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Lichenized and Lichenicolous Fungi Records From Kazdağı (Balıkesir, Turkey)

Seyhan ORAN*¹, Gülşah ÖZYİĞİTOĞLU², Şule ÖZTÜRK¹

*Corresponding author: seyhana@uludag.edu.tr

¹Uludağ University, Faculty of Arts & Science, Department of Biology, Bursa, Turkey

²Marmara University, Faculty of Arts & Science, Department of Biology, Istanbul, Turkey

Abstract: 184 infrageneric (183 lichenized and 1 lichenicolous fungi) taxa belonging to 79 genera were determined from Kazdağı in Balıkesir, Turkey. 73 of 184 taxa are new records for the province of Balıkesir.

Key words: Biodiversity, Lichen, Kaz Mountain, Turkey

Kazdağı'ndan (Balıkesir, Türkiye) Likenleşmiş ve Likenikol Mantar Kayıtları

Öz: Edremit-Kazdağı (Balıkesir, Türkiye)'nden 79 cinse ait 183 likenleşmiş mantar ile 1 likenikol mantar olmak üzere toplam 184 takson belirlenmiştir. 184 taksondan 73 tanesi Balıkesir ili için yeni kayıttır.

Anahtar kelimeler: Biyoçeşitlilik, Liken, Kazdağı, Türkiye

Introduction

There is no detailed study about lichen biodiversity of Kazdağı. Karamanoğlu (1964, 1971), was published seven taxa from Kazdağı. Culberson and Culberson (1968) and Schindler (1975), were recorded one taxon from Kazdağı. These papers were first lichen records from Kazdağı. Then, John (1992) was reported 2 taxa from Edremit-Kazdağı, Şenkardeşler (2009), was recorded 4 taxa from Evciler-Kazdağı. Oran and Öztürk (2010), were published 1 new record for Turkey from Kazdağı, Bayramiç, Çanakkale. Beside these papers, Çobanoğlu and Sevgi (2006) were published 75 taxa from Gürgen Dağı where is the north-east of Kazdağı range.

In addition, several lichen papers published from Balıkesir province where the Kazdağı is located are as follows; Pişüt, 1970; Güner, 1986; Güner and Özdemir, 1986 a; 1986b; John, 1992; 1995; 1996; 1999; 2007; Çetin and Tümen, 1994; Güvenç et al., 1996; Öztürk et al., 1998; Schindler, 1998; Pişüt and Guttová, 2008; 2009; Vondrák 2010; Çobanoğlu et al., 2011; Oran and Öztürk, 2011; 2012; Oran, 2011; Özdemir Türk et. al., 2015.

Kazdağı is an important natural area and is situated in northwestern Anatolia, in the vicinity of the Gulf of Edremit, forming a natural border between the provinces of Çanakkale and Balıkesir on the southeast part of the Biga Peninsula. Kazdağı is a mountain range of 60 km which is lying between 39° 42' N and 26° 51' E and also is a natural border between the Marmara and Aegean regions of Turkey. The highest places of Kazdağı are Karataş Peak (1774 m), Baba Peak (1765 m) and Sarıkız Peak (1726 m). Kazdağı is the second highest mountain in the Marmara Region. A part of Kazdağı (21,300 ha) was declared a National Park on 17.04.1994. At the same time, in order to preserve the endemic Kazdağı fir, 240 ha area was declared as a Natural Protection Area on 15.06.1988 (Özhatay et al., 2005; Dirmenci et al., 2007).

Different climate features dominate the study area. Due to its proximity to the Aegean Sea, the characteristic Mediterranean climate is dominant on the southern slopes of Kazdağı, while cooler and more humid terrestrial climates are observed on the northern slopes. It has a range of forest communities that reflect height, aspect and



climate changes. Red pine (*Pinus brutia* Ten.), larch (*Pinus nigra* Arn.) and oak forests (*Quercus cerris* L. var. *cerris* L., *Q. Frainetto* Ten., *Q. petraea* (Mattuschka) Liebl. subsp. *iberica* (Steven ex Bieb.) Krassilin.) and endemic Kazdağı fir (*Abies nordmanniana* (Steven) Spach subsp. *equi-trojani* (Asch. & Sint. ex Boiss.) Coode & Cullen) occupy a large area. In addition to these, different heights and aspects (*Fagus orientalis* Lipsky), hornbeam (*Carpinus betulus* L.), chestnut (*Castanea sativa* Mill.) and olive (*Olea europaea* L.) trees are encountered (Özhatay et al., 2005).

The mean annual temperature (1938-2016) is 14.6 °C and the mean annual rainfall (1938-2016) is 583.7 mm at Balıkesir province (Anonim 2016).

In this study, we aimed to contribute to the knowledge of the lichenized and lichenicolous fungi of Edremit-Kazdağı.

Materials and Methods

Samples were collected from a total of 36 localities (Figure 1, Table 1) on Kazdağı in 2001. They were examined with a stereomicroscope (Leica EZ4 model), and a light microscope (Olympus CX21) for morphology and anatomical observations. The sections of the specimens were examined in water, 10 % potassium hydroxide (KOH) or Lugol's-iodine (I). Identifications were determined with various lichen literatures (Brodo et al., 2001; Smith et al., 2009; Wirth, 1995; Giralt, 2001). Vouchers are stored in the Herbarium of Faculty of Arts & Sciences, Uludağ University, Bursa, Turkey (BULU).

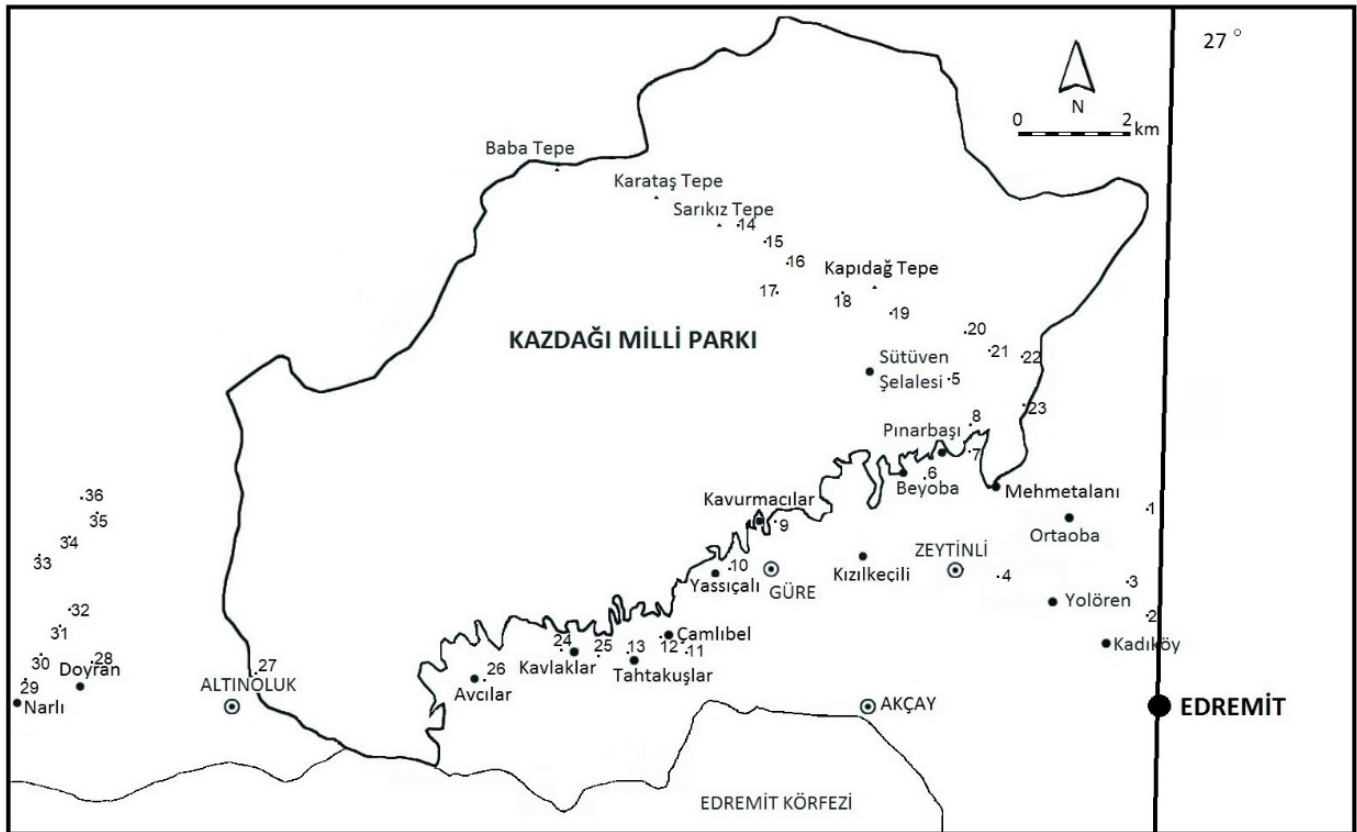


Figure 1. Map of collecting localities, Kazdağı, Balıkesir.



Table 1. The collected localities in Kazdağı, Balıkesir.

| Number | Locality | Altitude | Coordinates | Date |
|--------|---|----------|------------------------|------------|
| 1 | Edremit; entrance of Ortaoba, olive area | 340 m | 39° 37' N 26° 59' E | 16.08.2001 |
| 2 | Edremit - Ortaoba road, exit of Kadıköy, pine area | 160 m | 39° 36' N 26° 59' E | 16.08.2001 |
| 3 | Edremit; Yolören village, Değirmen place, olive area | 85 m | 39° 36' N 26° 58' E | 16.08.2001 |
| 4 | Edremit; Yolören - Zeytinli road, entrance of Zeytinli | 80 m | 39° 37' N 26° 57' E | 16.08.2001 |
| 5 | Edremit; Zeytinli, Sütüven Waterfall, Hasanboğuldu picnic area | 270 m | 39° 38' N 26° 55' E | 17.08.2001 |
| 6 | Edremit; Beyoba - Pınarbaşı road, exit of Beyoba, pine forest | 260 m | 39° 38' N 26° 55' E | 17.08.2001 |
| 7 | Edremit; Beyoba - Pınarbaşı road, entrance of Pınarbaşı, olive area | 290 m | 39° 38' N 26° 56' E | 17.08.2001 |
| 8 | Edremit; Pınarbaşı - Zeytinli road, exit of Pınarbaşı, riverside | 170 m | 39° 38' N 26° 56' E | 17.08.2001 |
| 9 | Edremit; Güre, around of Kavurmacılar district | 240 m | 39° 37' N 26° 53' E | 18.08.2001 |
| 10 | Edremit; Güre, around of Yassıçalı, pine forest | 110 m | 39° 37' N 26° 53' E | 18.08.2001 |
| 11 | Edremit; Edremit - Çamlıbel road, entrance of Çamlıbel, roadside | 170 m | 39° 35' N 26° 51' E | 18.08.2001 |
| 12 | Edremit; Edremit - Çamlıbel road, 1. km, pine forest | 90 m | 39° 35' N 26° 51' E | 18.08.2001 |
| 13 | Edremit; around of Tahtakuşlar, pine forest | 175 m | 39° 35' N 26° 51' E | 18.08.2001 |
| 14 | Edremit; Sarıkız Hill, open rocky area | 1720 m | 39° 42' N 26° 49' E | 19.08.2001 |
| 15 | Edremit; Sarıkız Hill - Zeytinli road, 5. km, pine forest | 1600 m | 39° 42' N 26° 53' E | 19.08.2001 |
| 16 | Edremit; Sarıkız Hill - Zeytinli road, 8. km, pine forest | 1430 m | 39° 42' N 26° 53' E | 19.08.2001 |
| 17 | Edremit; Sarıkız Hill - Zeytinli road, 9. km, around of Mermerli | 1330 m | 39° 41' N 26° 54' E | 19.08.2001 |
| 18 | Edremit; Sarıkız Hill - Zeytinli road, 11. km, rocky area | 1305 m | 39° 40' N 26° 55' E | 19.08.2001 |
| 19 | Edremit; Sarıkız Hill - Zeytinli road, 12. km, mixed forest | 1235 m | 39° 40' N 26° 55' E | 19.08.2001 |
| 20 | Edremit; Sarıkız Hill - Zeytinli road, 15. km, mixed forest | 1000 m | 39° 40' N 26° 55' E | 19.08.2001 |
| 21 | Edremit; Sarıkız Hill - Zeytinli road, 18. km, mixed forest | 850 m | 39° 39' N 26° 56' E | 19.08.2001 |
| 22 | Edremit; Sarıkız Hill - Zeytinli road, 22. km, oak area | 505 m | 39° 39' N 26° 57' E | 19.08.2001 |
| 23 | Edremit; Mehmetalanı - Zeytinli road, 3. km | 295 m | 39° 38' N 26° 57' E | 19.08.2001 |



Table 1. continued

| Number | Locality | Altitude | Coordinates | Date |
|--------|--|----------|------------------------|------------|
| 24 | Edremit; exit of Kavlaklar, ridgeway, 2. km, redpine forest | 295 m | 39° 36' N 26° 50' E | 20.08.2001 |
| 25 | Edremit; entrance of Kavlaklar, olive area | 85 m | 39° 34' N 26° 50' E | 20.08.2001 |
| 26 | Edremit; Akçay - Altınoluk road, Avcılar village ridgeway, sunny rocky slopes | 255 m | 39° 35' N 26° 48' E | 20.08.2001 |
| 27 | Edremit; Altınoluk, ridgeway, around of Sefa Hill | 280 m | 39° 35' N 26° 44' E | 20.08.2001 |
| 28 | Edremit; Altınoluk, Doyran village, ridgeway, 2. km, pine forest | 315 m | 39° 35' N 26° 42' E | 21.08.2001 |
| 29 | Edremit; Narlı village, ridgeway, 1. km, pine forest | 265 m | 39° 34' N 26° 40' E | 21.08.2001 |
| 30 | Edremit; Narlı village, ridgeway, 2. km, mixed forest | 330 m | 39° 35' N 26° 40' E | 21.08.2001 |
| 31 | Edremit; Narlı village, ridgeway, 5. km, mixed forest | 480 m | 39° 36' N 26° 41' E | 22.08.2001 |
| 32 | Edremit; Narlı village, ridgeway, 8. km, rocky area | 680 m | 39° 37' N 26° 41' E | 22.08.2001 |
| 33 | Edremit; Narlı village, ridgeway, 10. km, around of Daridere nursery, fruit garden | 600 m | 39° 36' N 26° 40' E | 22.08.2001 |
| 34 | Edremit; Narlı village, ridgeway, 11. km, exit of Daridere nursery, mixed forest | 610 m | 39° 36' N 26° 40' E | 22.08.2001 |
| 35 | Edremit; Narlı village, ridgeway, 13. km, oak area | 690 m | 39° 37' N 26° 41' E | 22.08.2001 |
| 36 | Edremit; Narlı village, ridgeway, Domuz çukuru place, mixed forest | 900 m | 39° 40' N 26° 41' E | 22.08.2001 |

Results

The list of taxa is arranged in alphabetical order with locality numbers and substrates. A herbarium number for specimens (BULU) are indicated in the parenthesis. Lichen taxa new to Balıkesir province are indicated by an asterisk (*).

***Acarospora fuscata* (Nyl.) Th. Fr.:** 14, 18, 27, 31, on siliceous rocks (18153, 18202, 18322, 18425)

* ***Acarospora sinopica* (Wahlenb.) Körb.:** 14, on siliceous rocks (18154)

***Alectoria sarmentosa* (Ach.) Ach.:** 36, on *Pinus nigra* (18549)

***Amandinea punctata* (Hoffm.) Coppins & Scheid.:** 5, 9, 33, on siliceous rocks (18033, 18079, 18467)

* ***Arthonia punctiformis* Ach.:** 33, on *Juglans* sp. (18447)

* ***Arthonia radiata* (Pers.) Ach.:** 34, on *Juglans* sp. (18497)

***Aspicilia cinerea* (L.) Körb.:** 5, 15, 24, 28, 31, 36, on siliceous rocks (18039, 18168, 18294, 18345, 18426, 18282)

***Aspicilia epiglypta* (Norrl. ex Nyl.) Hue:** 36, on siliceous rocks (18559)

***Aspicilia intermutans* (Nyl.) Arnold:** 5, 14, on siliceous rocks (18035, 18160)

***Athallia holocarpa* (Hoffm.) Arup, Frödén & Søchting:** 1, 6, on *Ficus* sp. (17983, 18049), on *Olea* sp. (17977, 18053), 5, on *Styrax officinalis* (18031), 10, on *Olea* sp. (18094), 21, on *Crataegus* sp., on *Styrax officinalis* (18243, 18263), 24, 28, on siliceous rocks (18297, 18337), 33, on *Cydonia oblonga* (18450), 36, on *Alnus* sp. (18547)

* ***Bagliettoa parmigera* (J. Steiner) Gams:** 7, 10, 28, on calcareous rocks (18061, 18105, 18335)



- * **Bagliettoa marmorea** (Scop.) Gueidan & Cl.Roux: 7, on calcareous rocks (18057)
- Biatora globulosa** (Flörke) Fr.: 31, on *Pinus brutia* (18418)
- Blastenia crenularia** (With.) Arup, Søchting & Frödén: 1, on siliceous rocks with limestone (17994), 4, 5, 9, 10, 12, 23, 24, 27, 28, 31, 33, on siliceous rocks (18023, 18042, 18077, 18100, 18125, 18278, 18291, 18324, 18341, 18423, 18458)
- Blastenia ferruginea** (Huds.) A. Massal.: 3, 13, 25, on *Olea* sp. (18014, 18143, 18308), 28, on *Celtis* sp., on *Ficus* sp., on *Olea* sp. (18355, 18347, 18349), 29, on *Pinus* sp. (18366), 30, on *Pistacia* sp., on *Styrax officinalis* (18391, 18397), 31, on *Pinus brutia* (18414), 34, on *Abies* sp. (18502), 35, on *Quercus frainetto* (18525), 36, on *Coryllus* sp. (18534)
- * **Blastenia herbidella** (Hue) Servit: 17, on *Celtis* sp. (18185)
- * **Blennothallia crispa** (Huds.) Otálora, P.M. Jørg. & Wedin: 1, 12, on calcareous rocks (17990, 18120), 10, on siliceous rocks (18104)
- Bryoria capillaris** (Ach.) Brodo & D. Hawksw.: 15, 17, on *Pinus* sp. (18162, 18200), 36, on *Pinus nigra* (18551)
- Bryoria fuscescens** (Gyeln.) Brodo & D. Hawksw.: 36, on *Pinus nigra* (18552)
- Buellia erubescens** Arnold: 17, on *Pinus* sp. (18183), 19, 20, on *Quercus* sp. (18215, 18223), 33, on *Cydonia oblonga* (18449), 34, on *Alnus* sp. (18489)
- Buellia griseovirens** (Turner & Borrer ex Sm.) Almb.: 17, on *Pinus* sp. (18184), 19, on *Quercus* sp. (18214), 21, on *Crataegus* sp. (18241), 33, on *Cydonia oblonga* (18451), 34, on *Abies* sp., *Castanea* sp. (18501, 18507), 35, on *Quercus frainetto* (18523)
- * **Caloplaca albopruinosa** (Arnold) H. Olivier: 1, on calcareous rocks (17986)
- * **Caloplaca atroflava** (Turner) Mong.: 1, on calcareous rocks (17991), 33, on siliceous rocks (18459)
- Caloplaca cerina** (Ehrh. ex Hedw.) Th. Fr.: 1, on *Ficus* sp. (17984), 10, on *Olea* sp. (18092), 34, on *Juglans* sp. (18496)
- * **Caloplaca erythrocarpa** (Pers.) Zwackh: 26, 28, on calcareous rocks (18309, 18332)
- Caloplaca haematites** (Chaub. ex St.-Amans) Zwackh: 28, on *Celtis* sp. (18356), 30, on *Pistacia* sp. (18408)
- * **Caloplaca irrubescens** (Arnold) Zahlbr.: 1, 4, 5, 12, 24, 27, 28, on siliceous rocks (17995, 18027, 18043, 18127, 18283, 18321, 18340)
- Candelariella vitellina** (Hoffm.) Müll. Arg.: 1, 27, on *Ficus* sp. (17985, 18318), 1, 4, 9, 14, 24, 27, 28, 29, 31, 32, 33, on siliceous rocks (18002, 18021, 18078, 18150, 18295, 18316, 18342, 18381, 18428, 18445, 18465), 3, 11, 13, on *Olea* sp. (18012, 18114, 18142), 28, on *Celtis* sp. (18359), 30, on *Pistacia* sp., on *Quercus* sp., on *Styrax officinalis* (18396, 18404, 18400)
- Candelariella xanthostigma** (Pers. ex Ach.) Lettau: 1, on *Pyrus* sp. (17980), 11, 25, on *Olea* sp. (18113, 18304), 20, on *Quercus* sp. (18216)
- * **Catillaria atomarioides** (Müll. Arg.) H. Kiliyas: 5, on siliceous rocks (18047)
- * **Catillaria chalybeia** A. Massal.: 4, 5, 10, 32, 33, on siliceous rocks (18024, 18045, 18109, 18440, 18468), 26, on calcareous rocks (18310)
- Circinaria caesiocinerea** (Nyl. ex Malbr.) A.Nordin et al.: 1, 9, 14, 27, 28, 31, 32, on siliceous rocks (18003, 18083, 18159, 18320, 18344, 18424, 18444), 12, on siliceous rocks with limestone (18129)
- Circinaria calcarea** (L.) A. Nordin, Savić & Tibell: 1, 17, 26, 28, on calcareous rocks (17987, 18190, 18314, 18334)
- Cladonia coniocraea** (Flörke) Spreng.: 34, on *Pinus nigra* (18480)
- Cladonia fimbriata** (L.) Fr.: 33, on siliceous soil (18478)
- * **Cladonia parasitica** (Hoffm.) Hoffm.: 21, on *Pinus* sp. (18267)
- Cladonia pyxidata** (L.) Hoffm.: 16, 31, on siliceous rocks (18179, 18422), 33, 36, on siliceous soil (18477, 18563)
- Collema furfuraceum** Du Rietz: 10, 11, on *Olea* sp. (18097, 18112)
- Collema nigrescens** (Huds.) DC.: 8, 25, on *Olea* sp. (18064, 18299), 13, 22, on *Quercus* sp. (18135, 18277), 21, on *Crataegus* sp. (18234), 31, on *Pyrus elaeagnifolia* (18413)
- Collema subflaccidum** Degel.: 6, on *Pyrus* sp. (18054)
- * **Collema subnigrescens** Degel.: 1, 5, 9, 28, 32, on siliceous rocks (17993, 18038, 18081, 18346, 18443), 10, on *Olea* sp. (18096)
- * **Dermatocarpon miniatum** (L.) W. Mann: 32, on siliceous rocks (18442)
- Diploschistes scruposus** (Schreb.) Norman: 4, 9, 24, on siliceous rocks (18028, 18086, 18284)
- * **Diplotomma chlorophaeum** (Hepp ex Leight.) Szatala: 4, 10, on siliceous rocks (18025, 18102)
- * **Diplotomma hedinii** (H. Magn.) P. Clerc & Cl. Roux: 7, on calcareous rocks (18059)



* *Enchylium polycarpon* (Hoffm.) Otálora, P.M. Jørg. & Wedin: 22, 28, on calcareous rocks (18274, 18330)

Enchylium tenax (Sw.) Gray: 12, on calcareous rocks (18121)

Evernia prunastri (L.) Ach.: 20, on *Quercus* sp. (18217), 21, on *Crataegus* sp., on *Pinus* sp., on *Quercus* sp., on *Styrax officinalis* (18247, 18268, 18269, 18254), 29, on *Pinus* sp. (18363), 31, on *Pinus brutia*, on *Pyrus elaeagnifolia* (18421, 18409), 35, on *Quercus frainetto* (18531), 36, on *Alnus* sp. (18537)

* *Flavoplaca citrina* (Hoffm.) Arup, Frödén & Søchting: 10, on siliceous rocks (18101)

* *Flavoplaca flavocitrina* (Nyl.) Arup, Frödén & Søchting: 12, on siliceous rocks (18126)

Gyalolechia flavorubescens (Huds.) Søchting, Frödén & Arup: 8, 34, on *Juglans* sp. (18068, 18495), 30, on *Quercus* sp. (18403)

Hafellia disciformis (Fr.) Marbach & H. Mayrhofer: 21, on *Crataegus* sp. (18231), 35, on *Quercus frainetto* (18528)

Hypocenomyce scalaris (Ach. ex Lilj.) M. Choisy: 17, 21, on *Pinus* sp. (18186, 18265)

Hypogymnia farinacea Zopf: 17, 20, on *Pinus* sp. (18187, 18226), 19, on *Quercus* sp. (18208), 31, on *Pinus brutia* (18414), 36, on *Pinus nigra* (18553)

Hypogymnia physodes (L.) Nyl.: 21, on *Crataegus* sp. (18248), 34, on *Pinus nigra* (18483), 35, on *Quercus frainetto* (18512)

Hypogymnia tubulosa (Schaer.) Hav.: 15, 16, 20, on *Pinus* sp. (18174, 18176, 18227), 21, on *Crataegus* sp., on *Styrax officinalis* (18253, 18255), 34, on *Pinus nigra* (18482), 35, on *Quercus frainetto* (18511)

* *Lathagrium cristatum* (L.) Otálora, P.M. Jørg. & Wedin: 7, 12, 17, 24, on calcareous rocks (18058, 18119, 18190, 18296)

* *Lathagrium fuscovirens* (With.) Otálora, P.M. Jørg. & Wedin: 1, on calcareous rocks (18001)

* *Lecania erysibe* (Ach.) Mudd: 29, on siliceous rocks (18388)

* *Lecania inundata* (Hepp ex Körb.) M. Mayrhofer: 28, on calcareous rocks (18325)

* *Lecania naegelii* (Hepp) Diederich & van den Boom: 34, on *Juglans* sp. (18498)

* *Lecanora argentata* (Ach.) Röhl.: 8, on *Juglans* sp. (18070)

Lecanora bolcana (Pollini) Poelt: 14, 24, 27, 28, 32, 36, on siliceous rocks (18156, 18285, 18319, 18343, 18433, 18566)

Lecanora campestris (Schaer.) Hue: 1, 4, 10, 31, on siliceous rocks (17999, 18019, 18099, 18427)

Lecanora carpinea (L.) Vain.: 21, on *Crataegus* sp., on *Styrax officinalis* (18232, 18261), 33, on *Malus* sp. (18455), 34, on *Juglans* sp. (18493), 35, on *Quercus frainetto* (18526), 36, on *Coryllus* sp. (18533)

Lecanora chlarotera Nyl.: 1, on *Ficus* sp., on *Olea* sp. (17981, 17976), 3, 10, on *Olea* sp. (18013, 18091), 6, on *Ficus* sp. (18050), 8, on *Juglans* sp. (18069), 15, 17, on *Pinus* sp. (18163, 18201), 20, on *Quercus* sp. (18221), 21, on *Crataegus* sp., on *Styrax officinalis* (18250, 18262), 30, on *Quercus* sp., on *Styrax officinalis* (18405, 18398), 33, on *Malus* sp. (18456), 34, on *Castanea* sp., *Juglans* sp. (18508, 18492), 35, on *Quercus frainetto* (18524), 36, on *Alnus* sp., on *Coryllus* sp. (18542, 18535)

Lecanora expallens Ach.: 31, on *Pinus brutia* (18419), 34, on *Abies* sp., on *Juglans* sp. (18505, 18490)

* *Lecanora frustulosa* (Dicks.) Ach.: 28, on siliceous rocks (18327)

Lecanora intumescens (Rebent.) Rabenh.: 35, on *Quercus frainetto* (18520)

* *Lecanora polytropa* (Ehrh. ex Hoffm.) Rabenh.: 15, on siliceous rocks (18170)

* *Lecanora rupicola* subsp. *subplanata* (Nyl.) Leuckert & Poelt: 14, 32, on siliceous rocks (18157, 18435)

Lecanora saligna (Schrad.) Zahlbr.: 17, 29, on *Pinus* sp. (18188, 18368)

* *Lecanora subcarpinea* Szatala: 20, on *Quercus* sp. (18222)

* *Lecanora symmicta* (Ach.) Ach.: 24, on *Pinus brutia* (18289)

Lecidea fuscoatra (L.) Ach.: 9, 14, 15, 23, 24, 29, 36, on siliceous rocks (18071, 18149, 18175, 18279, 18293, 18384, 18562)

* *Lecidea lactea* Flörke ex Schaer.: 14, 15, 16, 36, on siliceous rocks, (18158, 18171, 18181, 18565)

* *Lecidea lapicida* (Ach.) Ach.: 18, on siliceous rocks (18204)

Lecidea sarcogynoides Körb.: 14, on siliceous rocks (18151)

* *Lecidea silacea* (Hoffm.) Ach.: 28, on siliceous rocks (18328)

Lecidella carpathica Körb.: 4, 5, 10, 15, 33, on siliceous rocks (18020, 18041, 18103, 18167, 18463)



Lecidella elaeochroma (Ach.) M. Choisy: 1, on *Ficus* sp. (17982), 3, 10, 13, 25, on *Olea* sp. (18008, 18090, 18144, 18303), 5, on *Styrax officinalis* (18032), 6, on *Ficus* sp., on *Olea* sp. (18048, 18052), 8, on *Juglans* sp. (18067), 20, on *Quercus* sp. (18229), 21, on *Crataegus* sp., on *Styrax officinalis* (18233, 18260), 28, on *Celtis* sp., on *Olea* sp. (18354, 18352), 30, on *Pistacia* sp., on *Quercus* sp. (18392, 18406), 31, on *Pyrus elaeagnifolia* (18411), 33, on *Cydonia oblonga*, on *Malus* sp., *Prunus avium* (18448, 18454, 18479), 34, on *Abies* sp., on *Alnus* sp., on *Castanea* sp., on *Juglans* sp. (18499, 18488, 18506, 18491), 35, on *Quercus frainetto* (18527), 36, on *Alnus* sp., on *Coryllus* sp. (18541, 18532)

* **Lecidella stigmataea (Ach.) Hertel & Leuckert:** 17, on calcareous rocks (18192), 31, 33, on siliceous rocks (18429, 18462)

* **Lepraria finkii (B. de Lesd.) R.C.Harris:** 20, 21, on *Pinus* sp. (18228, 18240)

* **Lichenostigma cosmopolites Hafellner & Calat.:** 9, on *Xanthoparmelia* sp. (18087)

Lobothallia radiosa (Hoffm.) Hafellner: 1, on siliceous rocks with limestone (18005), 12, 28, on calcareous rocks (18115, 18326), 32, on siliceous rocks (18441)

Melanelixia glabra (Schaer.) O. Blanco et al.: 31, on *Pyrus elaeagnifolia* (18410)

Melanelixia glabratula (Lamy) Sandler & Arup: 20, on *Quercus* sp. (18218), 36, on *Alnus* sp. (18546)

Melanelixia subargentifera (Nyl.) O. Blanco et al.: 13, on *Olea* sp. (18140)

Melanelixia subaurifera (Nyl.) O. Blanco et al.: 29, on *Pinus* sp. (18390), 35, on *Quercus frainetto* (18517)

Melanohalea elegantula (Zahlbr.) O. Blanco et al.: 5, 29, on *Pinus* sp. (18029, 18362), 35, on *Quercus frainetto* (18518)

Melanohalea exasperata (De Not.) O. Blanco et al.: 13, 25, on *Olea* sp. (18139, 18306), 21, on *Crataegus* sp., on *Styrax officinalis* (18252, 18264), 35, on *Quercus frainetto* (18519), 36, on *Coryllus* sp. (18536)

Melanohalea exasperatula (Nyl.) O. Blanco et al.: 19, on *Quercus* sp. (18205)

* **Micarea denigrata (Fr.) Hedl.:** 34, on *Pinus nigra* (18485)

Monerolechia badia (Fr.) Kalb: 9, on *Xanthoparmelia pulla* (18075), 32, on siliceous rocks with moss (18437)

Myriolecis dispersa (Pers.) Šliva, Zhao Xin & Lumbsch: 33, on siliceous rocks (18461)

Myriolecis hagenii (Ach.) Šliva, Zhao Xin & Lumbsch: 33, on *Juglans* sp. (18446)

* **Nephroma tangeriense (Maheu & A.Gillet) Zahlbr.:** 5, on siliceous rocks with moss (18040)

Ochrolechia androgyna (Hoffm.) Arnold: 10, on siliceous rocks (18107)

Ochrolechia arborea (Kreyer) Almb.: 8, on *Olea* sp. (18063)

* **Ochrolechia microstictoides Räsänen:** 34, 36, on *Pinus nigra* (18484, 18548)

Ochrolechia parella (L.) A. Massal.: 5, on siliceous rocks (18037)

Parmelia saxatilis (L.) Ach.: 5, 17, 20, 21, on *Pinus* sp. (18030, 18189, 18720, 18266), 19, on *Quercus* sp. (18213), 24, on *Pinus brutia* (18290), 34, on *Pinus nigra* (18510), 35, on *Quercus frainetto* (18513), 36, on *Alnus* sp., on siliceous rocks (18539, 18555)

Parmelia submontana Nádv.: 35, on *Quercus frainetto* (18522)

Parmelia sulcata Taylor: 34, on *Alnus* sp. (18486), 35, on *Quercus frainetto* (18514), 36, on *Alnus* sp., on *Coryllus* sp. (18545, 18271)

* **Parmelina carporrhizans (Taylor) Hale:** 3, 10, on *Olea* sp. (18010, 18088)

Parmelina quercina (Wild.) Hale: 19, on *Quercus* sp. (18206), 35, on *Quercus frainetto* (18516)

Parmelina tiliacea (Hoffm.) Hale: 2, 29, on *Pinus* sp. (18006, 18361), 4, on siliceous rocks (18026), 8, 10, 13, 25, on *Olea* sp. (18062, 18089, 18136, 18302), 20, on *Quercus* sp. (18219), 21, on *Crataegus* sp. (18249), 31, on *Pinus brutia* (18415)

Parmeliopsis ambigua (Wulfen) Nyl.: 15, on *Pinus* sp. (18164)

* **Peltula euploca (Ach.) Poelt ex Pišút:** 29, on siliceous rocks (18387)

Pertusaria albescens (Huds.) M. Choisy & Werner: 3, 10, 25, on *Olea* sp. (18015, 18093, 18300), 21, on *Quercus* sp. (18230), 36, on siliceous rocks (18564)

Pertusaria amara (Ach.) Nyl.: 36, on siliceous rocks (18557)

* **Pertusaria flavicans Lamy:** 29, on siliceous rocks (18382)

Pertusaria leioplaca DC.: 34, on *Abies* sp., on *Castanea* sp., on *Juglans* sp. (18500, 18509, 18494)

Pertusaria leucosora Nyl.: 32, on siliceous rocks (18434)



- Pertusaria pertusa* (L.) Tuck.:** 20, on *Quercus* sp. (18220), 35, on *Quercus frainetto* (18521), 36, on *Alnus* sp. (18540)
- * ***Phaeophyscia ciliata* (Hoffm.) Moberg:** 8, on *Juglans* sp. (18065), 22, on *Quercus* sp. (18272)
- Phaeophyscia orbicularis* (Neck.) Moberg:** 13, on *Quercus* sp. (18134)
- Phlyctis argena* (Ach.) Flot.:** 21, on *Quercus* sp., on *Styrax officinalis* (18270, 18259), 34, on *Abies* sp., on *Alnus* sp. (18503, 18487), 36, on *Alnus* sp. (18544)
- Physcia adscendens* H. Olivier:** 25, on *Olea* sp. (18307), 28, on *Celtis* sp. (18353)
- Physcia aipolia* (Ehrh. ex Humb.) Fűrnr.:** 13, on *Olea* sp., on *Quercus* sp. (18137, 18133)
- * ***Physcia caesia* (Hoffm.) Hampe ex Fűrnr.:** 9, on siliceous rocks (18080), 29, on *Pinus* sp. (18364)
- Physcia leptalea* (Ach.) DC.:** 21, on *Styrax officinalis* (18239), 22, on *Quercus* sp. (18275), 28, on *Celtis* sp. (18358), 30, on *Pistacia* sp. (18393), 31, on *Pyrus elaeagnifolia* (18412)
- Physcia stellaris* (L.) Nyl.:** 3, 10, 11, 25, on *Olea* sp. (18009, 18095, 18111, 18301), 13, on *Olea* sp., on *Quercus* sp. (18138, 18132), 29, on siliceous rocks (18369)
- Physconia distorta* (With.) J.R. Laundon:** 3, on *Olea* sp. (18011)
- Physconia enteroxantha* (Nyl.) Poelt:** 13, on *Olea* sp. (18141)
- Physconia servitii* (Nádv.) Poelt:** 13, on *Quercus* sp. (18131), 25, on *Olea* sp. (18305)
- * ***Placynthium nigrum* (Huds.) Gray:** 17, 26, 28, on calcareous rocks (18193, 18313, 18333)
- Platismatia glauca* (L.) W.L. Culb. & C.F. Culb.:** 15, 16, 17, 20, on *Pinus* sp. (18165, 18182, 18199, 18224), 19, on *Pinus* sp., *Quercus* sp. (18212, 18211), 21, on *Styrax officinalis* (18257), 31, on *Pinus brutia* (18416), 34, 36, on *Pinus nigra* (18481, 18550)
- Pleurosticta acetabulum* (Neck.) Elix & Lumbsch:** 21, on *Crataegus* sp. (18235)
- Polysporina simplex* (Taylor) Vězda:** 9, 29, 32, 33, on siliceous rocks (18076, 18386, 18439, 18473)
- Porpidia albocaerulescens* (Wulfen) Hertel & Knoph:** 33, on siliceous rocks (18464)
- * ***Porpidia crustulata* (Ach.) Hertel & Knoph:** 9, 23, 33, on siliceous rocks (18082, 18280, 18470)
- * ***Porpidia macrocarpa* (DC.) Hertel & A.J. Schwab:** 33, 36, on siliceous rocks (18471, 18558)
- * ***Protoblastenia rupestris* (Scop.) J. Steiner:** 17, on calcareous rocks (18194)
- Pseudevernia furfuracea* var. *furfuracea* (L.) Zopf:** 15, on *Pinus* sp. (18166), 19, on *Pinus* sp., on *Quercus* sp. (18209, 18210), 21, on *Styrax officinalis* (18258), 35, on *Quercus frainetto* (18515), 36, on *Pinus nigra* (18554)
- Pseudosagedia aenea* (Wallr.) Hafellner & Kalb:** 34, on *Abies* sp. (18504)
- * ***Pyrenodesmia alociza* (A.Massal.) Arnold:** 1, on calcareous rocks (17988)
- Pyrenodesmia variabilis* (Pers.) A.Massal.:** 7, 12, on calcareous rocks (18060, 18122)
- Ramalina farinacea* (L.) Ach.:** 21, on *Crataegus* sp. (18236), 36, on *Alnus* sp. (18538)
- Ramalina fastigiata* (Pers.) Ach.:** 21, on *Crataegus* sp., on *Styrax officinalis* (18246, 18256)
- Ramalina fraxinea* (L.) Ach.:** 21, on *Crataegus* sp. (18237)
- * ***Ramalina subfarinacea* (Nyl. ex Cromb.) Nyl.:** 33, on siliceous rocks (18476)
- * ***Rhizocarpon badioatrum* (Flörke ex Spreng.):** 9, on siliceous rocks (18084)
- Rhizocarpon geminatum* Körb.:** 32, on siliceous rocks (18436)
- Rhizocarpon geographicum* (L.) DC.:** 1, 5, 14, 15, 16, 32, 33, 36, on siliceous rocks (18004, 18034, 18155, 18172, 18180, 18431, 18469, 18556)
- Rhizocarpon lecanorinum* Anders:** 15, on siliceous rocks (18173)
- * ***Rhizocarpon polycarpum* (Hepp) Th. Fr.:** 36, on siliceous rocks (18561)
- * ***Rhizocarpon reductum* Th. Fr.:** 18, 29, 33, on siliceous rocks (18203, 18385, 18472)
- * ***Rinodina capensis* Hampe:** 29, on *Pinus* sp. (18367), 30, on *Pistacia* sp., on *Styrax officinalis* (18394, 18399), 35, on *Quercus frainetto* (18529)
- Rinodina exigua* (Ach.) Gray:** 1, 13, on *Olea* sp. (17978, 18145), 19, 22, on *Quercus* sp. (18207, 18276), 21, on *Crataegus* sp. (18251), 30, on *Pistacia* sp., on *Quercus* sp., on *Styrax officinalis* (18395, 18407, 18401), 31, on *Pinus brutia* (18420)
- * ***Rinodina immersa* (Körb.) J. Steiner:** 1, on calcareous rocks (17989)
- * ***Rinodina occulta* (Körb.) Sheard:** 33, on siliceous rocks (18460)



* *Rinodina oxydata* (A. Massal.) A. Massal.: 5, 10, 12, 27, 28, on siliceous rocks (18046, 18108, 18128, 18323, 18336)

Rinodina sophodes (Ach.) A. Massal.: 1, on *Olea* sp. (17979), 6, 27, on *Ficus* sp. (18051, 18317), 28, on *Celtis* sp., *Ficus* sp., on *Olea* sp. (18357, 18348, 18351), 33, on *Cydonia oblonga* (18453)

* *Rinodina teichophila* (Nyl.) Arnold: 24, on siliceous rocks (18298)

* *Rinodina trachytica* (A. Massal.) Bagl. & Carestia: 14, 24, 28, on siliceous rocks (18161, 18288, 18329)

Rufoplaca arenaria (Pers.) Arup, Söchting & Frödén: 15, on siliceous rocks (18169)

* *Rufoplaca subpallida* (H. Magn.) Arup, Söchting & Frödén: 10, on siliceous rocks (18098)

* *Sarcogyne regularis* Körb.: 12, 26, on calcareous rocks (18118, 18311)

Scoliciosporum umbrinum (Ach.) Arnold: 21, on *Crataegus* sp. (18242), 33, on *Cydonia* sp. on *Malus* sp., (18452, 18457), 35, on *Quercus frainetto* (18530)

* *Scytinium lichenoides* (L.) Otálora, P.M. Jørg. & Wedin: 6, on *Pyrus* sp. (18055)

Squamarina cartilaginea (With.) P. James: 1, 12, on calcareous rocks (18000, 18116), 17, on soil (18197), 29, on siliceous rocks (18380)

Tephromela atra (Huds.) Hafellner: 1, 4, 5, 14, on siliceous rocks (17992, 18022, 18044, 18152), 36, on *Alnus* sp. (18543)

Toninia sedifolia (Scop.) Timdal: 12, 28, on calcareous rocks (18117, 18331), 17, on soil (18198)

* *Umbilicaria cylindrica* (L.) Delise: 14, 16, on siliceous rocks (18147, 18177)

* *Umbilicaria deusta* (L.) Baumg.: 16, on siliceous rocks (18178)

* *Umbilicaria nylanderiana* (Zahlbr.) H. Magn.: 14, on siliceous rocks (18148)

Usnea filipendula Stirt.: 21, on *Crataegus* sp. (18238)

* *Usnochroma carphinea* Arup, Söchting & Frödén: 29, on siliceous rocks (18370)

* *Variospora aurantia* (Pers.) Arup, Frödén & Söchting: 7, 12, on calcareous rocks (18056, 18123)

Variospora flavescens (Huds.) Arup, Söchting & Frödén: 28, on calcareous rocks (18360)

* *Verrucaria macrostoma* Dufour ex DC.: 26, on calcareous rocks (18312)

Verrucaria muralis Ach.: 17, 21, 26, on calcareous rocks (18196, 18244, 18315)

Verrucaria nigrescens Pers.: 10, 17, 21, on calcareous rocks (18106, 18195, 18245), 12, 28, on siliceous rocks (18124, 18339)

Xanthocarpia lactea (A. Massal.) A. Massal.: 33, on concrete (18474)

* *Xanthocarpia ochracea* (Schaer.) A. Massal. & De Not.: 28, on calcareous rocks (18338)

Xanthoparmelia conspersa (Ehrh. ex Ach.) Hale: 4, 9, on siliceous rocks (18018, 18072)

* *Xanthoparmelia delisei* (Duby) O. Blanco et al.: 24, on siliceous rocks (18287)

* *Xanthoparmelia protomatrae* (Gyeln.) Hale: 1, 4, 5, 29, on siliceous rocks (17997, 18016, 18036, 18383)

Xanthoparmelia pulla (Ach.) O. Blanco et al.: 1, 9, 24, 32, 33, on siliceous rocks (17998, 18074, 18292, 18438, 18466)

Xanthoparmelia stenophylla (Ach.) Ahti & D. Hawksw.: 4, 9, 14, 23, 36, on siliceous rocks (18017, 18073, 18146, 18281, 18560)

Xanthoparmelia tinctina (Maheu & A. Gillet) Hale: 1, 24, 32, 33, on siliceous rocks (17996, 18286, 18432, 18475), 29, on *Pinus* sp., on siliceous rocks (18365, 18389)

* *Xanthoparmelia verruculifera* (Nyl.) O. Blanco et al.: 9, on siliceous rocks (18085)

Xanthoria parietina (L.) Th. Fr.: 3, 11, 28, on *Olea* sp. (18007, 18110, 18350), 8, on *Juglans* sp. (18066), 13, 22, 30, on *Quercus* sp. (18130, 18273, 18402), 31, on *Pyrus elaeagnifolia* (18430)

Discussion

It has been determined 184 infrageneric taxa belonging to 79 genera from Edremit-Kazdağı. Among these taxa, 1 lichenicolous fungus, *Lichenostigma cosmopolites* was found on the *Xanthoparmelia* sp. thallus which growing on siliceous rocks. According to the literature, 73 taxa are reported for the first time from Balıkesir province with this study.

First lichen records from Kazdağı published in 1964 by Karamanoğlu (*Cladonia pyxidata*, *Lobaria pulmonaria* (L.) Hoffm., *Rhizocarpon geographicum*, and *Usnea florida* (L.) F. H. Wigg.). Then, *Platismatia glauca* is recorded by Culberson and Culberson in 1968. Also, in the year of 1971, Karamanoğlu was reported 3 taxa (*Hypogymnia physodes*, *Ramalina calicaris* (L.) Röhl., and *Ramalina fraxinea* var. *caliciformis* Nyl.). Additionally, *Parmelina submontana* was recorded as *Parmelia contorta* (Hoffm.)



Spreng. by Schindler in 1975. 6 of these 9 taxa were found in the present study. Özdemir Türk et. al. (2015), were recorded some *Peltigera* species (*P. canina* (L.) Willd., *P. monticola* Vitik., *P. neckeri* Hepp ex Müll. Arg., *P. polydactylon* (Neck.) Hoffm., *P. praetextata* (Flörke ex Sommerf.) Zopf) from Kazdağı.

Lichen samples were collected on 28 different substrates from 36 localities. Of the determined lichen taxa, were found to be 104 saxicolous, 86 epiphytic and 4 terricolous. When the morphological structure of the lichen genera determined from the study area are evaluated, it is seen that 48 of them crustose, 23 are foliose, and 7 are fruticose.

The percentage of the saxicolous lichen species growing on siliceous rocks is 71 %, growing on calcareous rocks is 22 % and growing in two different rock types is 7 %, approximately. For the epiphytic lichen species, the percentage of the growing on broad-leaved trees is 58 %, on pin-leaved trees is 20 %, and both of two different substrate types is 22 %.

Edremit district is an intensive settlement and an important place in terms of tourism. It is suggested that the number of

lichen species on soil (4 taxa) and moss (2 taxa) is very low due to anthropogenic effects.

The 36th locality (900 m) was the richest with 33 taxa. Also, 28th (31 taxa, 360 m), 33th (31 taxa, 600 m), the other rich localities were determined in our study. These localities have rather moist, different substrates types and protected forest features.

Genera with the highest number of taxon are *Caloplaca* (6 taxa), *Lecanora* (13 taxa), *Pertusaria* (6 taxa), *Rhizocarpon* (6 taxa), *Rinodina* (8 taxa), and *Xanthoparmelia* (7 taxa). Also, *Athallia holocarpa*, *Blastenia ferruginea*, *Candelariella vitellina*, *Lecanora chlorotera*, *Lecidella elaeochroma*, *Parmelina tiliacea* and *Xanthoria parietina* are the most common species in the study area.

In this study, lichen and lichenicolous specimens which were collected from western and southwestern parts of Kazdağı were evaluated and lichen biodiversity was revealed. However, considering the size, topographic structure, substrate and habitat variety of Kazdağı, it is a fact that the lichen diversity will be very rich. Therefore, further studies are needed to determine the lichen diversity the whole of Kazdağı.

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