora cenisia* Ach. - Locality 4, 9, 10, 11, 14, 22, 28, 30, 39, 50, 51, 52, 56, 59, 61, 62, 63, 66, 67, 70, 79, 80; on siliceous rock.
- \**Lecanora chlarotera* Nyl. - Locality 9, 66, 68, 79; on *Salix* sp., *Pinus sylvestris* and *Carpinus* sp.
- \**Lecanora crenulata* Hook. - Locality 42, 43, 76; on calcareous rock.
- \**Lecanora dispersa* (Pers.) Sommerf. - Locality 22, 28, 51, 52, 56, 63, 65, 79; on calcareous rock.
- \**Lecanora expallens* Ach. - Locality 68; on *Carpinus* sp.
- \**Lecanora frustulosa* (Dicks.) Ach. - Locality 56, 60; on siliceous rock.
- \**Lecanora gangaleoides* Nyl. - Locality 57; on siliceous rock.
- \**Lecanora garovaglioii* (Körb.) Zahlbr. - Locality 1, 10; on siliceous rock.
- \**Lecanora glabrata* (Ach.) Malme - Locality 67, 68, 78, 79, 80; on *Picea orientalis*, *Carpinus* sp., *Pinus sylvestris*, *Alnus* sp., *Prunus* sp. and *Populus* sp.
- \**Lecanora hagenii* (Ach.) Ach. - Locality 8a, 22, 56, 62, 71; on *Salix* sp. and *Pinus sylvestris*.
- \**Lecanora handelii* J. Steiner - Locality 3; on siliceous rock.
- \**Lecanora horiza* (Ach.) Lindsay - Locality 79, 80; on *Salix* sp. and *Populus* sp.
- +*Lecanora hybocarpa* (Tuck.) Brodo - Locality 79; on *Picea orientalis*.
- \**Lecanora intricata* (Ach.) Ach. - Locality 8, 9, 10, 52, 63, 68; on siliceous rock.
- \**Lecanora leptyrodes* (Nyl.) Degel. - Locality 67, 68, 78, 79, 80; on *Picea orientalis*, *Prunus* sp., *Populus* sp., *Carpinus* sp., *Salix* sp. and *Alnus* sp.
- \**Lecanora muralis* (Schreb.) Rabenh. - Locality 1, 4, 8, 10, 14, 15, 16, 18, 19, 20, 22, 23, 24, 25, 26, 28, 29, 30, 34, 36, 37, 38, 40, 46, 48, 49, 50, 51, 52, 59, 61, 62, 63, 66, 67, 68, 70, 71, 72, 78, 79; on calcareous rock.
- \**Lecanora persimilis* (Th. Fr.) Arnold - Locality 68; on *Salix* sp.
- \**Lecanora polytropa* (Ehrh.) Rabenh. - Locality 4, 8, 9, 10, 14, 30, 50, 51, 52, 56, 61, 62, 63, 64, 68, 72, 79; on siliceous rock.
- \**Lecanora rupicola* (L.) Zahlbr. - Locality 1, 3, 5, 8, 9, 10, 11, 14, 22, 25, 28, 29, 31, 33, 35, 36, 38, 41, 42, 44, 47, 49, 50, 51, 52, 56, 59, 61, 62, 63, 66, 67, 68, 70, 73, 78, 79; on siliceous rock.
- \**Lecanora subcarnea* (Lilj.) Ach. - Locality 1, 3, 8, 10, 14, 25, 50, 51, 56, 61, 63, 65, 74, 78, 79; on siliceous rock.
- \**Lecanora swartzii* (Ach.) Ach. - Locality 4, 9, 10, 11, 14, 22, 29, 38, 50, 52, 56, 61, 63, 65, 68, 70, 78, 79; on siliceous rock.

- \**Lecanora varia* (Hoffm.) Ach. - Locality 8, 10, 14, 51, 56, 62, 63; on *Pinus sylvestris*.
- \**Lecidea atrobrunnea* (DC.) Schaer. - Locality 3, 8, 10, 25, 50, 52, 62, 63; on siliceous rock.
- \**Lecidea confluens* (Weber) Ach. - Locality 4, 9, 10, 14, 50, 51, 52, 56, 63; on siliceous rock.
- \**Lecidea fuscoatra* (L.) Ach. - Locality 1, 3, 8, 9, 10, 22, 29, 50, 52, 56, 61, 62, 63, 68, 75, 79; on siliceous rock.
- \**Lecidea grisella* Flörke - Locality 63, 79; on siliceous rock.
- \**Lecidea hypnorum* Lib. - Locality 64; on the thallus of *Peltigera leucophlebia*.
- \**Lecidea lactea* Flörke ex Schaer. - Locality 3, 56, on siliceous rock.
- \**Lecidea lapicida* (Ach.) Ach. - Locality 3, 10, 14, 25, 29, 38, 50, 51, 52, 56, 59, 63, 79; on siliceous rock.
- \**Lecidea lithophila* (Ach.) Ach. - Locality 79; on siliceous rock.
- \**Lecidea plana* (J. Lahm) Nyl. - Locality 1, 10, 20, 50, 56, 63, 79; on siliceous rock.
- \**Lecidea sarcogynoides* Körb. - Locality 53; on stone.
- \**Lecidea variegatula* Nyl. - Locality 79; on siliceous rock.
- \**Lecidella achristotera* Nyl. - Locality 80; on *Salix* sp.
- \**Lecidella carpathica* Körb. - Locality 1, 3, 5, 6, 8, 9, 10, 11, 14, 20, 22, 25, 28, 29, 30, 38, 50, 51, 52, 56, 59, 61, 63, 65, 66, 67, 68, 78, 79; on calcareous rock.
- \**Lecidella elaeochroma* (Ach.) M. Choisy - Locality 67, 68, 78, 79, 80; on *Alnus* sp., *Carpinus* sp., *Populus* sp., *Pyrus* sp., *Prunus* sp. and *Salix* sp.
- \**Lecidella euphorea* (Flörke) Hertel - Locality 51, 67, 68, 78; on *Pinus sylvestris*, *Populus* sp., *Picea orientalis*, *Carpinus* sp. and *Alnus* sp.
- \**Lecidella patavina* (A. Massal.) Knoph & Leuckert - Locality 38; on granite rock.
- \**Lecidella stigmatea* (Ach.) Hertel & Leuckert - Locality 8, 10, 14, 38, 51, 52, 56, 61, 62, 63, 64, 68, 79; on calcareous rock.
- \**Lepraria caesioalba* (B. de Lesd.) J.R. Laundon - Locality 79; on siliceous rock.
- \**Lepraria incana* (L.) Ach. - Locality 57, 58, 60; on calcareous rock.
- \**Lepraria lobificans* Nyl. - Locality 56; on calcareous rock and mosses.
- \**Lepraria membranacea* (Dicks.) Vain - Locality 56; on mosses.
- \**Lepraria neglecta* (Nyl.) Erichsen - Locality 14; on mosses.
- \**Lepraria rigidula* (B. de Lesd.) Tønsberg - Locality 14, 56; on mosses.
- \**Leprocaulon microscopicum* (Vill.) Gams - Locality 71, 72; on mosses.
- \**Leproplaca chrysodeta* (Vain. ex Räsänen) J.R. Laundon - Locality 67; calcareous rock.

- \**Leptogium cyanescens* (Pers.) Körb. - Locality 41, 42, 43, 44, 48, 68, 72, 78; on mosses.
- \**Leptogium saturninum* (Dicks.) Nyl. - Locality 76, 77, 79; on mosses.
- \**Letharia vulpina* (L.) Hue - Locality 8, 51, 57, 59, 60, 63; on *Pinus sylvestris*.
- \**Lichenostigma maureri* Hafellner - Locality 14, 57; on the thallus of *Usnea lapponica*.
- \**Lobaria pulmonaria* (L.) Hoffm. - Locality 57, 60, 79; on *Pinus sylvestris*.
- \**Lobothallia alphoplaca* (Wahlenb.) Hafellner - Locality 3, 4, 8, 14, 20, 28, 29, 38, 50, 52, 63, 68, 71, 72, 73, 74, 75, 76, 79; on siliceous rock.
- \**Lobothallia praevalida* (Nyl.) Hafellner - Locality 79; on siliceous rock.
- \**Melanelia disjuncta* (Erichsen) Essl. - Locality 14, 34; on siliceous rock.
- \**Melanelia sorediata* (Ach.) Goward & Ahti - Locality 10, 14, 38, 54, 55, 58, 79; on siliceous rock.
- \**Melanelia stygia* (L.) Essl. - Locality 1, 3, 4, 8, 10, 14, 20, 38, 43, 44, 45, 46, 50, 51, 56; on siliceous rock.
- \**Melanelixia fuliginosa* (Fr. ex Duby) O. Blanco, et al. subsp. *fuliginosa* - Locality 14, 63, 70, 80; on *Pinus sylvestris* and *Populus* sp.
- \**Melanelixia fuliginosa* (Fr. ex Duby) O. Blanco, et al. subsp. *glabrata* (Lamy) J.R. Laundon - Locality 67; on *Pinus sylvestris*.
- \**Melanelixia glabra* (Schaer.) Nyl. - Locality 68; on *Picea orientalis*.
- \**Melanelixia subargentifera* (Nyl.) O. Blanco, et al. - Locality 67, 79, 80; on *Pinus sylvestris* and *Prunus* sp.
- \**Melanelixia subaurifera* (Nyl.) O. Blanco, et al. - Locality 68, 78, 80; on *Prunus* sp., *Alnus* sp., *Picea orientalis* and *Pinus sylvestris*.
- \**Melanohalea elegantula* (Zahlbr.) O. Blanco, et al. - Locality 10, 11, 14, 79; on *Pinus sylvestris*, calcareous rock and mosses.
- \**Melanohalea exasperata* (De Not.) O. Blanco, et al. - Locality 8, 56, 57, 60, 68; on *Pinus sylvestris*.
- \**Melanohalea exasperatula* (Nyl.) O. Blanco, et al. - Locality 1, 3, 10, 14, 20, 38, 39, 42, 43, 56, 57, 60, 63, 67, 68, 79, 80; on *Carpinus* sp., *Prunus* sp., *Populus* sp., *Salix* sp., *Pinus sylvestris* and calcareous rock.
- \**Melanohalea infumata* (Nyl.) O. Blanco, et al. - Locality 4, 8, 9, 10, 14, 28, 30, 38, 50, 51, 56, 59, 68, 79; on calcareous rock and mosses.
- \**Miriquidica deusta* (Stenh.) Hertel & Rambold - Locality 35; on siliceous rock.
- Myelochroa aurulenta* (Tuck.) Elix & Hale - Locality 79; on calcareous rock and mosses.
- \**Nephroma bellum* (Spreng.) Tuck. - Locality 80; on *Picea orientalis*.
- \**Nephroma parile* (Ach.) Ach. - Locality 14, 15, 16, 24, 26, 33, 34, 46, 47, 54, 56, 57, 58, 60, 66, 67, 68, 73, 76, 78, 79; on *Pinus sylvestris*, siliceous rock and mosses.

- \**Normandina pulchella* (Borrer) Nyl. - Locality 68; on mosses.
- \**Ochrolechia androgyna* (Hoffm.) Arnold - Locality 56; on mosses.
- \**Opegrapha varia* Pers. - Locality 68; on *Carpinus* sp.
- \**Pannaria conoplea* (Ach.) Bory - Locality 68; on mosses.
- \**Parmelia omphalodes* (L.) Ach. - Locality 35, 36, 37; on siliceous rock.
- \**Parmelia saxatilis* (L.) Ach. - Locality 4, 8, 9, 10, 23, 38, 43, 50, 56, 57, 60, 66, 68, 72, 79; on siliceous rock, mosses and *Pinus sylvestris*.
- \**Parmelia sulcata* Taylor - Locality 8, 9, 14, 20, 33, 35, 36, 37, 53, 54, 55, 67, 68, 78, 79; on *Populus* sp., *Pinus sylvestris*, *Carpinus* sp., *Alnus* sp., *Salix* sp., *Picea orientalis*, *Prunus* sp. and mosses.
- \**Parmeliella triptophylla* (Ach.) Müll. Arg. - Locality 80; on siliceous rock.
- \**Parmelina tiliacea* (Hoffm.) Hale - Locality 15, 16; on mosses.
- Parmelinopsis minarum* (Vain.) Elix & Hale - Locality 68; on *Pinus sylvestris*.
- \**Parmeliopsis ambigua* (Wulfen) Nyl. - Locality 8, 10, 14, 43, 51, 56, 57, 60, 63, 64, 79; on *Pinus sylvestris*.
- \**Parmeliopsis hyperopta* (Ach.) Vain. - Locality 9, 51, 79; on *Pinus sylvestris*.
- Parmotrema hypoleucinum* (J. Steiner) Hale - Locality 79; on *Pinus sylvestris*.
- \**Parmotrema perlatum* (Huds.) M. Choisy - Locality 39, 57, 60, 79; on *Pyrus* sp. and *Pinus sylvestris*.
- Parmotrema reticulatum* (Taylor) M. Choisy - Locality 79; on *Pinus sylvestris* and mosses.
- \**Peltigera canina* (L.) Willd. - Locality 8a, 10, 14, 57, 60, 62, 65, 67, 71, 73, 78, 80; on mosses.
- \**Peltigera didactyla* (With.) J.R. Laundon - Locality 66; on soil.
- \**Peltigera elisabethae* Gyeln. - Locality 56, 66, 78; on mosses.
- \**Peltigera horizontalis* (Huds.) Baumg. - Locality 57, 58, 60, 78, 79, 80; on mosses.
- \**Peltigera kristinssonii* Vitik. - Locality 14; on mosses.
- \**Peltigera lepidophora* (Nyl.) Bitter - Locality 38, 40, 41; on soil.
- \**Peltigera leucophlebia* (Nyl.) Gyeln. - Locality 14, 43, 57, 60, 64, 66, 67, 80; on mosses.
- \**Peltigera malacea* (Ach.) Funck - Locality 14, 41; on mosses.
- \**Peltigera membranacea* (Ach.) Nyl. - Locality 32; on mosses.
- \**Peltigera neckeri* Hepp ex. Müll. Arg. - Locality 12, 13, 14, 50, 56, 78; on mosses.
- \**Peltigera neopolydactyla* (Gyeln.) Gyeln. - Locality 57, 60, 78, 80; on mosses.
- \**Peltigera polydactylon* (Neck.) Hoffm. - Locality 14, 31, 42, 48, 64, 74, 79; on soil and mosses.
- \**Peltigera ponojensis* Gyeln. - Locality 65, 78; on mosses.

- \**Peltigera praetextata* (Sommerf.) Zopf - Locality 14, 15, 19, 21, 23, 24, 39, 44, 49, 56, 57, 60, 65, 78, 79, 80; on mosses and soil.
- \**Peltigera rufescens* (Weiss) Humb. - Locality 5, 10, 14, 18, 20, 26, 30, 32, 40, 49, 53, 57, 58, 60, 66, 67, 69, 75, 79; on mosses and soil.
- \**Peltigera venosa* (L.) Hoffm. - Locality 14, 56, 69; on soil.
- \**Peltula euploca* (Ach.) Poelt ex Ozenda & Clauzade - Locality 1, 31, 55; on siliceous rock.
- \**Pertusaria albescens* (Huds.) M. Choisy & Werner - Locality 38, 51, 67, 79; on *Pinus sylvestris*.
- \**Pertusaria amara* (Ach.) Nyl. var. *amara* - Locality 54, 58, 60; on *Pinus sylvestris*.
- \**Pertusaria amara* (Ach.) Nyl. var. *flotowiana* (Flörke) Erichsen - Locality 79; on siliceous rock.
- \**Pertusaria aspergilla* (Ach.) J.R. Laundon - Locality 38; on calcareous rock.
- \**Pertusaria lactea* (L.) Arnold - Locality 12, 13, 32, 33, 38, 56, 66, 76, 77; on siliceous rock.
- \**Pertusaria pertusa* (L.) Tuck. - Locality 44, 49; on siliceous rock.
- \**Pertusaria pupillaris* (Nyl.) Th. Fr. - Locality 14, 63, 79; on *Pinus sylvestris*.
- \**Pertusaria rupicola* (Fr.) Harm. - Locality 14; on calcareous rock.
- \**Phaeophyscia chloantha* (Ach.) Moberg - Locality 39; on calcareous rock and mosses.
- \**Phaeophyscia ciliata* (Hoffm.) Moberg - Locality 21, 24, 37, 68, 73, 77; on *Populus* sp. and *Prunus* sp.
- \**Phaeophyscia constipata* (Norrl. & Nyl.) Moberg - Locality 14, 56, on mosses.
- \**Phaeophyscia endococcina* (Körb.) Moberg - Locality 8, 9, 14, 39, 50, 51, 52, 56, 61, 63, 79, 80; on *Populus* sp., mosses, calcareous rock and siliceous rock.
- \**Phaeophyscia endophoenicea* (Harm.) Moberg - Locality 16, 18, 68; on *Carpinus* sp. and calcareous rock.
- \**Phaeophyscia nigricans* (Flörke) Moberg - Locality 1, 79; on *Populus* sp.
- \**Phaeophyscia orbicularis* (Neck.) Moberg - Locality 8a, 62, 67, 68, 78, 79; on *Alnus* sp., *Populus* sp., *Carpinus* sp. and *Salix* sp.
- \**Phaeophyscia poeltii* (Frey) Clauzade & Cl. Roux - Locality 8a, 11, 56; on *Pinus sylvestris* and *Salix* sp.
- \**Phaeophyscia sciastra* (Ach.) Moberg - Locality 4, 10, 14, 38, 50, 56, 63, 79; on mosses and calcareous rock.
- \**Phaeorrhiza nimbosea* (Fr.) H. Mayrhofer & Poelt - Locality 53, 74; on soil.
- \**Phlyctis argena* (Ach.) Flot. - Locality 78, 80; on *Picea orientalis* and *Corylus* sp.

- \**Physcia adscendens* (Fr.) H. Olivier - Locality 16, 17, 18, 20, 21, 23, 38, 39, 44, 69, 75, 78, 79, 80; on *Prunus* sp., *Salix* sp., *Alnus* sp. and calcareous rock.
- \**Physcia aipolia* (Ehrh. ex Humb.) Fűrnr. - Locality 1, 2, 4, 8, 10, 14, 20, 40, 41, 42, 50, 56, 67, 68, 69, 74, 76, 78, 79, 80; on *Alnus* sp., *Pinus sylvestris*, *Populus* sp., *Prunus* sp., *Salix* sp., *Pyrus* sp. *Picea orientalis* and mosses.
- \**Physcia biziana* (A. Massal.) Zahlbr. - Locality 4, 8, 10, 14, 20, 51, 56, 61, 63, 79; on *Salix* sp., *Ulmus* sp., mosses and calcareous rock.
- \**Physcia caesia* (Hoffm.) Hampe ex Fűrnr. - Locality 1, 3, 4, 8, 9, 10, 14, 20, 30, 38, 41, 45, 56, 79; on mosses and calcareous rock.
- \**Physcia dimidiata* (Arnold) Nyl. - Locality 1, 14, 20, 25, 38, 50, 51, 56, 79; on *Pinus sylvestris*, mosses, soil and calcareous rock.
- \**Physcia dubia* (Hoffm.) Lettau - Locality 1, 3, 7, 8, 10, 14, 17, 20, 24, 25, 26, 30, 31, 32, 33, 38, 39, 47, 49, 51, 52, 56, 62, 63, 68, 79; on *Pinus sylvestris*, mosses and siliceous rock.
- \**Physcia stellaris* (L.) Nyl. - Locality 2, 7, 56; on *Pinus sylvestris*.
- \**Physcia tenella* (Scop.) DC. - Locality 56; on *Pinus sylvestris*.
- \**Physcia tribacia* (Ach.) Nyl. - Locality 9, 10, 14, 30, 39, 56; on *Pinus sylvestris*, soil and siliceous rock.
- \**Physconia distorta* (With.) J.R. Laundon - Locality 20, 44, 45, 67, 68, 78, 79; on *Carpinus* sp., *Populus* sp., *Alnus* sp., *Pyrus* sp., *Salix* sp. and mosses.
- \**Physconia enteroxantha* (Nyl.) Poelt - Locality 21, 79; on *Pyrus* sp. and mosses.
- \**Physconia muscigena* (Ach.) Poelt - Locality 12, 15, 17, 19, 24, 26, 31, 36, 48, 49, 50, 53, 69, 73, 75, 77; on mosses.
- \**Physconia perisidiosa* (Erichsen) Moberg - Locality 10, 15, 16, 21, 68, 79; on *Populus* sp., *Pyrus* sp. and mosses.
- \**Physconia subpulverulenta* (Szatala) Poelt - Locality 26, 78, 79; on *Alnus* sp., *Pinus sylvestris* and mosses.
- \**Placynthium nigrum* (Huds.) Gray - Locality 18, 79; on calcareous rock.
- \**Platismatia glauca* (L.) W.L. Culb. & C.F. Culb. - Locality 67, 71, 72, 73, 79; on *Pinus sylvestris*.
- \**Polysporina simplex* (Davies) Vězda - Locality 4, 10; on siliceous rock.
- \**Porpidia albocaerulescens* (Wulfen) Hertel & Knoph - Locality 24, 68; on siliceous rock.
- \**Porpidia crustulata* (Ach.) Hertel & Knoph - Locality 66, 78, 79; on siliceous rock.
- \**Porpidia macrocarpa* (DC.) Hertel & A.J. Schwab - Locality 63, 67, 79, 80; on calcareous rock.
- \**Porpidia tuberculosa* (Sm.) Hertel & Knoph - Locality 78; on siliceous rock.

- \**Protopannaria pezizoides* (Weber ex F.H. Wigg.) P.M. Jørg. & S.Ekman - Locality 34, 45, 47, 64; on soil.
- \**Pseudevernia furfuracea* (L.) Zopf var. *ceratea* (Ach.) D. Hawksw - Locality 43, 79; on *Pinus sylvestris*.
- \**Pseudevernia furfuracea* (L.) Zopf var. *furfuracea* - Locality 2, 4, 9, 14, 39, 51, 56, 57, 60, 61, 62, 66, 79; on *Pinus sylvestris*.
- \**Ramalina capitata* (Ach.) Nyl. - Locality 3, 4, 8, 10, 20, 30, 38, 39, 50, 53, 54, 55, 58; on siliceous rock.
- \**Ramalina farinacea* (L.) Ach. - Locality 42, 43, 57, 60, 68, 79, 80; on *Pinus sylvestris*.
- \**Ramalina fastigiata* (Pers.) Ach. - Locality 79; on *Pinus sylvestris*.
- +*Ramalina lacera* (With.) J.R. Laundon - Locality 80; on *Picea orientalis*.
- \**Ramalina panizzei* De Not. - Locality 20, 68, 79, 80; on *Picea orientalis*, *Pinus sylvestris* and calcareous rock.
- \**Ramalina pollinaria* (Westr.) Ach. - Locality 39, 56, 60, 67, 78, 79; on *Pinus sylvestris* and *Picea orientalis*.
- \**Ramalina polymorpha* (Lilj.) Ach. - Locality 2, 4, 8, 17, 21, 27, 28, 30, 42, 44, 50, 56, 69, 75, 77; on siliceous rock.
- \**Ramalina thrausta* (Ach.) Nyl. - Locality 80; on *Picea orientalis*.
- \**Rhizocarpon badioatrum* (Flörke ex Spreng.) Th. Fr. - Locality 50, 56, 61, 63, 68, 78; on siliceous rock.
- \**Rhizocarpon disporum* (Nägeli ex Hepp) Müll. Arg. - Locality 3, 14, 51, 56, 79; on siliceous rock.
- \**Rhizocarpon geographicum* (L.) DC. - Locality 1, 3, 4, 5, 6, 7, 8, 9, 10, 14, 17, 19, 21, 22, 23, 25, 26, 28, 30, 32, 34, 35, 37, 38, 43, 44, 45, 46, 47, 49, 50, 51, 52, 56, 59, 61, 62, 63, 66, 68, 70, 71, 72, 73, 74, 75, 76, 77, 79; on siliceous rock.
- \**Rhizocarpon lecanorinum* Anders - Locality 70; on siliceous rock.
- \**Rhizocarpon reductum* Th. Fr. - Locality 66; on siliceous rock.
- \**Rhizocarpon simillimum* (Anzi) Lettau - Locality 50; on siliceous rock.
- \**Rhizocarpon subgeminatum* (Anzi) Lettau - Locality 3, 14, 56; on siliceous rock.
- \**Rhizoplaca chrysoleuca* (Sm.) Zopf - Locality 1, 3, 4, 8, 10, 11, 20, 22, 25, 27, 29, 30, 34, 35, 36, 37, 38, 40, 41, 47, 48, 49, 50, 51, 52, 53, 54, 55, 58, 59, 63, 69, 70, 72, 74, 75, 77, 79; on siliceous rock.
- \**Rhizoplaca melanophthalma* (DC.) Leuckert - Locality 1, 3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 15, 16, 19, 21, 22, 23, 24, 26, 27, 31, 32, 38, 50, 52, 56, 58, 59, 63, 79; on siliceous rock.
- \**Rhizoplaca peltata* (Ramond) Leuckert & Poelt - Locality 3, 44, 47, 49; on siliceous rock.
- \**Rimularia insularis* (Nyl.) Rambold & Hertel - Locality 10, 70; on the thallus of *Aspicilia* sp.
- \**Rinodina confragosa* (Ach.) Körb. - Locality 52, 65; on siliceous rock.



- \**Rinodina epimilvina* H. Mayrhofer - Locality 10; on *Rinodina milvina*.
- \**Rinodina luridescens* (Anzi) Arnold - Locality 56, 65, 68, 79, on siliceous rock.
- \**Rinodina milvina* (Wahlenb.) Th. Fr. - Locality 1, 4, 8, 9, 10, 11, 14, 17, 18, 19, 20, 22, 25, 28, 29, 30, 38, 50, 51, 52, 56, 59, 61, 62, 63, 65, 68, 70, 79, 80; on calcareous rock.
- \**Rinodina occulta* (Körb.) Sheard - Locality 38; on siliceous rock.
- \**Rinodina oleae* Bagl. - Locality 68, 79, 80; on *Populus* sp., *Salix* sp., *Carpinus* sp., *Picea orientalis* and *Pinus sylvestris*.
- \**Rinodina pyrina* (Ach.) Arnold - Locality 62, 67, 68, 79, 80; on *Alnus* sp., *Picea orientalis*, *Pinus sylvestris*, *Populus* sp. *Prunus* sp. and *Salix* sp.
- \**Rinodina teichophila* (Nyl.) Arnold - Locality 68; on siliceous rock.
- \**Romjulularia lurida* (Ach.) Timdal - Locality 1, 50; on soil.
- \**Sarcogyne privigna* (Ach.) A. Massal. - Locality 45; on siliceous rock.
- \**Sarcogyne regularis* Körb. - Locality 46; on siliceous rock.
- \**Scoliciosporum chlorococcum* (Graewe ex Stenh.) Vězda - Locality 68; on *Salix* sp.
- \**Scoliciosporum intrusum* (Th. Fr.) Hafellner - Locality 50; on the thallus of *Aspicilia caesiocinerea*.
- \**Scoliciosporum umbrinum* (Ach.) Arnold - Locality 3, 14, 38, 50, 56; on the thallus of *Umbilicaria vellea* and siliceous rock.
- \**Squamarina cartilaginea* (With.) P. James - Locality 79; on soil.
- \**Stereocaulon pileatum* Ach. - Locality 41, 42; on siliceous rock.
- \**Thyrea confusa* Henssen - Locality 56; on calcareous rock.
- \**Toninia sedifolia* (Scop.) Timdal - Locality 30, 40, 41, 42, 72, 73; on soil.
- \**Toninia squalida* (Ach.) A. Massal. - Locality 14, 27, 33, 34, 35, 36, 37, 56; on soil.
- \**Trapelia coarctata* (Turner ex Sm.) M. Choisy - Locality 67; on calcareous rock.
- Trapeliopsis gelatinosa* (Flörke) Coppins & P. James - Locality 68; on calcareous rock.
- \**Tuckermanopsis chlorophylla* (Willd.) Hale - Locality 79, 80; on *Picea orientalis* and *Pinus sylvestris*.
- \**Umbilicaria cylindrica* (L.) Delise - Locality 3, 6, 9, 12, 13, 23, 24, 26, 33, 34, 36, 37, 40, 44, 45, 47, 49, 50, 56, 64, 72, 74, 75, 76, 77; on siliceous rock.
- \**Umbilicaria decussata* (Vill.) Zahlbr. - Locality 6, 40, 41, 48, 50, 46, 71, 74, 77; on siliceous rock.
- \**Umbilicaria deusta* (L.) Baumg. - Locality 2, 3, 10, 14, 21, 23, 24, 39, 40, 42, 44, 50, 58, 66, 71, 73, 75, 76; on siliceous rock.
- \**Umbilicaria hirsuta* (Sw. ex Westr.) Ach. - Locality 50; on siliceous rock.
- \**Umbilicaria hyperborea* (Ach.) Hoffm. - Locality 4; on siliceous rock.

- \**Umbilicaria nylanderiana* (Zahlbr.) H. Magn. - Locality 4, 9, 50; on siliceous rock.
- \**Umbilicaria polyphylla* (L.) Baumg. - Locality 8; on siliceous rock.
- \**Umbilicaria subglabra* (Nyl.) Harm. - Locality 3, 13, 50; on siliceous rock.
- \**Umbilicaria vellea* (L.) Ach. - Locality 3, 27, 32, 35, 37, 43, 46, 48, 50, 56, 58, 71, 72; on siliceous rock.
- \**Usnea barbata* (L.) Weber ex F.H. Wigg - Locality 8, 9, 14, 57, 60, 79, 80; on *Picea orientalis* and *Pinus sylvestris*.
- \**Usnea cavernosa* Tuck. - Locality 51, 65; on *Pinus sylvestris*.
- \**Usnea chaetophora* Stirt. - Locality 67; on *Picea orientalis*.
- \**Usnea cornuta* Körb. - Locality 66, 68; on *Carpinus* sp. and *Pinus sylvestris*.
- \**Usnea dasypoga* (Ach.) Nyl. - Locality 39, 43, 52, 56, 57, 60, 68, 79, 80; on *Carpinus* sp., *Picea orientalis* and *Pinus sylvestris*.
- \**Usnea esperantiana* P. Clerc - Locality 63; on *Pinus sylvestris*.
- \**Usnea florida* (L.) Weber ex F.H. Wigg. - Locality 43, 57, 60, 79, 80; on *Pinus sylvestris*.
- \**Usnea fulvovirens* (Räsänen) Räsänen - Locality 68; on *Carpinus* sp.
- \**Usnea glabrescens* (Nyl. ex Vain.) Vain. - Locality 67, 68, 78, 79; on *Carpinus* sp., *Pinus sylvestris* and *Picea orientalis*.
- \**Usnea hirta* (L.) Weber ex F.H. Wigg. - Locality 9, 10, 14, 43, 51, 56, 57, 59, 60, 63, 64, 67, 68, 71, 72, 79, 80; on *Picea orientalis* and *Pinus sylvestris*.
- \**Usnea intermedia* Jatta - Locality 67, 79; on *Pinus sylvestris* and *Picea orientalis*.
- \**Usnea lapponica* Vain. - Locality 8, 10, 14, 51, 56, 57, 63, 64, 67, 68, 79; on *Carpinus* sp., *Pinus sylvestris* and *Picea orientalis*.
- \**Usnea subfloridana* Stirt. - Locality 57, 60, 66, 68, 79; on *Carpinus* sp. and *Pinus sylvestris*.
- \**Usnea substerilis* Motyka - Locality 2, 9, 10, 14, 51, 56, 68, 80; on *Picea orientalis* and *Pinus sylvestris*.
- \**Usnea wasmuthii* Räsänen - Locality 63, 68, 79; on *Carpinus* sp. and *Pinus sylvestris*.
- \**Xanthoparmelia conspersa* (Ehrh. ex Ach.) Hale - Locality 5, 7, 15, 16, 17, 23, 24, 31, 32, 33, 53, 54, 55, 64, 69, 73, 76, 78, 79; on siliceous rock.
- \**Xanthoparmelia convoluta* (Kremp.) Hale - Locality 3, 4, 8, 20, 30, 38, 50, 56; on soil.
- \**Xanthoparmelia delisei* (Duby) O. Blanco, et al. - Locality 8, 10, 38, 56, 78; on siliceous rock.
- \**Xanthoparmelia pokornyi* (Körb.) O. Blanco, et al. - Locality 4, 5, 12, 30, 33, 38, 46, 50, 54, 69; on soil.

- \**Xanthoparmelia pulla* (Ach.) O. Blanco, et al. - Locality 9, 10, 14, 20, 28, 34, 38, 43, 45, 47, 49, 56, 68, 70, 79; on siliceous rock.
- \**Xanthoparmelia stenophylla* (Ach.) Ahti & D. Hawksw. - Locality 3, 5, 8, 9, 10, 13, 14, 16, 19, 20, 23, 28, 30, 31, 35, 36, 38, 40, 41, 44, 48, 49, 50, 54, 55, 56, 67, 68, 70, 73, 75, 77, 78, 79; siliceous rock and mosses.
- \**Xanthoparmelia tinctina* (Maheu & A. Gillet) Hale - Locality 1, 8, 9, 10, 20, 25, 38, 56, 70, 79; on siliceous rock.
- Xanthoparmelia verrucigera* (Nyl.) Hale - Locality 68; on siliceous rock.
- \**Xanthoparmelia verruculifera* (Nyl.) O. Blanco, et al. - Locality 3, 14, 50, 52, 63, 79; on siliceous rock.
- \**Xanthoria aureola* (Ach.) Erichsen - Locality 20, 51, 56; on siliceous rock.
- \**Xanthoria candelaria* (L.) Th. Fr. - Locality 2, 8, 10, 14, 56, 62, 63; on *Pinus sylvestris*.
- \**Xanthoria elegans* (Link) Th. Fr. - Locality 1, 3, 4, 9, 10, 12, 13, 16, 17, 18, 20, 21, 22, 26, 27, 28, 29, 30, 34, 36, 37, 38, 45, 46, 51, 52, 53, 54, 56, 58, 59, 68, 70, 73, 74; on *Salix* sp., *Populus* sp., calcareous and siliceous rock.
- \**Xanthoria fallax* (Hepp ex Arnold) Arnold - Locality 1, 20, 39, 68, 69, 73, 74, 76, 77, 78, 79, 80; on *Salix* sp., *Populus* sp., *Prunus* sp. *Pyrus* sp., *Pinus sylvestris* and *Alnus* sp.
- \**Xanthoria fulva* (Hoffm.) Poelt & Petut. - Locality 2; on *Pinus sylvestris*.
- \**Xanthoria parietina* (L.) Th. Fr. - Locality 5, 6, 12, 18, 19, 21, 24, 33, 35, 36, 41, 42, 46, 48, 53, 55, 58, 63, 67, 69, 71, 73, 74, 77, 79; on *Salix* sp., *Pinus sylvestris*, *Pyrus* sp., *Populus* sp., *Prunus* sp. and siliceous rock.
- \**Xanthoria polycarpa* (Hoffm.) Rieber - Locality 80; on *Populus* sp.
- \**Xanthoria sorediata* (Vain.) Poelt - Locality 79; on calcareous rock.
- \**Vahliella leucophaea* (Vahl) P.M. Jørg. - Locality 67, 80; on siliceous rock.
- \**Verrucaria baldensis* A. Massal - Locality 72; on calcareous rock.
- \**Verrucaria muralis* Ach. - Locality 22, 29; on siliceous rock.
- \**Verrucaria nigrescens* Pers. - Locality 1, 5, 6, 7, 13, 17, 18, 23, 24, 26, 27, 33, 35, 36, 38, 41, 45, 46, 49, 51, 53, 54, 56, 58, 63, 68, 69, 73, 75, 77, 79; on calcareous rock.
- \**Verrucaria ochrostoma* Borrer - Locality 56; on calcareous rock.
- \**Verrucaria polysticta* Borrer - Locality 3, 10, 22, 25, 38, 50, 56; on calcareous rock.
- \**Vulpicida pinastri* (Scop.) J.-E. Mattsson & M.J. Lai - Locality 9, 10, 14, 51, 57, 60, 63, 79; on *Pinus sylvestris*.

## Discussion

We found 357 taxa, in which there are 9 taxa of lichenicolous fungi, a taxon of non-lichenized fungus, 181 taxa of crustose lichen (three of them are parasitic), 113 taxa of foliose lichen, 53 taxa of fruticose lichen, and 9 taxa of leprose lichen.

The 153 taxa are epiphytic, where the 36 of them epiphytic on mosses; 146 taxa saxicolous; 21 taxa terricolous; 24 taxa epiphytic or saxicolous, three taxa terricolous or muscicolous. In the study area the species were found on 13 different substrata, excluding lichenicolous, non-lichenized and parasitic ones. Of these, *Scoliciosporum umbrinum* also grows on rock and *Umbilicaria vellea* (as parasitic). *Rinodina epimilviva* on the thallus of *Rinodina milvina* and *Lecidea hypnorum* (on the thallus of *Peltigera leucophlebia*) have been recorded growing as parasitic. 117 lichen taxa were defined as corticolous only (on deciduous and coniferous trees) while 36 on mosses only. About 133 lichenized fungi were found to grow on the bark of deciduous and coniferous trees. The growth form and substrata represented in Table 2 reflect the habitat in Ardahan where the lichens were collected.

*Caloplaca*, *Lecanora*, *Peltigera*, *Cladonia*, *Usnea* and *Lecidea* are the most common genera in the study area. Moreover the genus of *Lecanora* has the biggest diversity among others genus (represented by 32 species, growing on rocks and deciduous and coniferous trees mostly in Göle, Çıldır and Posof regions), second common genus is *Caloplaca* (represented by 22 species, mostly on rocks and deciduous trees) and mainly occurring in Göle and Posof districts. The other common genera are *Peltigera* (16 members), *Cladonia* and *Usnea* (15 members), and *Lecidea*, consisting of 11 members. Majority of the member of the genus *Peltigera*, *Cladonia* and *Usnea* were reported growing on the bark of *Pinus sylvestris* at the Ardahan center (Yalnızçam forest) and, Göle (Yeniköy forests), and on the bark of *Picea orientalis* at the Posof district (Figure 1, Table 1). Because the forested areas are covered by meadows and grasslands, therefore the crustose species were found to be more common than other taxa.

Foliose genera such as *Flavoparmelia*, *Parmelia*, *Phaeophyscia*, *Physcia*, *Physconia*, *Melanelixia*, *Melanohalea*, *Peltigera*, *Xanthoparmelia* and *Xanthoria* were mostly found in Göle, Ardahan (center-Yalnızçam forests) and Posof regions (Figure 1, Table 1) and predominantly on deciduous (i.e. *Carpinus*, *Prunus*, *Pyrus*, *Alnus*, *Salix*), coniferous trees (i.e. *Pinus sylvestris* and *Picea orientalis*), and mosses. The most common localities are Posof: center, control tower forests (Loc. 79), Göle: Eskidemirkapı village, forest area (Loc. 56), Ardahan: center, Bağdeşen village-2 and forest area (Loc. 14), Posof: Kurşunçavuş, along the river and woodlands (Loc. 68), Göle: Köprülü, Köprülü plateau (Loc. 63) and Hanak: a. Altaş village, open area (Loc. 38) respectively (Figure 1, Table 1). 142 taxa were found in Posof town: control tower forests, while 106 species in

Göle: Eskidemirkapı village and woodlands. Fruticose taxa, mostly growing on deciduous and coniferous trees, and also on soil and mosses, were predominantly found on trees and mosses in Göle, Posof and Ardahan (center-Yalnızçam forests) towns. On the other hand crustose species, growing on siliceous and calcareous rocks, were found in Çıldır, Damal, Hanak and some part of Göle districts, since forests areas are very scarce there.

Localities 3, 10, 22, 25, 27, 33, 35, 36, 38, 50, 56, 72, 73, 75, 77, 79, are situated near a lime pit in where *Verrucaria baldensis*, *V. calciseda* and *V. nigrescens* are found, they are identified as an indicator species of lime and calcareous substratum (Figure 1, Table 1).

The substrata reported for these lichens reflect the general habitat features in the Ardahan province and to some extent determine the species presence. *Evernia prunastri*, *Hypogymnia physodes*, *Melanohalea exasperatula*, *Parmelia sulcata*, *Parmeliopsis ambigua*, *Physcia aipolia*, *Pseudevernia furfuracea* var. *furfuracea*, *Ramalina farinacea*, *R. pollinaria*, *Rinodina pyrina*, *Usnea dasypoga*, *U. hirta*, *U. lapponica*, *U. subfloridana*, *U. substerilis* and *Xanthoria fallax* are the most common and the best representative of phorophytes. *Cladonia cyathomorpha*, *C. macrophylla* *Porpidia tuberculosa*, *Rinodina occulta*, *Usnea wasmuthii* and *Xanthoparmelia convoluta* have been recorded their occurring for the second time in Turkey (Aslan et al. 2002, Candan & Özdemir-Türk 2008, Kinalioğlu 2009, Kinalioğlu & Aptroot 2010, Verseghy 1982, Yazici et al. 2008), while *Caloplaca oasis*, *Cladonia carneola*, *Endohyalina insularis*, *Lepraria rigidula*, *Parmeliella triptophylla*, *Pertusaria pupillaris*, *Phaeophyscia poeltii*, *Rinodina epimilvina* and *Scoliciosporum chlorococcum* for the third time in Turkey (Çobanoğlu et al. 2008, Doğru & Güvenç 2007, Halici et al. 2005, 2007a, John 1996a, 2002, 2003, John & Breuss 2004, John et al. 2000, Kinalioğlu 2007, Mayrhofer 1984, Öztürk et al. 2010, Szatala 1960, Şenkardeşler & Lökös 2010, Türk et al. 2009, Verseghy 1982, Yazici et al. 2010c). On the other hand *Arthonia intexta*, *Caloplaca subpallida*, *Peltigera kristinssonii*, *Rhizocarpon simillimum* and *Usnea esperantiana* have been found for the fourth time in Turkey (Halicı 2008, Halici & Aksoy 2009, John 1996b, Halici et al. 2006, 2007b, John & Nimis 2000, Kinalioğlu 2009a,b, Rigler 1852, Steiner 1899, Vitikainen 1985, 1994, Yazici 1999).

Especially *Xanthoparmelia convoluta* collected from localities 8, 9, 20, 30, 38, 50, 56 and *X. pokorny* from localities 3, 4, 12, 30, 33, 38, 46, 50, 54, 68, 69, 70 have been found abundantly growing on soil. On the other hand *Melanohalea infumata* on mosses and also rocks, *Lecanora albellula* on *Pinus sylvestris* and *Lecanora leptyroides* on deciduous trees were intensively found in Posof town.

Lichen biodiversity is very rich in the *Pinus sylvestris* forests of Göle and Ardahan towns, and also *Picea orientalis* and *Pinus sylvestris* forests of Posof town. From time to time some taxa of *Cladonia* on soil and mosses, and especially *Peltigera* spp. were abundantly seen growing on mosses in the *Pinus sylvestris* forests of Göle town. In the same forests *Usnea*, *Hypogymnia*, *Pseudevernia* and *Parmeliopsis ambigua* have been mostly found on the branches and badies of *Pinus sylvestris*. *Lecanora*, *Phaeophyscia*, *Physcia* and *Physconia* taxa have largely been found on deciduous trees such as *Populus*, *Carpinus*, *Pyrus* and *Prunus* in Posof town

Especially along and around the main road of Göle: Göle-Ardahan Ardahan-Hanak, Hanak-Damal and open areas of Göle, *Rhizoplaca chrysoleuca*, *R. melanophthalma*, *Lecanora rupicola*, *L. cenisia*, *Rhizocarpon geographicum*, *Ramalina capitata*, *R. polytropa* (especially in Ardahan: Çamlıbel), *Caloplaca grimmiae* (on *Candelariella vitellina*), *Lecidella carpathica* and *Rinodina milvina* were seen to be plentiful on siliceous and calcareous rocks. Lichen diversity is very poor since especially there are meadows and grasslands covering a larger area in the north and south of Ardahan town. Thus lichen samples couldn't be collected from there. On the other hand meadows and grasslands, covering a larger area especially, are prevalent in Çıldır town. But *Salix*, *Populus* partly occur along the stream of Öncül village. Thus some epiphytic taxa such as *Physcia*, *Physconia*, *Caloplaca* scarcely grow on these trees. On the other hand *Acarospora fuscata*, *Lecanora rupicola*, *Lecanora cenisia*, *Lecidella carpathica*, *Candelariella vitellina*, *Caloplaca grimmiae* (on *Candelariella vitellina*), and especially *Rhizocarpon geographicum*, *Rhizoplaca chrysoleuca* and *R. melanophthalma* were seen to grow plentifully on rocks in the rest of Çıldır town.

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**Table 1.** Collecting localities.

No	Locality	Coordinate	Altitude (m)	Date
1.	Ardahan: a. Center, side of Kura river	41°07'03.51"N, 42°42'18.03"E	1800	26.07.2009
2.	Ardahan: b. Center, main roadside of Hanak	41°07'04.90"N, 42°44'30.42"E	1850	26.07.2009
3.	Ardahan: a. Center, Çamlıbel 1	41°12'15.39"N, 42°33'08.14"E	2302	31.07.2009
4.	Ardahan: b. center, Çamlıbel 2	41°11'26.16"N, 42°35'09.20"E	1968	31.07.2009
5.	Ardahan: a. Center, main roadside of Ölçek village	41°07'06.45"N, 42°50'09.84"E	1825	27.07.2009
6	Ardahan: b. Center, Ölçek village, Ziyaret hill and surroundings	41°07'23.72"N, 42°51'23.86"E	1765	27.07.2009
7	Ardahan: Ardahan-Hanak, mainroad, forest area	41°07'30.83"N, 42°47'01.23"E	1940	01.08.2009
8	Ardahan: center, Yalnızçam forests 1	41°02'34.52"N, 42°26'32.44"E	1966-2124	13.08.2008
8a	Ardahan: center, Yalnızçam village	41°04'00.60"N, 42°29'46.14"E	1825	14.08.2008
9	Ardahan: center, Yalnızçam forests 2	40°51'13.48"N, 42°47'35.28"E	1966-2124	14.08.2008
10	Ardahan : center, opposite of Tepeler village, Kent forests	41°02'45.75"N, 42°35'24.37"E; 41°02'52.74"N, 42°36'19.00"E	1983-2034	09.12.2008
11	Ardahan: center, Bağdeşen village 1	41°03'32.69"N, 42°23'30.84"E	1987	10.12.2008
12	Ardahan: center, Hasköy	40°59'26.31"N, 42°52'48.21"E	1979	13.12.2008
13	Ardahan: center, Çatalköprü village	41°04'26.78"N, 42°28'30.32"E	1864	12.12.2008

Table 1. continued

No	Locality	Coordinate	Altitude (m)	Date
14	Ardahan: center, Bağdeşen village 2, woodlands	41°03'08.78"N, 42°24'21.15"E	2010	12.04.2009
15	Ardahan: center, Çimenkaya village	41°06'29.55"N, 42°29'27.32"E	1919	21.08.2009
16	Ardahan: center, Tunçoluk village	41°00'18.00"N, 42°59'05.36"E	2210	21.08.2009
17	Ardahan: center, Aşağıkurtoğlu village	41°01'23.75"N, 42°54'22.61"E	1970	21.08.2009
18	Ardahan, Samanbeyli köyü	41°02'17.23"N 42°53'34.18"E	1977	21.08.2009
19	Çıldır: Akdarı village	41°16'37.82"N, 43°08'59.07"E	1730	17.08.2009
20	Çıldır: Öncül village	41°14'21.99"N, 43°09'37.41"E	1762	15.08.2009
21	Çıldır: Övündü vilage	41°16'05.48"N, 43°00'21.89"E	1360	16.08.2009
22	Çıldır: entrance to town, side of main road, opposite of Eskibeyrehatun village	41°07'08.94"N, 42°57'47.00"E	1955	02.08.2009
23	Çıldır: Eskibeyrehatun village	41°07'08.94"N, 42°57'47.01"E	1955	02.08.2009
24	Çıldır: Yenibeyrehatun village	41°08'27.72"N, 42°57'54.27"E	1910	03.08.2009
25	Çıldır: Semiha Şakir village	41°07'50.32"N, 43°02'54.87"E	1964	04.08.2009
26	Çıldır: a. exit of town, side of main road opposite of Saymalı village 1	41°08'21.09"N, 43°10'01.27"E	2008	05.08.2009
27	Çıldır: b. exit of town, side of main road opposite of Saymalı village 2	41°08'01.85"N, 43°09'29.20"E	1960	05.08.2009

Table 1. continued

No	Locality	Coordinate	Altitude (m)	Date
28	Çıldır, Aşık Şenlik village	41°08'40.92"N, 43°12'42.27"E	1918	06.08.2009
29	Çıldır: Meryemköy	41°07'38.02"N, 43°01'19.57"E	2014	07.08.2009
30	Çıldır: Yıldırımtepe village	41°07'52.81"N, 43°07'34.61"E	1990	08.08.2009
31	Çıldır: Güvenocak village	41°06'39.43"N, 43°12'52.05"E	1935	11.08.2009
32	Çıldır: Başköy	41°07'29.35"N, 43°17'33.88"E	1985	12.08.2009
33	Çıldır: Gölbelen village	41°04'27.68"N, 43°07'18.52"E	1995	13.08.2009
34	Çıldır: Göbelbakan village	41°03'04.79"N, 43°07'50.91"E	2025	14.08.2009
35	Çıldır: a.Akkiraz village	41°15'02.39"N, 43°06'53.74"E	1582	10.08.2009
36	Çıldır: b. south of Akkiraz village, along the Kura river	41°14'06.10"N, 43°06'03.72"E	1470	10.08.2009
37	Çıldır: Saymalı village	41°07'30.10"N, 43°11'22.48"E	1910	09.08.2009
38	Hanak: a.Ataş village, open area	41°09'40.08"N, 42°52'27.76"E	1735	28.07.2009
39	Hanak: b.Ataş village, forest area	41°09'47.49"N, 42°52'58.62"E	1790-1850	28.07.2009
40	Hanak: Çayağzı village	41°11'26.81"N, 42°50'58.21"E	1795	18.08.2009
41	Hanak: Avcılar village	41°15'09.84"N, 42°49'40.91"E	1850	19.08.2009
42	Hanak: center, forest area	41°16'12.00"N, 42°51'16.65"E	2046	20.08.2009
43	Hanak: Alaçam village, forest area	41°11'17.29"N, 42°48'07.83"E	2004	24.08.2009
44	Damal: center, main roadside	41°20'54.55"N, 42°51'28.06"E	2174	30.07.2009

Table 1. continued

No	Locality	Coordinate	Altitude (m)	Date
45	Damal: a. Border Posof	41°25'05.02"N, 42°50'43.49"E	2296	30.07.2009
46	Damal: b. Ilgar way	41°24'55.06"N, 42°44'31.46"E	2540	30.07.2009
47	Damal: Damal plateau	41°22'58.27"N, 42°53'40.72"E	2355	29.08.2009
48	Damal: Burmadere village	41°18'26.33"N, 42°47'10.97"E	2015	30.08.2009
49	Damal: Dereköy	41°19'40.02"N, 42°48'08.40"E	2021	29.07.2009
50	Göle: Göle-Ardahan main road side, 20 km from Ardahan	40°54'57.54"N, 42°35'48.10"E	1980-2000	26.07.2009
51	Göle: Çakırüzüm, forest area	40°47'44.90"N, 42°31'59.35"E	2233	21.07.2008
52	Göle: opposite of Çakırüzüm forest area	40°48'28.88"N, 42°33'21.61"E	2090	12.12.2008
53	Göle: Günorta village	40°52'56.19"N, 42°24'57.64"E	2020	22.07.2008
54	Göle: Serinçayır village	40°51'58.15"N, 42°29'48.98"E; 40°51'58.15"N, 42°29'24.20"E	2059-2061	23.07.2008
55	Göle: Yenidemirkapı village	40°50'54.50"N, 42°43'12.80"E	2030	11.12.2008
56	Göle: Eskidemirkapı village, woodlands	40°51'00.91"N, 42°47'35.90"E	2000	11.12.2008
57	Göle: Kılıçboğaz forests	40°41'34.03"N, 42°34'14.24"E	2260	24.07.2008
58	Göle: Senemoğlu village	40°46'40.17"N, 42°39'39.60"E	2040	26.07.2008
59	Göle: Uğurtaş village	40°56'07.36"N, 42°28'16.48"E	1985	22.08.2009
60	Göle: Karıncadüzü forests	40°46'19.87"N, 42°33'18.43"E	2210	22.08.2009
61	Göle: Samandöken village	40°50'36.54"N, 42°30'32.25"E; 40°51'23.06"N, 42°29'45.80"E	2060 2055	13.04.2009, 20.08.2008
62	Göle: Köprülü village	40°53'13.23"N, 42°27'42.45"E	2050	14.04.2009

Table 1. continued

No	Locality	Coordinate	Altitude (m)	Date
63	Göle: Köprülü, Köprülü plateau	40°50'32.35"N, 42°24'17.55"E	2057, 2169, 2274	14.04.2009, 28.07.2008
64	Göle: Yeniköy, Yeniköy forests 1,	40°58'00.27"N, 42°29'01.83"E	1960	27.07.2008
65	Göle: Yeniköy, Yeniköy forests 2	40°59'16.79"N, 42°25'58.78"E	2019	27.07.2008
66	Göle: Yeniköy: Yeniköy forests 3	40°58'40.18"N, 42°26'11.47"E	2000	11.04.2009
67	Posof: Alköyü, forest area 1	41°28'24.51"N, 42°46'37.27"E	1750, 1900	01.08.2009
68	Posof: Kurşunçavuş, along the river and forests area	41°31'59.63"N, 42°37'06.12"E; 41°31'37.76"N, 42°37'16.40"E	1890, 1790	25.08.2009, 15.08.2008
69	Posof: Kurşunçavuş village	41°31'37.76"N, 42°37'16.40"E,	1790	11.08.2008
70	Posof: roadside, 2 km to Kurşunçavuş	41°31'13.57"N, 42°39'26.02"E	1835	11.08.2008
71	Posof: Yeniköy	41°28'17.62"N, 42°49'24.54"E	1600	16.04.2009
72	Posof: Doğrular village and woodlands	41°30'38.48"N, 42°42'36.10"E	1674	17.04.2009
73	Posof: Uğurca village	41°31'08.88"N, 42°41'32.90"E	1802	18.04.2009
74	Posof: Günlüce village	41°31'18.51"N, 42°40'06.27"E	1783	18.04.2009
75	Posof: Günbatan village	41°28'35.84"N, 42°36'20.42"E	1880	26.08.2009
76	Posof: Demirdöven village	41°29'47.35"N, 42°39'04.16"E	1670	27.08.2009
77	Posof: Yolağzı village	41°30'10.39"N, 42°37'21.02"E	1870	28.08.2009
78	Posof: center, forest area (Forest storage, 1. Border company),	41°29'44.17"N, 42°44'03.88"E	1430	07.12.2008
79	Posof: center, control tower forests	41°31'45.03"N, 42°43'59.90"E	2000, 1918, 1920	08.12.2008, 20.08.2008
80	Posof: Alköy, forest area 2	41°27'42.86"N, 42°46'34.13"E	1980	12.08.2008

Table 2. The numbers of taxa based on the growth form and substrate in Ardahan

The growth forms and substrata	Crustose	Foliose	Fruticose	Leprose	Total
Epiphytic only	48	60	40	5	153
Saxicolous only	117	24	2	3	146
Terricolous only	10	5	6	-	21
Corticolous only	41	44	31	1	117
Coniferous	24	49	38	1	101
Deciduous	34	26	7	-	67
<i>Pinus</i>	14	39	27	-	80
<i>Picea</i>	16	11	15	1	43
<i>Populus</i>	20	15	-	-	35
<i>Salix</i>	21	12	-	-	33
<i>Carpinus</i>	12	6	6	-	24
<i>Alnus</i>	10	11	-	-	21
Muscicolous only	8	16	8	4	36
Saxicolous	123	45	3	4	175
Mosses	10	44	11	5	70
Terricolous	10	10	9	-	29
<i>Prunus</i>	6	9	-	-	15
<i>Pyrus</i>	4	7	-	-	11
<i>Corylus</i>	1	-	-	-	1
<i>Ulmus</i>	1	-	-	-	1