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YALÇIN KARAGÖZ

ALİ ASLAN

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## Floristic lichen records from Kemaliye District (Erzincan) and Van Province

Yalçın KARAGÖZ<sup>1,\*</sup>, Ali ASLAN<sup>2</sup>

<sup>1</sup>Department of Pharmaceutical Botany, Faculty of Pharmacy, Atatürk University 25240, Erzurum - TURKEY

<sup>2</sup>Department of Biology, Kazım Karabekir Education Faculty, Atatürk University, 25240, Erzurum - TURKEY

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**Abstract:** Numerous lichen specimens from 32 locations in Kemaliye District of Erzincan Province and 4 locations in Van Province were examined. In total 144 lichens, including 5 varieties, 2 subspecies and 4 forms, in 47 genera were identified. *Acarospora lavicola* J.Steiner, *Adelolecia kolaensis* (Nyl.) Hertel & Rambold, and *Arthonia apotheciorum* (A. Massal.) Almq. were found to be new for Turkey. All identified taxa, excluding the ones mentioned above, are new for Kemaliye and 101 taxa are new for Erzincan Province.

**Key words:** Flora, Kemaliye, lichen, new records, taxonomy, Van

### Introduction

The lichen biodiversity of Turkey is far from being completely investigated and Kemaliye District is no exception. Some floristic lichen records from the area, covering a part of Erzincan Province and Kemaliye were reported (Yazıcı & Aslan, 2003; Karagöz et al., 2011). Lichen records from other close regions were provided by various authors (Aslan, 2000; Aslan et al., 2002, 2005; Yazıcı et al., 2004, 2005, 2008, 2010a, 2010b; Yazıcı & Aslan, 2006; Candan & Turk, 2008), but no lichenised fungi have thus far been reported for Kemaliye. However, there are some recent studies on epiphytic and lichenicolous lichens in Turkey (Candan & Halıcı, 2011; Oran & Öztürk, 2012).

Kemaliye District is situated at the latitudes 39°2' - 39°20'N and the longitudes 38°23' - 38°45'E, in the B7 grid square (Davis et al., 1965), and it has interesting

geographic and climatic properties. The natural flora of Kemaliye represents characteristic features of mountain steppes. Natural tree populations are scarce and are primarily composed of dwarf trees like oak (*Quercus* sp.) and juniper (*Juniperus* sp.) as well as shrubs like *Rosa canina*. At the valley bottoms, the anthropogenic flora is dominated by *Prunus* spp., *Populus* spp., and less frequently *Salix* spp.

Kemaliye consists of a network of valleys, with bottom points at an altitude of approximately 850 m and peaks as high as 3300 m. The south-western part of the district bears large areas of high plateaux. Keban Dam Lake, just next to the district's southern border, provides high humidity for the valleys. Therefore, the continental climate dominating the plateaux and valley tops of Kemaliye is replaced by a milder and more humid climate, resembling Mediterranean, at the valley bottoms.

\* E-mail: ykaragoz@atauni.edu.tr

The geographical and climatic properties of Kemaliye lead to the formation of many varieties of habitats for lichen growth: dry and exposed rock walls, shaded and humid rock cracks, flat and stony lands, rough and plant covered areas etc. This diversity of habitats and microclimate possibilities attracts attention as regards to lichen biodiversity. Being a region of climate transition and habitat diversity, Kemaliye is well worth a close look; hence this study aimed to determine the lichen flora of Kemaliye District. In addition, during a recent excursion to Van Province (Davis square B9), 3 taxa were found to be new records for Turkey and were added to the list below.

### Materials and methods

Lichen specimens were collected in 36 different localities in Kemaliye (Erzincan) District and Van Province in 2008 and 2009. The following list summarises the localities.

#### List of localities

1. Kemaliye, Sarıçiçek plateau, 1 km S of Subaşı village, 39°15'39"N, 38°39'01"E, 1895 m, 03.07.2008.
2. Kemaliye, Mezbanbaşı, 6.5 km SW of Sırakonak village, 39°11'15"N, 38°25'54"E, 1851 m, 05.07.2008.
3. Kemaliye, 3.6 km SE of Kuşak village, 39°07'10"N, 38°32'54"E, 1029 m, 03.07.2009.
4. Kemaliye, 900 m SE of Kekikpınarı village, 39°08'37"N, 38°27'30"E, 1275 m, 12.07.2009.
5. Kemaliye, Geşo Pass, 1.7 km NE of Yeşilyamaç village, 39°16'15"N, 38°34'00"E, 1682 m, 10.07.2008.
6. Kemaliye centre, 39°15'45"N, 38°29'51"E, 942 m, 01.07.2008.
7. Kemaliye, 1.2 km SE of Dutluca village, 39°07'42"N, 38°37'25"E, 1165 m, 17.07.2009.
8. Kemaliye, Yazıbaşı, Sırakonak village, 39°07'48"N, 38°16'37"E, 1639 m, 07.07.2008.
9. Kemaliye, Yakup Halife Tomb, Sırakonak village, 39°08'02"N, 38°17'24"E, 1653 m, 15.07.2009.
10. Kemaliye, Dutluca village centre, 39°08'35"N, 38°37'05"E, 1175 m, 16.07.2009.
11. Kemaliye, Avaz, Lawyer's spring, 39°13'02"N, 38°28'28"E, 1375 m, 08.07.2008.
12. Kemaliye, Dere, Adak village, 39°06'54"N, 38°33'39"E, 1235 m, 18.07.2009.
13. Kemaliye, Bey Rock, Kozlupınar village, 39°12'38"N, 38°33'01"E, 1245 m, 11.07.2008.
14. Kemaliye, Kırkgözeler, Yuva village, 39°14'07"N, 38°31'22"E, 1352 m, 14.07.2008.
15. Kemaliye, Çitköy village vicinity, 39°06'45"N, 38°36'22"E, 1030 m, 16.07.2009.
16. Kemaliye, Rabat River bridge, 39°09'40"N, 38°45'59"E, 855 m, 10.07.2009.
17. Kemaliye, 1.2 km S of Apçağa village, 39°14'06"N, 38°30'49"E, 1296 m, 09.07.2008.
18. Kemaliye, 1 km N of Derindere village, 39°19'16"N, 38°27'28"E, 1750 m, 02.07.2008.
19. Kemaliye, 750 m NW of Karakoçlu village, 39°19'49"N, 38°28'26"E, 1598 m, 12.07.2008.
20. Kemaliye, 1.75 km W of Salihli village, 39°20'07"N, 38°29'05"E, 1440 m, 01.07.2009.
21. Kemaliye centre by Murat river, 39°15'42"N, 38°30'03"E, 839 m, 01.07.2008.
22. Kemaliye, 1 km N of Dutluca village, 39°08'49"N, 38°36'58"E, 1209 m, 02.07.2009.
23. Kemaliye, 2 km E of Kekikpınarı village, 39°09'15"N, 38°29'27"E, 1218 m, 13.07.2009.
24. Kemaliye, 750 m S of Kırkgöze, Yuva village, 39°14'34"N, 38°31'21"E, 1226 m, 06.07.2009.
25. Kemaliye, Karakoçlu village, 39°19'03"N, 38°29'16"E, 1352 m, 11.07.2009.
26. Kemaliye, 3.7 km SW of Sırakonak village, 39°13'58"N, 38°27'46"E, 1639 m, 19.07.2009.
27. Kemaliye, Ağıl village, 39°12'28"N, 38°22'44"E, 1443 m, 18.07.2008.
28. Kemaliye, 750 m E of Dutluca village, 39°09'03"N, 38°38'09"E, 1230 m, 07.07.2009.
29. Kemaliye, north peak of Karanlık Canyon, 39°19'08"N, 38°27'28"E, 1720 m, 08.07.2009.
30. Kemaliye, 450 m NW of Venkağ Castle, 39°19'06"N, 38°27'53"E, 1659 m, 04.07.2009.
31. Kemaliye, 250 m NW of Toybelen village, 39°14'57"N, 38°30'57"E, 927 m, 05.07.2009.
32. Kemaliye, 700 m W of Apçağa village, 39°14'41"N, 38°31'15"E, 1133 m, 09.07.2009.

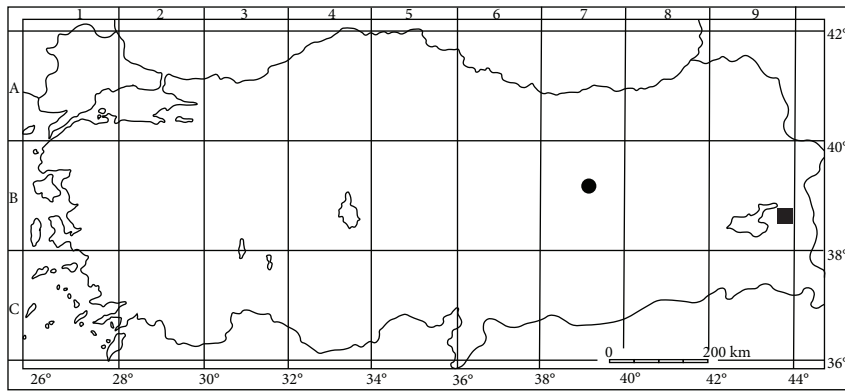


Figure. Map of Turkey showing the localities. • Kemaliye District, ■ Van Province.

33. Van: entrance of Başkale, 38°02'23"N, 44°01'36"E, 2274 m, 13.09.2009.

34. Van: Erçek road exit, 38°39'19"N, 43°41'10"E, 1860 m, 28.09.2009.

35. Van: eastern slopes of Erek mountain, 38°29'59"N, 43°29'22"E, 1976 m, 05.10.2008.

36. Van: Özalp district cemetery, 38°39'37"N, 43°39'54"E, 2021 m, 25.09.2009.

The localities are shown on the map in the Figure.

Lichens were collected along with a piece of their substrate and put into paper bags until further processing. A Magellan 500 GPS device was used to determine latitudes, longitudes, and altitudes. Specimens were identified with the aid of various flora books (Poelt, 1974, 1981; Clauzade et al., 1985; Wirth, 1995; Dobson, 2000; Brodo et al., 2001; Smith, 2009; Galloway & Ledingham, 2012) using a light microscope (Nikon Eclipse 80i) and a stereomicroscope (Nikon SMZ 1500). Vouchers are kept in the herbarium of Kazım Karabekir Education Faculty, Atatürk University (ATAKKEF). The floristic list includes genus name, species name, author(s), locality number, and habitat information, in that order.

## Results

Surveying 36 stations, we identified 144 species and subspecies level taxa. *Acarospora lavicola* J.Steiner, *Adolecia kolaensis* (Nyl.) Hertel & Rambold, and *Arthonia apotheciorum* (A.Massal.) Almq., identified from stations 33-36 in Van Province, were found to

be new records for Turkey. All other lichen taxa are new records for Kemaliye. One hundred and one taxa are new for Erzincan Province. The list is shown below. Numbers indicate stations as listed above. An asterisk (\*) indicates new species for Erzincan province. A number sign (#) and bold indicates new records for Turkey. Plain list members are species that were previously reported from Erzincan.

### List of taxa

*Acarospora cervina* (Ach.) A.Massal., 2, 5, 6, 11, 12, 13, 15, 17, 20, 21, 22, 25, 29, on calcareous rocks.

#*Acarospora lavicola* J.Steiner., 33, on calcareous rocks.

On silicates, particularly volcanic rocks. Spores broadly ellipsoid, 3.0-4.5/2-3 µm, to almost spherical. Thallus areolate, plate lemon-yellow, areoles about 0.5-1.5 mm wide, flat, apothecia pale brown, several to many in each areole, later coalescing, then 0.3-0.6 mm wide (Poelt, 1974).

\**A. scabra* (Pers.) Th.Fr., 2, 5, 11, on calcareous rocks.

\**A. veronensis* A.Massal., 14, on siliceous rocks.

\**A. versicolor* Bagl. & Carestia., 2, on calcareous rocks.

#*Adolecia kolaensis* (Nyl.) Hertel & Rambold., 34, 35, on calcareous rocks.

Thallus of minute creamish to pale yellowish brown areoles, 0.1-1 mm diameter, coalescing into larger structures following joints and cracks in rock substratum and forming elongated patches 1-3 cm diameter. Upper surface convex, minutely cracked,

surrounded and/or intersected by a thin, narrow, black prothallus, the whole lichen appearing piebald. Apothecia sessile, scattered, black, lecideine, convex; disc matt, epruinose, slightly roughened. Ascospores not seen (Galloway & Ledingham, 2012).

#*Arthonia apotheciorum* (A.Massal.) Almq., 36, on *Lecanora dispersa*.

Thallus absent, lichenicolous. Apothecia developing in the host hymenium and blackening the disc, 0.1-0.4 mm diameter, black rounded, flat to slightly convex; epitecium dark brown, K+ olive; hymenium 40-50 µm tall, colourless I+ blue; hypothecium colourless or very pale brown; paraphysoids 1.5-2 µm wide, apices with dark pigmented caps, 2-4 µm wide. Ascospores 9-15 × 3-5 µm, 1-septate, narrowlt ovoid to clavate, colourless (Smith, 2009).

\**A. lapidicola* (Taylor) Branth & Rostr., 2, on calcareous rocks.

\**Aspicilia caesiocinerea* (Nyl. ex Malbr.) Arnold., 2, 25, 27, on calcareous rocks.

\**A. calcarea* (L.) Körb., 2, 3, 4, 5, 7, 11, 12, 13, 14, 15, 17, 19, 21, 22, 23, 25, 26, 27, 28, 29, on calcareous rocks.

\**A. cheresina* (Müll. Arg.) Hue., 28, on *Aspicilia calcarea*.

\**A. cinerea* (L.) Körb., 2, 22, 27, 31, on calcareous rocks.

\**A. contorta* subsp. *contorta* (Hoffm.) Körb., 3, 6, 7, 11, 12, 13, 14, 15, 18, 19, 22, 27, on calcareous rocks.

\**A. contorta* subsp. *hoffmaniana* S.Ekman & Fröberg ex R.Sant., 2, 12, 18, 28, 29, 30, on calcareous rocks.

*A. desertorum* (Kremp.) Mereschk., 2, 8, 11, on calcareous rocks.

\**A. farinosa* (Flörke) Flagey., 27, on calcareous rocks.

\**A. mastrucata* (Wahlenb.) Th.Fr. 22, on calcareous rocks.

\**A. polychroma* Anzi., 11, on calcareous rocks.

\**Caloplaca agardhiana* (Flot.) Flagey., 2, 5, 14, on calcareous rocks.

\**C. alociza* (A.Massal.) Mig., 5, on calcareous rocks.

\**C. arenaria* (Pers.) Müll.Arg., 29, 30, on *Aspicilia* spp. and *Verrucaria* spp.

*C. biatorina* (Trevis.) J.Steiner., 2, 11, 13, on calcareous rocks.

*C. cerina* var. *cerina* (Ehrh. ex Hedw.) Th.Fr., 3, 4, 7, 15, 31, on calcareous rocks.

\**C. chalybaea* (Fr.) Müll.Arg., 2, 5, 21, on calcareous and siliceous rocks.

*C. citrina* (Hoffm.) Th.Fr. 23, on calcareous rocks.

\**C. dalmatica* (A.Massal.) H.Olivier., 2, 5, 11, on calcareous rocks.

*C. decipiens* (Arnold) Blomb. & Forssell., 6, on calcareous rocks.

\**C. flavovirescens* (Wulfen) Dalla Torre & Sarntn., 1, 2, 5, 6, 14, 15, (on calcareous rocks.

*C. holocarpa* (Hoffm.) A.E.Wade., 2, 5, 7, 9, 11, 12, 14, 23, 28, on calcareous rocks. \**C. inconnexa* (Nyl.) Zahlbr., 6, 27, 28, on various crustose lichens, mainly *Acarospora* spp. and *Aspicilia* spp.

\**C. lactea* (A.Massal.) Zahlbr., 2, 15, on calcareous rocks.

\**C. lobulata* (Flörke) Hellb., 10, on *Populus* sp., 14, on *Quercus* sp.

\**C. oasis* (A.Massal.) Szatala., 30, on *Caloplaca* spp.

\**C. polycarpa* (A.Massal.) Zahlbr., 11, on *Verrucaria* spp.

\**C. variabilis* (Pers.) Müll.Arg., 2, 5, 6, 7, 8, 9, 11, 12, 14, 15, 18, 22, 24, 28, 29, 31, on calcareous rocks.

\**C. xantholyta* (Nyl.) Jatta., 4, on bryophytes, 12, 15, on siliceous rocks.

*Candelariella aurella* f. *aurella* (Hoffm.) Zahlbr., 2, 3, 5, 6, 7, 9, 10, 11, 12, 14, 15, 25, 28, 30, on calcareous and siliceous rocks.

\**C. medians* f. *medians* (Nyl.) A.L.Sm., 6, on calcareous rocks.

*C. vitellina* f. *vitellina* (Ehrh.) Müll.Arg., 7, 11, 13, 14, 15, 16, 18, 21, 22, 27, 30, on calcareous rocks.

\**C. xanthostigma* (Pers. ex Ach.) Lettau., 21, on *Salix* sp.

\**Catapyrenium daedaleum* (Kremp.) Stein., 2, 14, on calcareous rocks.

\**C. lachneum* (Ach.) R.Sant., 14, on soil.

\**C. rufescens* (Ach.) Breuss., 8, on soil, 11, on soil over calcareous rocks.

\**C. squamulosum* (Ach.) Breuss., 2, 14, on calcareous rocks.

*Cladonia fimbriata* (L.) Fr. 14, on bryophytes.

\**C. pocillum* (Ach.) O.J.Rich., 14, on soil over calcareous rock.

\**C. pyxidata* (L.) Hoffm., 14, on bryophytes over calcareous rock.

*Collema auriforme* (With.) Coppins & J.R.Laundon., 12, on calcareous rock and bryophytes over the rock.

*C. cristatum* var. *cristatum* (L.) Weber ex F.H.Wigg., 3, 4, 7, 14, 15, on calcareous rocks.

*C. furfuraceum* Du Rietz, 3, on calcareous rocks.

\**C. parvum* Degel., 6, 12, on calcareous rocks.

\**Dermatocarpon intestiniforme* (Körb.) Hasse., 1, 2, 12, on siliceous and calcareous rocks.

*D. miniatum* var. *miniatum* (L.) W. Mann., 12, on siliceous and calcareous rocks.

*Diploschistes muscorum* (Scop.) R.Sant., 3, 4, on calcareous rocks.

*D. ocellatus* (Fr.) Norman., 1, 3, 4, 15, on calcareous rocks.

\**Diplotomma epipolium* (Ach.) Arnold., 1, 5, 13, 25, on nutrient enriched and normal calcareous rocks.

*Farnoldia micropsis* (A.Massal.) Hertel., 2, on calcareous rock.

\**Fulgensia fulgens* (Sw.) Elenkin., 3, on soil, 11, on calcareous rock.

\**Hyperphyscia adglutinata* (Flörke) H.Mayrhofer & Poelt., 15, on calcareous rock, 32 on *Quercus* sp.

\**Hypocenyomyce scalaris* (Ach. ex Lilj.) M.Choisy., 4, 12, on siliceous rocks.

\**Immersaria athroocarpa* (Ach.) Rambold & Pietschm., 2, on calcareous rock.

\**Ionaspis lacustris* (With.) Lutzoni. 2, on calcareous rock.

\**Lecania crytella* (Ach.) Th.Fr., 7, on *Quercus* sp., 14, on *Populus* sp.

\**L. turicensis* (Hepp) Müll.Arg. 2, 3, on calcareous rocks.

\**Lecanora albescens* (Hoffm.) Branth & Rostr., 12, 15, on calcareous rocks.

*L. bolcana* (Pollich) Poelt., 3, 6, 12, 15, 19, 21, on calcareous rocks.

*L. crenulata* Hook., 5, 13, 14, on calcareous rocks.

*L. dispersa* (Pers.) Röhl., 2, 5, 7, 9, 15, 28, 30, on calcareous rocks.

\**L. garovaglii* (Körb.) Zahlbr., 12, on calcareous rock.

\**L. hagenii* (Ach.) Ach., 7, 9, 10, 14, 22, 31, on calcareous rocks.

\**L. intricata* (Ach.) Ach., 2, 31, on siliceous rocks; 22, on calcareous rock.

*L. muralis* (Schreb.) Rabenh., 2, 3, 5, 6, 7, 11, 12, 14, 27, 31, on calcareous rocks.

*L. polytropha* (Hoffm.) Rabenh., 14, on siliceous rock.

\**L. rouxii* S.Ekman & Tønsberg., 4, on calcareous rock.

*L. rupicola* var. *rupicola* (L.) Zahlbr., 2, 6, 26, on bryophytes.

\**L. semipallida* H.Magn., 7, 11, 14, 15, 18, on calcareous rocks.

*Lecidea atrobrunnea* (Ramond) Schaer., 2, 6, 18, 20, 22, 31, on calcareous rocks.

\**L. fuscoatra* (L.) Ach., 28, on siliceous rock.

\**Lecidella carpathica* Körb., 5, 16, 22, 25, 31, on calcareous rocks.

\**L. patavina* (A.Massal.) Knoph & Leuckert., 2, on bryophytes and calcareous rock, 4, on *Quercus* sp.

*Lepraria incana* (L.) Ach., 12, on calcareous rock.

\**L. membranacea* (Dicks.) Vain., 12, 14, on calcareous rocks.

\**Leptogium gelatinosum* (With.) J.R.Laundon., 12, on bryophytes and calcareous rock.

*L. lichenoides* (L.) Zahlbr., 3, on calcareous rock.

\**L. saturninum* (Dicks.) Nyl., 15, on *Quercus* sp. and calcareous rock.



- \**L. schraderi* (Bernh.) Nyl., 4, on calcareous rock.
- \**Lobothallia alphoplaca* (Wahlenb.) Hafellner, 21, on siliceous rock.
- L. radiosa* (Hoffm.) Hafellner., 2, 3, 7, 10, 12, 15, 18, 27, on calcareous rocks.
- \**Melanohalea exasperata* (De Not.) O.Blanco, A.Crespo, Divakar, Essl., D.Hawksw. & Lumbsch., 3, 7, 32, on calcareous rocks.
- Peltigera rufescens* (Weiss) Humb., 14, on soil.
- \**Phaeophyscia ciliata* (Hoffm.) Moberg, 7, on *Populus* sp., 9, 15, 28, 29, on *Quercus* sp.
- \**P. endococcina* (Körb.) Moberg., 17, on calcareous rock.
- P. orbicularis* (Neck.) Moberg., 3, 4, 7, 9, 10, 15, on calcareous rocks.
- \**P. poeltii* (Frey) Clauzade & Cl.Roux., 9, 11, 14, 31, on *Quercus* sp.
- Physcia aipolia* (Ehrh. ex Humb.) Fürnr., 11, on *Salix* sp. 15, 32, on *Quercus* sp.
- \**P. biziana* (A.Massal.) Zahlbr., 7, 14, 28, on *Populus* sp. 10, 29, on *Quercus* sp.
- P. caesia* (Hoffm.) Hampe ex Fürnr., 2, on calcareous rock.
- P. dubia* (Hoffm.) Lettau., 2, 11, 22, on calcareous rocks.
- \**P. leptalea* (Ach.) DC., 7, on *Quercus* sp.
- P. stellaris* (L.) Nyl., 7, on *Quercus* sp.
- Physconia distorta* (With.) J.R.Laundon., 3, 4, 7, 12, 13, 14, 17, on calcareous rocks.
- P. muscigena* (Ach.) Poelt., 9, on soil.
- \**Placocarpus schaeferi* (Fr.) Breuss., 8, 11, 26, on calcareous rocks.
- \**Placynthium nigrum* (Huds.) Gray., 4, 11, 14, on calcareous rocks.
- \**Polysporina cyclocarpa* (Anzi) Vězda, 2, on bryophytes and calcareous rock.
- Psora decipiens* (Hedw.) Hoffm., 3, 4, 15, on calcareous rocks.
- \**P. vallesiaca* (Schaer.) Timdal., 4, 15, 26, on calcareous rocks.
- Rhizocarpon geographicum* (L.) DC., 2, 16, 20, 25, 26, 27, 31, on calcareous rocks; 6, on bryophytes.
- \**R. umbilicatum* (Ramond) Flagey., 2, on soil.
- \**Rhizoplaca chrysoleuca* (Sm.) Zopf., 20, on calcareous rock.
- \**R. melanophthalma* (DC.) Leuckert., 6, on calcareous rock.
- \**R. peltata* (Ramond) Leuckert & Poelt., 6, 15, 18, on calcareous rocks.
- \**Rinodina bischoffii* (Hepp) A.Massal., 5, 6, 27, on calcareous rocks.
- \**R. calcarea* (Hepp ex Arnold) Arnold. 5, on calcareous rock.
- \**R. immersa* (Körb.) J.Steiner, 2, 5, 12, on calcareous rocks.
- \**R. olea* Bagl., 7, 9, 31, on calcareous rocks.
- \**R. sophodes* (Ach.) A.Massal., 3, on calcareous rock.
- \**Romjularia lurida* (Ach.) Timdal., 5, on calcareous rock.
- \**Sarcogyne privigna* (Ach.) A.Massal., 7, on siliceous rock.
- \**S. regularis* Körb., 7, 24, on calcareous rocks.
- \**Squamarina cartilaginea* var. *cartilaginea* (With.) P.James., 1, 3, 4, 12, 14, 15, 25, on calcareous rocks.
- \**S. lentigera* (Weber) Poelt., 4, 15, on calcareous rocks.
- \**Staurothele areolata* (Ach.) Lettau., 30, on siliceous and calcareous rocks.
- \**S. rufa* (A.Massal.) Zschacke., 2, 15, on calcareous rocks.
- \**Timdalia intricata* (H.Magn.) Hafellner., 5, on calcareous rock.
- \**Toninia albilabra* (Dufour) H.Olivier., 15, on calcareous rock.
- \**T. athallina* (Hepp) Timdal., 5, 11, 29, on calcareous rocks.
- \**T. caeruleonigrans* (Lightf.) Th.Fr. 4, on soil.
- \**T. candida* (Weber) Th.Fr. 12, on soil.
- \**T. sedifolia* (Scop.) Timdal., 5, 14, 15, on calcareous rocks, 18, 22, on soil.
- \**Verrucaria fuscella* (Turner) Winch., 2, 4, on calcareous rocks.

- \**V. fuscula* Nyl., 11, 22, on calcareous rocks.  
\**V. hochstetteri* Fr., 15, on calcareous rock.  
\**V. macrostoma* f. *macrostoma* Dufour ex DC., 2, 6, 12, 25, on calcareous rocks.  
\**V. marmorea* (Scop.) Arnold., 5, on calcareous rock.  
\**V. muralis* Ach., 2, 24, on calcareous rocks.  
\**V. nigrescens* Pers., 2, 3, 7, 9, 11, 12, 13, 14, 15, 17, 18, 19, 21, 22, 26, 28, 30, on calcareous rocks.  
\**V. ochrostoma* Borrer., 30, on calcareous rock.  
\**V. polysticta* Borrer., 2, 12, 14, 18, on calcareous rocks.  
\**Verruculopsis lecideoides* (A.Massal.) Gueidan & Cl.Roux., 2, on calcareous rock.  
*Xanthoparmelia pulla* (Ach.) O.Blanco, A.Crespo, Elix, D.Hawksw. & Lumbsch. 1, on siliceous and calcareous rocks.  
*Xanthoria candelaria* (L.) Th.Fr., 7, on calcareous rock.  
*X. elegans* (Link) Th.Fr., 2, 5, 6, 16, 20, 22, 25, on calcareous rocks.  
\**X. fallax* (Hepp ex Arnold) Arnold., 4, 10, on calcareous rocks.

## Discussion

Habitat diversity mentioned in the introduction reflects itself in the 23 families to which the determined taxa belong. Additionally, one genus (*Timdalia*) is still incertae sedis. *Verrucariaceae* and *Physciaceae*, involving 6 and 5 genera, respectively, are remarkably rich families. As regards to total species number, however, *Teloschistaceae* exceeds both with 22 species and subspecies taxa. *Verrucariaceae* and *Physciaceae* succeed *Teloschistaceae* with 19 and 18 taxa, respectively.

The genus *Caloplaca* contains 18 infrageneric taxa, and is the richest genus in our study. *Lecanora* has 12, *Aspicilia* has 10, and *Verrucaria* has 10 infrageneric taxa. These 4 mentioned genera are renowned for their ecological tolerance.

Morphologically 114 taxa of 144 lichens are crustose, 27 are foliose, and 3 are fruticose. Six lichens

were reported to grow on other lichens. Of these, *Caloplaca oasis* can survive even without a thallus, but a few apothecia. Thalli of *Aspicilia cheresina* closely resemble thalli of *A. calcarea*, on which it is frequently found to be parasitic. Other parasitic species *Arthonia apotheciorum*, *Caloplaca arenaria*, *C. inconnexa*, and *C. polycarpa* may or may not be found with thalli. These parasitic lichens were found on various species of *Acarospora*, *Aspicilia*, *Caloplaca*, and *Lecanora*.

More than 2/3 of the taxa were found to grow on calcareous substrata. This may reflect the geological properties of Kemaliye as well as the substrate preference of lichens. Dominant geological formations in Kemaliye are permo-carboniferous and jura-cretaceous. The western part of the district has neogen gypsum surfaces. Andesite formation is remarkable in the south-western part. One can easily find fossils of sea origin, which are known to be remnants of the Tethys Ocean, in the high altitude Sariçiçek plateau. It is certain that millions of years of presence of the Tethys Ocean led to deposition of calcareous material on the formations mentioned above. Therefore, calcareous substrata are dominant in the district. This may explain the overwhelming number of lichens found on calcareous substrata.

The station bearing the highest number of lichen taxa is station 2 with 48 taxa. It is followed by stations 15 and 14 with 34 and 33 taxa, respectively. Stations 26 and 32 are the poorest ones, with only 3 taxa each. Locality 26 is a mildly inclined, thin soil slope, which is exposed to erosion of both water and wind. Frequent rocks of this station were covered with *Rhizocarpon geographicum*. Apparently the substrata (soil or rocks) are often swept by water and wind, not giving any time for lichen colonisation, except for *R. geographicum* and some similar taxa. Locality 32 is mostly covered with agricultural fields and scattered dwarf trees. There are very few rocks or stones. This limits the substrate availability for lichens. The lack of species diversity in localities 26 and 32 may be attributed to these factors.

*Aspicilia calcarea* was found in 20 stations, and was the most common species, followed by *Verrucaria nigrescens* and *Caloplaca variabilis*, which were found in 17 and 16 stations, respectively. Other common taxa include *Candelariella aurella* (14 stations),



*Acarospora cervina* (13 stations), *Aspicilia contorta* subsp. *contorta* (12 stations), *Candelariella vitellina* f. *vitellina* (11), *Lecanora muralis* (10 stations), and *Caloplaca holocarpa* (9 stations).

Excluding the new records for Turkey, which are collected from Van Province, of the reported taxa, 58 were found in only 1 station while 24 were found in 2 stations, 25 in 3 stations, 6 in 4 stations, 8 in 5 stations, 4 in 6 stations, and 5 in 7 stations. We think this phenomenon, too, reflects the habitat diversity of Kemaliye.

The scarcity of epiphytic taxa may be explained by the fact that there is no first grade forest zone in Kemaliye. The current tree presence inhabits epiphytic species to an extent but usually there are no common epiphytes. A similar situation is also valid for foliose species. Most of the known foliose lichens live on soil. Usually agricultural zones and grasslands occupy most of the soil in Kemaliye. Additionally, a large part of the district is occupied by steep rocky

cliffs. The rare existence of epiphytic and foliose species may be attributed to the reasons mentioned above.

In this study, we contribute to the lichen flora of Turkey with a floristic list of Kemaliye lichens and 3 new records from Van Province. It would be realistic to say that the lichen flora of Turkey is still largely unknown. The large regions waiting to be explored at present surely inhabit new species for our country and perhaps for the world.

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### References

- Aslan A (2000). Lichens from the regions of Artvin, Erzurum and Kars (Turkey). *Israel Journal of Plant Sciences* 48: 143-155.
- Aslan A, Aptroot A & Yazıcı K (2002). New lichens for Turkey. *Mycotaxon* 84: 277-280.
- Aslan A, Vezda A, Yazıcı K & Karagöz Y (2005). New foliicolous lichen records for lichen flora of Turkey. *Cryptogamie Mycologie* 26: 61-66.
- Brodo IM, Sharnoff SD & Sharnoff S (2001). *Lichens of North America*. New Haven, Conn., London: Yale University Press.
- Candan M & Halıcı MG (2011). New *Cercidospora* records for Turkey. *Turkish Journal of Botany* 35: 625-629.
- Candan M & Turk AÖ (2008). Lichens of Malatya, Elazığ and Adıyaman provinces (Turkey). *Mycotaxon* 105: 19-22.
- Clauzade G, Roux C & Centre-Ouest StBd (1985). *Likenoj de Okcidenta Europa: Ilustrita Determinlibro*. Saint-Suplice-de-Royan: S.B.C.O.
- Davis PH (ed.) (1965). *Flora of Turkey and the East Aegean Islands*. Vol. 1. Edinburgh: Edinburgh University Press.
- Dobson F (2000). *Lichens: An Illustrated Guide to the British and Irish Species*. Slough: Richmond Publishing Co.
- Galloway DJ & Ledingham J (2012). Additional lichen records from new Zealand. *Australian Lichenology* 70: 14-25.
- Karagöz Y, Aslan A, Yazıcı K & Aptroot A (2011). *Diplotomma*, *Lecanora*, and *Xanthoria* lichen species new to Turkey. *Mycotaxon* 115: 115-119.
- Oran S & Öztürk S (2012). Epiphytic lichen diversity on *Quercus ceris* and *Q. Frainetto* in the Marmara region (Turkey). *Turkish Journal of Botany* 36: 175-190.
- Poelt J (1974). Bestimmungsschlüssel europäischer Flechten. J.Cramer.
- Poelt J (1981). *Bestimmungsschlüssel Europäischer Flechten Ergänzungshelf. 2*. Vaduz: J.Cramer.
- Smith CW (2009). *The Lichens of Great Britain and Ireland*. London: British Lichen Society.
- Wirth V (1995). *The Lichens: Baden-Württemberg*. Vol. 1-2 Stuttgart: Ulmer.
- Yazıcı K & Aslan A (2003). Lichens from the regions of Gümüşhane, Erzincan and Bayburt (Turkey). *Cryptogamie Mycologie* 24: 287-300.
- Yazıcı K & Aslan A (2006). Four new lichens from Turkey. *Mycotaxon* 95: 315-318.
- Yazıcı K, Aslan A & Aptroot A (2004). Four new lichen species from Turkey. *Mycotaxon* 90: 177-180.
- Yazıcı K, Aslan A & Aptroot A (2005). New lichen records from Turkey. *Mycotaxon* 92: 341-344.
- Yazıcı K, Aptroot A, Etayo J, Aslan A & Guttova A (2008). Lichens from the Batman, Mardin, Osmaniye and Sivas regions of Turkey. *Mycotaxon* 103: 141-144.
- Yazıcı K, Elix J.A & Aslan A (2010a). Some parmelioid lichens new to Turkey and Asia. *Mycotaxon* 111: 489-494.
- Yazıcı K, Aptroot A, Aslan A, Etayo J, Spier L & Karagöz Y (2010b). Lichenized and lichenicolous fungi from nine different areas in Turkey. *Mycotaxon* 111: 113-116.