

## A Note About Lichenicolous Fungi From Ardahan (Turkey)

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**Abstract** – As a result of lichenological exploration in Ardahan (Turkey), thirty-four species of lichenicolous fungi belonging to 15 genera were determined on 20 different lichenized fungi. Three lichenicolous fungi – *Intralichen lichenicola*, *Lichenonium lichenicola*, *Polycoccum evae* – are reported as new to Turkey and the Middle East. In addition *Lichenostigma rupicolae*, firstly reported from Turkey was also found on *Pertusaria* sp. for the second time in the world. Their geographical distribution are presented.

**Ascomycetes / Lichenicolous fungi / New records / Ardahan**

### INTRODUCTION

In recent years there has been an increasing number of studies on the lichens and lichenicolous fungi of Turkey (Candan & Halici, 2009; Halici & Aksoy, 2009; Etayo & Yazici, 2009; Yazici *et al.*, 2010a,b,c; Halici *et al.*, 2010). No lichenicolous fungi have ever been reported from Ardahan while seven lichenized fungi have been recorded from this region (Yazici *et al.*, 2010a,b). On the other hand 136 lichenicolous fungi have been found in other regions of Turkey (Halici *et al.*, 2010). This number is small when compared with other European countries (Santesson, 1993; Kocourková, 2000; Scholz, 2000; Faltynowicz, 2003; Hawksworth, 2003), reflecting the fact that many regions of Turkey remain unexplored.

In the present study, we record for the first time three lichenicolous fungi from Ardahan region that are also new to Turkey. With this study the number of lichenicolous fungal taxa has reached 139 species in Turkey.

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## MATERIALS AND METHODS

Specimens were collected from 18 localities in 2008 and 2009 during lichenological field studies carried out in Ardahan region. The collection of lichenicolous fungi species originates from Ardahan (Center), Göle, Hanak, Çıldır, and Posof districts and the localities are marked on the map – Fig. 1. Ardahan (41°07'N / 42°42'E) is a province of the Eastern Anatolia Region in the far north-east of Turkey where the country borders with Georgia (Fig. 1). According to the flora of Turkey (Davis, 1965), the province is located in the grid square A9. It is high mountain region where a continental climate is dominant, with a mild impact from the Black Sea. In Ardahan region, Göle, Çıldır, and Hanak districts the climate characterize hot dry summers and cold snowy winters (mean annual temperature 6°C) and the mean annual rainfall is about 500-600 mm. The collection sites are well-lit, windswept and open area without trees except Posof region. In the collection area of Posof district microclimatic conditions with moderately rainy winters and hot summers dominate (mean annual temperature 6.8°C) and mean annual rainfall is about 600 mm and *Pinus* trees are dominant along the mainroad and uphill (Akman, 1999).

Hand-cut sections were microscopically examined in water (incl. all measurements), 10% KOH, and lactophenol cotton blue. Air-dried samples were observed and studied with a Nikon SMZ1500 stereomicroscope and a Nikon Eclipse 80i light microscope. Nomenclature and species concepts follow Alstrup & Hawksworth (1990), Atienza *et al.* (2003), Calatayud *et al.* (2002), Cole & Hawksworth (2004), Ertz *et al.* (2005), Etayo & Sancho (2008), Fernandez-Brime *et al.* (2010), Galloway 2007, Halici (2008), Halici & Hawksworth (2007, Hawksworth (1983), Hawksworth & Cole (2002), Ihlen & Wedin (2007), Smith *et al.* (2009) & Wirth (1995). Descriptions of the species are based on our materials. Vouchers are stored in the herbarium of the Biology Department, Faculty of Science, Karadeniz Technical University, Trabzon, Turkey (KTUB).

## RESULTS

*Arthonia clemens* (Tul.) Th. Fr. – TURKEY, Ardahan: [Loc. 6] Göle, Göle-Ardahan, mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, in the apothecia of *Rhizoplaca chrysoleuca*, 26.07.2009, leg. K. Yazici (KTUB 2040).

*Arthonia epiphyscia* Nyl. – TURKEY, Ardahan: [Loc. 4] Bağdaşan village, 41°03'32.69"N / 42°23'30.84"E, 1987 m, 10.12.2008, on the thallus of *Physcia aipolia*, leg. K. Yazici (KTUB 2071); [Loc. 11] Hanak, Altaş village, 41°09'40.08"N / 42°52'27.76"E 1735 m, 28.07.2009, on the thallus of *Physcia aipolia*, leg. K. Yazici (KTUB 2076); [Loc. 2] Ardahan, Center, opposite of Tepeler village, Kent forests, 41°02'45.75"N / 42°35'24.37"E, 1983-2034 m, 09.12.2008, on the thallus of *Physcia aipolia*, leg. K. Yazici (KTUB 2075); [Loc. 7] Göle, Köprülü, Köprülü high plateau, 40°50'32.35"N / 42°24'17.55"E, 2169 m, 28.07.2008, on the thallus of *Physcia aipolia*, leg. K. Yazici (KTUB 2044).

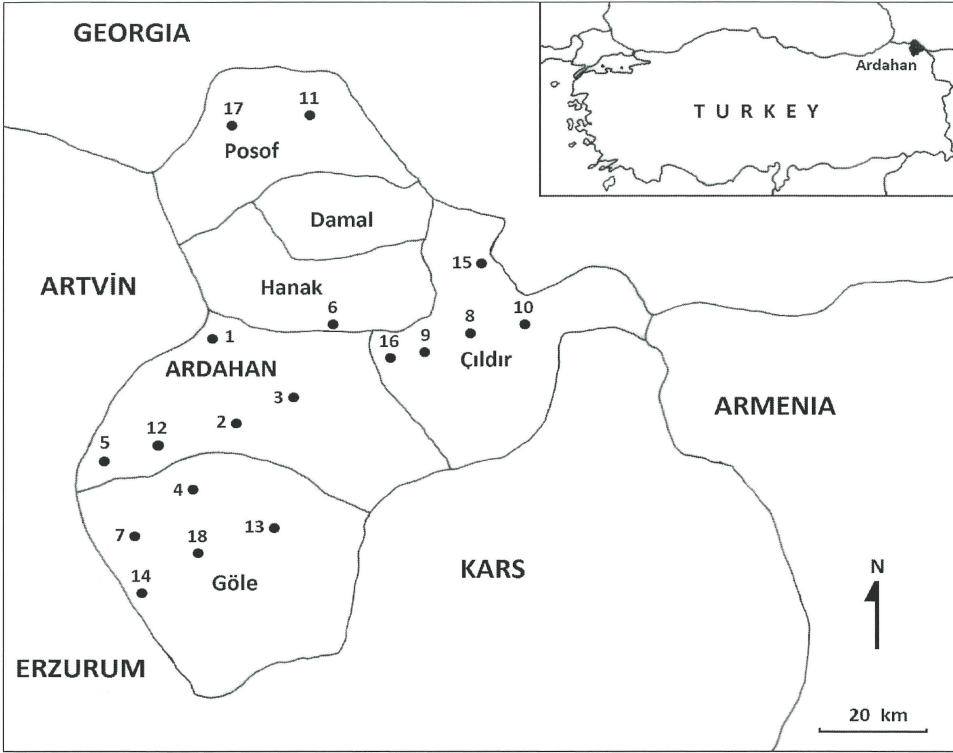


Fig. 1. Ardahan province with localities of lichenicolous fungi under this study. **1.** Ardahan: Center, Çamlıbel,  $41^{\circ}12'15.39''\text{N} / 42^{\circ}33'08.14''\text{E}$ , 2302 m, 31.07.2009; **2.** Ardahan: Center, opposite of Tepeler village, Kent forests,  $41^{\circ}02'45.75''\text{N} / 42^{\circ}35'24.37''\text{E}$ , 1983-2034 m, 09.12.2008; **3.** Ardahan: Center, side of the Kura river,  $41^{\circ}07'03.51''\text{N} / 42^{\circ}42'18.03''\text{E}$ , 1800 m, 26.07.2009; **4.** Ardahan: Center, Bağdaşan village,  $41^{\circ}03'32.69''\text{N} / 42^{\circ}23'30.84''\text{E}$ , 1987 m, 10.12.2008; **5.** Ardahan: Center, Yalnızçam Forests,  $41^{\circ}02'34.52''\text{N} / 42^{\circ}26'32.44''\text{E}$ , 1966-2124 m, 13.08.2008; **6.** Ardahan: Göle, Göle-Ardahan Mainroad side, 20 km to Ardahan,  $40^{\circ}54'57.54''\text{N} / 42^{\circ}35'48.11''\text{E}$ , 1980-2000 m, 26.07.2009; **7.** Ardahan: Göle, Köprülü, Köprülü yaylası:  $40^{\circ}50'32.35''\text{N} / 42^{\circ}24'17.55''\text{E}$ , 2169 m, 28.07.2008; **8.** Ardahan: Göle, Samandıken village,  $40^{\circ}50'36.54''\text{N} / 42^{\circ}30'32.25''\text{E}$ , 2060 m, 20.08.2008; **9.** Ardahan: Göle, Eskidemirkağı forests,  $40^{\circ}51'00.91''\text{N} / 42^{\circ}47'35.90''\text{E}$ , 2000 m, 11.12.2008; **10.** Ardahan: Göle, opposite of Çakırüzüm forests,  $40^{\circ}48'28.88''\text{N} / 42^{\circ}33'21.61''\text{E}$ , 2090 m, 12.12.2008; **11.** Ardahan: Hanak, Altaş village,  $41^{\circ}09'40.08''\text{N} / 42^{\circ}52'27.76''\text{E}$ , 1735 m, 28.07.2009; **12.** Ardahan: Çıldır, Yıldırımtepe village,  $41^{\circ}07'52.81''\text{N} / 43^{\circ}07'34.61''\text{E}$ , 1990 m, 08.08.2009; **13.** Ardahan: Çıldır, Meriyemköy,  $41^{\circ}07'38.02''\text{N} / 43^{\circ}01'19.57''\text{E}$ , 2014 m, 07.08.2009; **14.** Ardahan: Çıldır, Aşık Şenlik village,  $41^{\circ}08'40.92''\text{N} / 43^{\circ}12'42.27''\text{E}$ , 1918 m, 06.08.2009; **15.** Ardahan: Çıldır, Öncül village,  $41^{\circ}14'21.99''\text{N} / 43^{\circ}09'37.41''\text{E}$ , 1762 m, 15.08.2009; **16.** Ardahan: Çıldır, Eskibeyrehatun,  $41^{\circ}07'08.94''\text{N} / 42^{\circ}57'47.01''\text{E}$ , 1955 m, 02.08.2009; **17.** Ardahan: Posof, Center, Kontrol tower forests,  $41^{\circ}31'45.03''\text{N} / 42^{\circ}43'59.90''\text{E}$ , 2000 m, 20.08.2008; **18.** Ardahan: Posof, 2 km to Kurşunçavuş, roadside,  $41^{\circ}31'13.57''\text{N} / 42^{\circ}39'26.02''\text{E}$ , 1835 m, 11.08.2008.

*Arthonia molendoi* (Heufl. ex Frauenf.) R. Sant. – TURKEY, Ardahan: [Loc. 12] Çıldır, Yıldırımtepe village,  $41^{\circ}07'52.81''\text{N} / 43^{\circ}07'34.61''\text{E}$ , 1990 m, 08.08.2009, in the apothecia of *Xanthoria elegans*, leg. K. Yazıcı (KTUB 2046).

***Arthonia phaeophysciae*** Grube & Matzer – TURKEY, Ardahan: [Loc. 3] Center, side of Kura river, 41°07'03.51"N / 42°42'18.03"E, 1800 m, 26.07.2009, on the thallus of *Phaeophyscia orbicularis*, leg. K. Yazici (KTUB 2043).

***Caloplaca grimmiae*** (Nyl.) H. Olivier – TURKEY, Ardahan: [Loc. 6] Göle, Göle-Ardahan Mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, 26.07.2009, on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2073); [Loc. 13] Çıldır, Meryemköy, 41°07'38.02"N / 43°01'19.57"E, 2014 m, 07.08.2009, on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2077); [Loc. 14] Çıldır opposite of Aşık Şenlik village, 41°08'40.92"N / 43°12'42.27"E, 1918 m, 06.08.2009, on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2072); [Loc. 17] Posof, Center, Kontrol tower forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2042).

***Carbonea supersparsa*** (Nyl.) Hertel – TURKEY, Ardahan: [Loc. 5] Center, Yalnızçam forests, 41°08'26.83"N / 42°29'42.21"E, 1966-2124 m, 14.08.2008, on the thallus of *Lecanora polytropia*, leg. K. Yazici (KTUB 2074); [Loc. 17] Ardahan: Posof, Center, Kontrol tower forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, on the thallus of *Lecanora polytropia*, leg. K. Yazici (KTUB 2047).

***Carbonea vitellinaria*** (Nyl.) Hertel – TURKEY, Ardahan: [Loc. 7] Göle, Köprülü, Köprülü high plateau, 40°50'32.35"N / 42°24'17.55"E, 2169 m, 28.07.2008, on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2078); [Loc. 5] Ardahan, Center, Yalnızçam forests, 41°02'34.52"N / 42°26'32.44"E, 1966-2124 m, 13.08.2008, on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2080); [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2079); [Loc. 1] Ardahan, center, Çamlıbel, 41°12'15.39"N / 42°33'08.14"E, 2302 m, 31.07.2009, on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2049).

***Cercidospora epipolytropia*** (Mudd) Arnold – TURKEY, Ardahan: [Loc. 7] Göle, Köprülü-Köprülü high plateau, 40°50'32.35"N / 42°24'17.55"E, 2169 m, 28.07.2008, on the thallus of *Lecanora polytropia*, leg. K. Yazici (KTUB 2083); [Loc. 10] Göle, opposite of Çakırüzüm forests, 40°48'28.88"N / 42°33'21.61"E, 2090 m, 12.12.2008, on the thallus of *Lecanora polytropia*, leg. K. Yazici (KTUB 2041).

***Cercidospora macrospora*** (Uloth) Hafellner & Nav.-Ros. – TURKEY, Ardahan: [Loc. 6] Göle, Göle-Ardahan Mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, 26.07.2009, on the thallus of *Protoparmeliopsis muralis*, leg. K. Yazici (KTUB 2081); [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, on the thallus of *Protoparmeliopsis muralis*; [Loc. 15] Çıldır, Öncül village, 41°14'21.99"N / 43°09'37.41"E, 1762 m, 15.08.2009, on the thallus of *Protoparmeliopsis muralis*, leg. K. Yazici (KTUB 2050).

***Cercidospora melanophthalmae*** Nav.-Ros., Calat. & Hafellner – TURKEY, Ardahan: [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, in the apothecia and on the thallus of

*Rhizoplaca melanophthalma*, leg. K. Yazici (KTUB 2082); [Loc. 1] Ardahan, Center, Çamlıbel, 41°12'15.39"N / 42°33'08.14"E, 2302 m, 31.07.2009, in the apothecia and on the thallus of *Rhizoplaca melanophthalma*, leg. K. Yazici (KTUB 2084); [Loc. 16] Çıldır, mainroad side, opposite of Eskibeyrehatun, 41°07'08.94"N / 42°57'47.00"E, 1955 m, 02.08.2009, in the apothecia and on the thallus of *Rhizoplaca melanophthalma*, leg. K. Yazici (KTUB 2085); [Loc. 12] Çıldır, Yıldırımtepe village, 41°07'52.81"N / 43°07'34.61"E, 1990 m, 08.08.2009, in the apothecia and on the thallus of *Rhizoplaca melanophthalma*, leg. K. Yazici (KTUB 2047).

*Cercidospora xanthoriae* (Wedd.) R. Sant. – TURKEY, Ardahan: [Loc. 5] center, Yalnızçam forests, 40°51'13.48"N / 42°47'35.28"E, 1966-2124 m, 14.08.2008, on the thallus and in the apothecia of *Xanthoria elegans*, leg. K. Yazici (KTUB 2048).

*Endococcus macrosporus* (Hepp ex Arnold) Nyl. – TURKEY, Ardahan: [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, on the thallus of *Rhizocarpon geographicum*, leg. K. Yazici (KTUB 2051).

*Endococcus rugulosus* (Borrer ex Leight.) Nyl. – TURKEY, Ardahan: [Loc. 16] Çıldır, mainroad side, opposite of Eskibeyrehatun village, 41°07'08.94"N / 42°57'47.00"E, 1955 m, 02.08.2009, on the thallus of *Aspicilia caesiocinerea*; [Loc. 4] Ardahan, Center, Bağdaşan vilage, 41°03'32.69"N / 42°23'30.84"E, 1987 m, 10.12.2008, on the thallus of *Aspicilia caesiocinerea*, leg. K. Yazici (KTUB 2089); [Loc. 3] Ardahan, Center, side of Kura river, 41°07'03.51"N / 42°42'18.03"E, 1800 m, 26.07.2009, on the thallus of *Aspicilia caesiocinerea*, leg. K. Yazici (KTUB 2088); [Loc. 7] Göle, Köprülü, Köprülü high plateau, 40°50'32.35"N / 42°24'17.55"E, 2169 m, 28.07.2008, on the thallus of *Aspicilia caesiocinerea*, leg. K. Yazici (KTUB 2054).

*Endococcus stigma* (Körb.) Stizenb. – TURKEY, Ardahan: [Loc. 18] Posof, 2 km to Kurşunçavuş, roadside, 41°31'13.57"N / 42°39'26.02"E, 1835 m, 11.08.2008, on the thallus of *Acarospora* sp., leg. K. Yazici (KTUB 2087); [Loc. 2] Ardahan, Center, opposite of Tepeler village, Kent forests, 41°02'45.75"N / 42°35'24.37"E, 1983-2034 m, 09.12.2008, on the thallus of *Acarospora* sp., leg. K. Yazici (KTUB 2086); [Loc. 6] Göle, Göle-Ardahan Mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, 26.07.2009, on the thallus of *Acarospora* sp., leg. K. Yazici (KTUB 2090); [Loc. 17] Posof, Center, Kontrol tower forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, on the thallus of *Acarospora* sp., leg. K. Yazici (KTUB 2055).

*Intralichen lichenicola* (M.S. Christ. & D. Hawksw.) D. Hawksw. & M.S. Cole – TURKEY, Ardahan: [Loc. 1] Center, Çamlıbel, 41°12'15.39"N / 42°33'08.14"E, 2302 m, 31.07.2009, in the apothecia and on the thallus of *Candelariella vitellina*, leg. K. Yazici (KTUB 2035). New to Turkey and the Middle East. [The species was seen in fairly sunlit, windswept and open situation, and grows in the apothecia of the lichens (Hawksworth & Cole, 2002).

- Lichenocodium erodens*** M.S. Christ. & D. Hawksw. – TURKEY, Ardahan: [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, in the apothecia of *Rhizoplaca chrysoleuca*, leg. K. Yazici (KTUB 2056).
- Lichenocodium lichenicola*** (P. Karst.) Petr. & Syd. – TURKEY, Ardahan: [Loc. 2] Center, opposite of Tepeler village, Kent forests, 41°02'52.74"N / 42°36'19.00"E, 1983 m, 09.12.2008, on the thallus of *Physcia aipolia*, leg. K. Yazici (KTUB 2037). New to Turkey and the Middle East. [The specimens were found in well-lit and open forests dominated by *Pinus silvestris*].
- Lichenodiplis lecanorae*** (Vouaux) Dyko & D. Hawksw. – TURKEY, Ardahan: [Loc. 6] Göle, Göle-Ardahan Mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, 26.07.2009, in the apothecia of *Caloplaca* sp., leg. K. Yazici (KTUB 2052).
- Lichenostigma elongatum*** Nav.-Ros. & Hafellner – TURKEY, Ardahan: [Loc. 2] Center, opposite of Tepeler village, Kent forests, 41°02'45.75"N / 42°35'24.37"E, 1983 m, 09.12.2008, on the thallus of *Lobothallia* sp., leg. K. Yazici (KTUB 2091); [Loc. 6] Göle, Göle-Ardahan mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, 26.07.2009, on the thallus of *Aspicilia intermutans*, leg. K. Yazici (KTUB 2057).
- Lichenostigma rouxii*** Nav.-Ros., Calat. & Hafellner – TURKEY, Ardahan: [Loc. 17] Posof, center, Kontrol tower forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, on the thallus of *Squamarina cartilaginea*, leg. K. Yazici (KTUB 2059).
- Lichenostigma rugosum*** G. Thor – TURKEY, Ardahan: [Loc. 17] Posof, center, Kontrol Tower forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 08.12.2008, on the thallus of *Diploschistes* sp., leg. K. Yazici (KTUB 2053).
- Lichenostigma rupicolae*** Fdez.-Brime & Nav.-Ros. – TURKEY, Ardahan: [Loc. 4] Center, Bağdaşan village, 41°03'32.69"N / 42°23'30.84"E, 1987 m, 10.12.2008, on the thallus of *Pertusaria* sp., leg. K. Yazici (KTUB 2058). [*Lichenostigma rupicolae*, firstly reported from Turkey in the world, was also found on *Pertusaria* sp. for the second time in the world (Fernández-Brime *et al.*, 2010).]
- Lichenostigma triseptatum*** Halıcı & D. Hawksw. – TURKEY, Ardahan: [Loc. 6] Göle, Göle-Ardahan mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, 26.07.2009, on the thallus of *Aspicilia caesiocinerea*, leg. K. Yazici (KTUB 2092); [Loc. 17] Posof, Center, Kontrol tower forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, on the thallus of *Aspicilia caesiocinerea*, leg. K. Yazici (KTUB 2060).
- Muellerella erratica*** (A. Massal.) Hafellner & V. John – TURKEY, Ardahan: [Loc. 10] Göle, opposite of Çakırüzüm forests, 40°48'28.88"N / 42°33'21.61"E, 2090 m, 12.12.2008, on the thallus of *Lecidea* sp., leg. K. Yazici (KTUB 2094); [Loc. 1] Ardahan, Center, Çamlıbel, 41°12'15.39"N / 42°33'08.14"E, 2302 m, 31.07.2009, on the thallus of *Aspicilia caesiocinera*, leg. K. Yazici (KTUB 2063).

- Muellerella lichenicola*** (Sommerf.) D. Hawksw. – TURKEY, Ardahan: [Loc. 2] Center, opposite of Tepeler village, Kent forests, 41°02'45.75"N / 42°35'24.37"E, 1983-2034 m, 09.12.2008, on the thallus *Aspicilia caesiocinerea*, leg. K. Yazici (KTUB 2061).
- Muellerella pygmaea*** (Körb.) D. Hawksw. – TURKEY, Ardahan: [Loc. 8] Göle, Samandöken village 40°50'36.54"N / 42°30'32.25"E, 2060 m, 20.08.2008, on the thallus of *Immersaria athroocarpa*, leg. K. Yazici (KTUB 2095); [Loc. 2] Ardahan, Center, opposite of Tepeler village, Kent forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, on the thallus of *Acarospora* sp., leg. K. Yazici (KTUB 2093); [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, on the thallus of *Acarospora* sp., leg. K. Yazici (KTUB 2062).
- Muellerella ventosicola*** (Mudd) D. Hawksw. – TURKEY, Ardahan: [Loc. 2] Center, opposite of Tepeler village, Kent forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, on the thallus of *Rhizocarpon geographicum*, leg. K. Yazici (KTUB 2096); [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, on the thallus of *Rhizocarpon geographicum*, leg. K. Yazici (KTUB 2099); [Loc. 6] Göle, Göle-Ardahan mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, 26.07.2009, on the thallus of *Rhizocarpon geographicum*, leg. K. Yazici (KTUB 2098); [Loc. 11] Hanak, Altaş village, 41°09'40.08"N / 42°52'27.76"E, 1735 m, 28.07.2009, on the thallus of *Rhizocarpon geographicum*, leg. K. Yazici (KTUB 2097); [Loc. 1] Ardahan, Center, Çamlıbel, 41°12'15.39"N / 42°33'08.14"E, 2302 m, 31.07.2009, on the thallus of *Rhizocarpon geographicum*, leg. K. Yazici (KTUB 2065).
- Plectocarpon lichenum*** (Sommerf.) D. Hawksw. – TURKEY, Ardahan: [Loc. 17] Posof, Center, Kontrol tower forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, on the thallus of *Lobaria pulmonaria*, leg. K. Yazici (KTUB 2070).
- Polycoccum evae*** Calat. & V.J. Rico – TURKEY, Ardahan: [Loc. 3] Center, side of Kura River, 41°07'03.51"N / 42°42'18.03"E, 1800 m, 26.07.2009, on the thallus of *Dimelaena oreina*, leg. K. Yazici (KTUB 2100); [Loc. 13] Çıldır, Meryemköy, 41°07'38.02"N / 43°01'19.57"E, 2014 m, 07.08.2009, on the thallus of *Dimelaena oreina*, leg. K. Yazici (KTUB 2036), New to Turkey and the Middle East. [The specimens were found along the river, in well-lit and also open situation in *Dimelaena oreina*].
- Polycoccum microstictum*** (Leight.) Arnold – TURKEY, Ardahan: [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, on the thallus of *Acarospora* sp., leg. K. Yazici (KTUB 2064).
- Rosellinula haplospora*** (Th. Fr. ex Th. Fr.) R. Sant. – TURKEY, Ardahan: [Loc. 6] Göle, Göle-Ardahan mainroad side, 20 km to Ardahan, 40°54'57.54"N / 42°35'48.11"E, 1980-2000 m, 26.07.2009, on the thallus of *Aspicilia intermutans*, leg. K. Yazici (KTUB 2101); [Loc. 16] Ardahan, Çıldır, mainroad side, opposite of Eskibeyrehatun village, 41°07'08.94"N / 42°57'47.00"E, 1955 m, 02.08.2009, on the thallus of *Aspicilia intermutans*, leg. K. Yazici (KTUB 2067).

***Rosellinula frustulosa*** (Vouaux) R. Sant. – TURKEY, Ardahan: [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, on the thallus of *Lecanora frustulosa*, leg. K. Yazici (KTUB 2070).

***Stigmidium squamariae*** (B. de Lesd.) Cl. Roux & Triebel – TURKEY, Ardahan: [Loc. 17] Posof, Center, Kontrol tower forests, 41°31'45.03"N / 42°43'59.90"E, 2000 m, 20.08.2008, in the apothecia of *Lecanora polytropa*, leg. K. Yazici (KTUB 2066).

***Zwackhiomyces coepulonus*** (Norman) Grube & R. Sant. – TURKEY, Ardahan: [Loc. 9] Göle, Eskidemirkapı forests, 40°51'00.91"N / 42°47'35.90"E, 2000 m, 11.12.2008, on the thallus and also in the apothecia of *Xanthoria elegans*.

## DISCUSSION

Thirty-four species of lichenicolous fungi belonging to 15 genera were recognized in the studied materials from Ardahan Province (Turkey). Three species – *Intralichen lichenicola*, *Lichenocodium lichenicola* and *Polycoccum evae* – are new to Turkey and the Middle East. All species are new to Ardahan region.

All lichenicolous fungi were collected on crustose lichens except *Plectocarpon lichenum* growing on *Lobararia pulmonaria*. Four lichenicolous species were found on *Aspicilia caesiocinerea* and three on *Candelariella vitellina*, *Acarospora* sp. and *Xanthoria elegans*. Three species were collected on *Aspicilia intermutans*, *Lecanora polytropa*, *Physcia aipolia*, *Rhizocarpon geographicum* and *Rhizoplaca chrysoleuca*.

*Stigmidium squamariae*, *Lichenodiplis lecanorae*, *Lichenocodium erodens*, *Arthonia molendoi* and *Arthonia clemens* were only found in the apothecia of hosts, while 25 species were found only on the thallus of crustose lichenized fungi. On the other hand *Zwackhiomyces coepulonus*, *Cercidospora xanthoriae*, *Cercidospora melanophthalmae* and *Intralichen lichenicola* were found to grow in both apothecia and on the thallus of their hosts. *Muellerella pymae* grows on the thallus of *Immersaria athroocarpa* and *Acarospora* sp.

The most common genera of lichenicolous fungi are *Arthonia*, *Cercidospora*, *Lichenostigma* and *Muellerella*. On the other hand the most common lichenicolous species are *Arthonia epiphyscia*, *Caloplaca grimmiae*, *Carbonea vitellinaria*, *Cercidospora macrospora*, *C. melanophthalmae*, *Endococcus rugulosus*, *E. stigma*, *Muellerella pygmaea*, *M. ventosicola* and *Rosellinula haplospora*. Ten lichenicolous fungi were found in locality 9 while nine species were defined in locality 6 and eight species in locality 17. leg. K. Yazici (KTUB 2068).

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