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Contributions to Lichenized Fungal Diversity of Görükle Campus Area (Bursa Uludag University-Bursa, Turkey)

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ABSTRACT
This investigation reports on 62 infrageneric taxa belonging to 38 genera from Bursa Uludag University Görükle Campus Area. 43 of 62 taxa are new record for Görükle Campus Area and 2 taxa are new for Bursa. A number of morphological, anatomical and ecological pecularities of the determined lichen taxa from the research area were evaluated. A great majority of the recorded lichen taxa were found as crustose and mesophytic form and low tolerance to eutrophication.

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Görükle Kampüs Alanı'nın (Bursa Uludağ Üniversitesi-Bursa, Türkiye) Likenleşmiş Mantar Çeşitliliğine Katkılar

ÖZET
Bu araştırmada, Bursa Uludağ Üniversitesi Görükle Kampüs Alanı'ndan 38 cinse ait 62 takson rapor edilmiştir. 62 taksonun 43 tanesi Görükle Kampüs Alanı için, 2 takson ise Bursa için yeni kayıttır. Araştırma alanından belirlenen liken taksonlarının bazı morfolojik, anatomik ve ekolojik özellikleri değerlendirilmiştir. Kaydedilen liken taksonlarının büyük bir kısmı kabuksu ve mezofitik yapıda ve ötrofikasyona düşük toleranslı olarak bulunmuştur.

Araştırma Makalesi

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INTRODUCTION

Our country has a great richness in terms of lichen biodiversity and therefore many lichenological studies are being carried out by native and foreign researchers. The list of Turkey lichens was published by John and Türk in the year of 2017. In spite of there are many studies on lichen biodiversity in the Marmara Region, (e.g. Özdemir Türk and Güner 1998; Yazıcı 1999; Karabulut et al. 2004; Çobanoğlu and Sevgi 2006; Oran and Öztürk 2006; Oran et al. 2018) still some areas that have not yet been fully explored for lichen biodiversity. According to the literature, the first lichenological study in relation to the research area was published by Güvenç and Aslan in 1994. In another paper, some lichen taxa were recorded from Görükle Campus Area (Oran and Öztürk 2011).

The purpose of this research was to detected the existing lichen biodiversity in the Görükle Campus Area and to determine the change (increase or decrease) in the lichen biodiversity by comparing with the results of the studies in the past.

MATERIALS and METHODS

Study area

Görükle Campus Area is located on about of 16 km² which is lying between 40° 13′ - 40° 15′ N, 28° 51′ - 28° 53 ′ E, and northwest of the province of Bursa. The average altitude from the sea is 110 meters and it is under the influence of Mediterranean vegetation and climate (Akman 1999). When the flora of the study area is examined, mediterranean elements are seen as dominant. Euro-Siberian and Irano-Turanian elements are fewer. Several arboreal plants such as *Quercus* spp. L., *Paliurus* sp. Mill., *Rubus* spp. L., *Salix* spp. L., *Acer* sp. L., *Platanus* sp. L., *Pinus* spp. L., *Cupressus* sp. L., *Robinia* sp. L., *Catalpa* sp. Scopoli, *Cedrus* Duham., *Fraxinus excelsior* Tourn. ex L., *Juglans* sp. L., *Populus* sp. L., *Ligustrum* sp. L. *Cupressus* sp. L., and *Syringa* sp. L. are found in the study area (Tarımcılar and Kaynak 1994; 1995).

Collection and Identification

Lichen samples were collected from different 13

localities (Figure 1, Table 1) on Görükle Campus Area between 2013 and 2017. They were identified with a stereomicroscope (Leica EZ4) for morphology, and a light microscope (Olympus CX21) for anatomical observations. Identifications were determined with various lichen literatures (Brodo et al. 2001; Smith et al. 2009; Wirth 1995). Vouchers are stored in the Herbarium of Bursa Uludag University, Bursa (BULU). Author names are abbreviated according to Brummitt & Powell (1992).

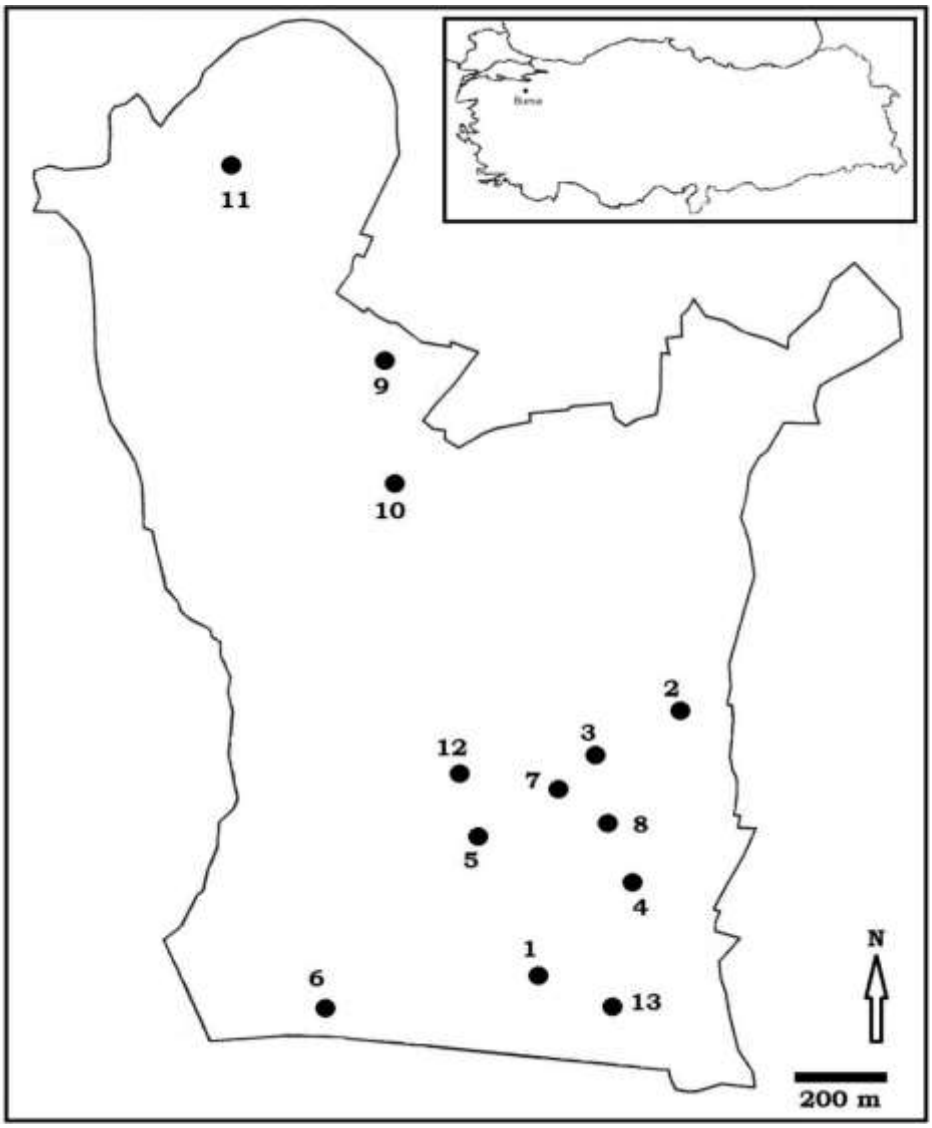

Figure 1. Map of Görükle Campus Area, Bursa, Turkey.

Table 1. The localities which collected lichen samples in Görükle Campus Area.

Number	Locality	Altitude	Date
1	Around of policlinics of Medicine Faculty, roadside	85 m	09.05.2013
2	Road to Veterinary Farm, roadside	117 m	26.07.2014
3	Around of Veterinary Faculty, oak area	117 m	26.07.2014
4	Around of Institude of Natural Sciences, pine and oak areas	102 m	26.07.2014
5	Around of nursery	106 m	26.07.2014
6	Around of tennis court	100 m	26.07.2014
7	Around of KYK dormitories, oak area	135 m	09.04.2016
8	Around of Faculty of Economics and Administrative Sciences, oak area	113 m	09.04.2016
9	South of Yolçatı Village (Okul Street), red pine forest	133 m	06.11.2017
10	Agriculture Faculty Farm – Yolçatı Village, forest road	153 m	06.11.2017
11	Around of dam, oak and pine areas	104 m	06.11.2017
12	West of KYK dormitories, pine area	132 m	14.11.2017
13	Around of Holiday Inn Hotel, coniferous forest and maple plantations	84 m	14.11.2017

RESULTS

The taxa list is ordered in alphabetically with locality numbers and substrates below. A herbarium number for samples are given in the parenthesis after the substrates. New lichen taxa for Görükle Campus Area are remarked by an asterisk (*) and new for Bursa province by a plus (+).

Amandinea punctata (Hoffm.) Coppins & Scheid.
9, *Pinus* sp. (18665), a cone of *Pinus* sp. (18685), **11**, *Pinus* sp. (18715), **12**, *Pinus* sp. (18748), **13**, *Acer* sp. (18774), a cone of *Pinus* sp. (18787)
* ***Anaptychia ciliaris*** (L.) Körb. ex A.Massal.
5, *Robinia* sp. (18616)
* ***Athallia holocarpa*** (Hoffm.) Arup, Frödén & Søchting
1, *Catalpa* sp. (18584), **4**, *Pinus* sp. (18609), **6**, concrete (18641), **9**, a cone of *Pinus* sp. (18683), **10**, a cone of *Cupressus* sp. (18703), *Paliurus* sp. (18698)
* ***Athallia cerinella*** (Nyl.) Arup, Frödén & Søchting
9, *Pinus* sp. (18655), **13**, a cone of *Pinus* sp. (18791)
+ * ***Bacidia arceutina*** (Ach.) Arnold
13, *Pinus* sp. (18785)
* ***Blastenia ferruginea*** (Huds.) A.Massal.
13, *Acer* sp. (18776)
* ***Calogaya decipiens*** (Arnold) Arup, Frödén & Søchting
6, concrete (18639)
* ***Caloplaca cerina*** (Ehrh. ex Hedw.) Th.Fr.
10, *Paliurus* sp. (18693)
* ***Candelariella aurella*** (Hoffm.) Zahlbr.
6, concrete (18638)
* ***Candelariella xanthostigma*** (Pers. ex Ach.) Lettau
10, *Paliurus* sp. (18694)
+ * ***Catillaria nigroclavata*** (Nyl.) Schuler
3, *Quercus* sp. (18603), **9**, *Pinus* sp. (18656), *Quercus* sp. (18680), **10**, *Paliurus* sp. (18697), **11**, *Quercus* sp. (18722)
* ***Cladonia chlorophaea*** (Flörke ex Sommerf.) Sprengel
12, a branch of *Pinus* sp. (18740), a cone of *Pinus* sp. (18742)
* ***Cladonia fimbriata*** (L.) Fr.
9, *Pinus* sp. log (18666), **11**, *Pinus* sp. (18713), soil (18726), **12**, *Pinus* sp. (18750), a cone of *Pinus* sp. (18738)
* ***Cladonia foliacea*** (Huds.) Willd.
8, soil (18733), **9**, soil (18667), **11**, soil (18727), **12**, soil (18757)
Cladonia furcata (Huds.) Schrad.
9, soil (18668), **11**, soil (18725), **12**, soil (18739)
* ***Cladonia pyxidata*** (L.) Hoffm.
9, *Pinus* sp. (18664), **12**, soil (18736), a cone of *Pinus* sp. (18741), siliceous rocks (18756)
Cladonia rangiformis Hoffm.
12, soil (18735)
* ***Diplotomma alboatrum*** (Hoffm.) Flot.
1, *Acer* sp. (18581)
Evernia prunastri (L.) Ach.
1, *Acer* sp. (18571), **3**, *Quercus* sp. (18595), **4**, *Quercus* sp. (18614), **5**, *Robinia* sp. (18618), **9**, *Pinus* sp. (18660), *Quercus* sp. (18670), **11**, *Pinus* sp. (18707), **12**, *Pinus* sp. (18744), **13**, *Acer* sp. (18766), *Pinus* sp. (18779)
* ***Flavoparmelia caperata*** (L.) Hale
11, *Pinus* sp. (18729)
* ***Hyperphyscia adglutinata*** (Flörke) H. Mayrhofer & Poelt
9, *Pinus* sp. (18654)
Hypogymnia physodes (L.) Nyl.
8, *Quercus* sp. (18732)
* ***Hypogymnia tubulosa*** (Schaer.) Hav.
7, *Quercus* sp. (18730)
* ***Lecania cyrtella*** (Ach.) Th.Fr.
1, *Catalpa* sp. (18586), **4**, *Pinus* sp. (18610), **13**, *Acer* sp. (18777)
* ***Lecania naegelii*** (Hepp) Diederich & P. Boom
9, *Quercus* sp. (18681), **10**, *Paliurus* sp. (18701)
* ***Lecanora carpinea*** (L.) Vain.
1, *Acer* sp. (18578), **5**, *Quercus* sp. (18630), **9**, *Quercus* sp. (18676), **10**, *Paliurus* sp. (18692), **11**, *Quercus* sp. (18723), **13**, *Acer* sp. (18772), a cone of *Pinus* sp. (18788)
Lecanora chlarotera Nyl.
1, *Acer* sp. (18577), **9**, *Quercus* sp. (18675), **10**, *Paliurus* sp. (18696), **13**, *Acer* sp. (18773)
* ***Lecanora symmicta*** (Ach.) Ach.
13, *Cedrus* sp. (18759)
Lecidella elaeochroma (Ach.) M.Choisy
1, *Acer* sp. (18572), **2**, *Fraxinus* sp. (18591), **3**, *Quercus* sp. (18600), **5**, *Robinia* sp. (18622), **8**, *Quercus* sp. (18734), **9**, *Pinus* sp. (18648), *Quercus* sp. (18677), **10**, *Paliurus* sp. (18691), **11**, *Quercus* sp. (18721), **13**, *Acer* sp. (18771), *Cedrus* sp. (18794), a cone of *Pinus* sp. (18789)
* ***Lepraria incana*** (L.) Ach.
3, *Quercus* sp. (18604), **9**, *Pinus* sp. (18659), **12**, *Pinus* sp. (18749), **13**, *Cedrus* sp. (18758)
* ***Melanelixia glabratula*** (Lamy) Sandler & Arup
9, *Pinus* sp. (18658)
Melanelixia subaurifera (Nyl.) O.Blanco *et al.*
1, *Acer* sp. (18580), **4**, *Quercus* sp. (18612), **9**, *Pinus* sp. (18653), *Quercus* sp. (18678), **11**, *Pinus* sp. (18711), *Quercus* sp. (18720), **12**, *Pinus* sp. (18746), **13**, *Acer* sp. (18765)
Myriolecis dispersa (Pers.) Sliwa, Zhao Xin & Lumbsch
6, concrete (18640)
* ***Myriolecis hagenii*** (Ach.) Sliwa, Zhao Xin & Lumbsch
1, *Acer* sp. (18583), **10**, *Paliurus* sp. (18700), a cone of *Cupressus* sp. (18704), **13**, a cone of *Pinus* sp. (18792)
* ***Parmelia saxatilis*** (L.) Ach.
11, *Pinus* sp. (18714)
Parmelia sulcata Taylor
1, *Acer* sp. (18569), **3**, *Quercus* sp. (18601), **4**, *Quercus* sp. (18615), **9**, *Pinus* sp. (18662), *Quercus* sp. (18672), **11**, *Pinus* sp. (18710), **12**, *Pinus* sp. (18743), **13**, *Acer* sp. (18761), *Pinus* sp. (18782)
* ***Parmelina tiliacea*** (Hoffm.) Hale

5, *Robinia* sp. (18620), **9**, *Pinus* sp. (18651)
* ***Phaeophyscia orbicularis*** (Neck.) Moberg
1, *Acer* sp. (18568), **2**, *Fraxinus* sp. (18590), **5**, *Quercus* sp. (18629), **13**, *Acer* sp. (18763), *Pinus* sp. (18783)
* ***Phlyctis argena*** (Sprengel) Flot.
3, *Quercus* sp. (18605), **11**, *Quercus* sp. (18718)
Physcia adscendens (Fr.) H.Olivier
1, *Acer* sp. (18573), **2**, *Robinia* sp. (18588), **3**, *Quercus* sp. (18602), **4**, *Pinus* sp. (18607), **5**, *Acer* sp. (18624), *Robinia* sp. (18619), **6**, *Pinus* sp. (18636), *Platanus* sp. (18634), **9**, *Cupressus* sp. (18645), *Pinus* sp. (18650), *Quercus* sp. (18674), **10**, *Paliurus* sp. (18695), **12**, siliceous rocks (18751), **13**, *Acer* sp. (18762), a cone of *Pinus* sp. (18786), *Pinus* sp. (18781)
* ***Physcia aipolia*** (Ehrh. ex Humb.) Hampe
1, *Acer* sp. (18574), **5**, *Quercus* sp. (18631), **8**, *Quercus* sp. (18731)
* ***Physcia leptalea*** (Ach.) DC.
1, *Acer* sp. (18579)
* ***Physcia stellaris*** (L.) Nyl.
1, *Acer* sp. (18582), **3**, *Quercus* sp. (18599), **5**, *Quercus* sp. (18628), *Robinia* sp. (18621), **9**, *Cupressus* sp. (18646)
Physcia tenella (Scop.) DC.
5, *Robinia* sp. (18632), **6**, *Platanus* sp. (18643), **9**, *Cupressus* sp. (18647), *Pinus* sp. (18652), *Quercus* sp. (18679), **11**, *Pinus* sp. (18716), *Quercus* sp. (18724), **13**, *Pinus* sp. (18784)
* ***Physconia enteroxantha*** (Nyl.) Poelt
9, *Pinus* sp. (18657), **12**, *Pinus* sp. (18747)
Pleurosticta acetabulum (Neck.) Elix & Lumbsch
1, *Acer* sp. (18570), **2**, *Quercus* sp. (18593), **3**, *Quercus* sp. (18598), **4**, *Quercus* sp. (18613), **5**, *Acer* sp. (18625), *Quercus* sp. (18626), **9**, *Pinus* sp. (18663), *Quercus* sp. (18673), **11**, *Pinus* sp. (18709), *Quercus* sp. (18717), **12**, *Pinus* sp. (18745)
Protoparmeliopsis muralis (Schreb.) M.Choisy
6, concrete (18637), **12**, siliceous rocks (18754)
Pseudevernia furfuracea (L.) Zopf
11, *Pinus* sp. (18706)
Ramalina farinacea (L.) Ach.
1, *Acer* sp. (18576), **3**, *Quercus* sp. (18596), **11**, *Pinus* sp. (18712), **13**, *Acer* sp. (18767), *Pinus* sp. (18780)
Ramalina fastigiata (Pers.) Ach.
1, *Acer* sp. (18575), **3**, *Quercus* sp. (18597), **4**, *Quercus* sp. (18611), **9**, *Pinus* sp. (18661), *Quercus* sp. (18671), **11**, *Pinus* sp. (18708), **13**, *Acer* sp. (18768)
* ***Ramalina fraxinea*** (L.) Ach.
13, *Acer* sp. (18770)
* ***Ramalina obtusata*** (Arnold) Bitter
13, *Acer* sp. (18769)
* ***Rinodina exigua*** (Ach.) S.Gray
13, *Acer* sp. (18775)
Rinodina pyrina (Ach.) Arnold
1, *Catalpa* sp. (18585), **4**, *Pinus* sp. (18608), **9**, a cone of *Pinus* sp. (18684), **10**, *Paliurus* sp. (18699), **13**, a cone of *Pinus* sp. (18793)
* ***Sarcogyne regularis*** Körb.
9, calcareous rocks (18686)
* ***Scytinium lichenoides*** (L.) Otálora, P.M.Jørg. & Wedin
12, soil (18737)
* ***Verrucaria macrostoma*** Dufour ex DC.
9, calcareous rocks (18689)
* ***Verrucaria muralis*** Ach
9, calcareous rocks (18690), **12**, calcareous rocks (18753)
* ***Verrucaria nigrescens*** Pers.
9, calcareous rocks (18687), **12**, siliceous rocks (18755)
* ***Verruculopsis lecideoides*** (A.Massal.) Gueidan & Cl.Roux
9, calcareous rocks (18688)
* ***Xanthocarpia crenulatella*** (Nyl.) Frödén, Arup & Søchting
6, concrete (18642)
Xanthoria parietina (L.) Th.Fr.
1, *Acer* sp. (18567), **2**, *Robinia* sp. (18587), *Fraxinus* sp. (18589), *Quercus* sp. (18592), **3**, *Quercus* sp. (18594), **4**, *Pinus* sp. (18606), **5**, *Acer* sp. (18623), *Quercus* sp. (18627), *Robinia* sp. (18617), **6**, *Pinus* sp. (18635), *Platanus* sp. (18633), **9**, *Cupressus* sp. (18644), *Pinus* sp. (18649), *Quercus* sp. (18669), a cone of *Pinus* sp. (18682), **10**, a cone of *Cupressus* sp. (18702), *Paliurus* sp. (18705), **11**, *Quercus* sp. (18719), **12**, siliceous rocks (18752), **13**, *Acer* sp. (18764), a cone of *Cupressus* sp. (18760), a cone of *Pinus* sp. (18790), *Pinus* sp. (18778)

DISCUSSION

Floristic evaluations

In the present study, 62 infrageneric taxa belonging to 38 genera were reported from Görükle Campus Area of Bursa Uludag University. 43 taxa are recorded for the first time from study area. 2 of these are new report from Bursa province.

Lichen samples were collected on 16 different substrates from 13 localities in this study. Of the determined lichen taxa, were found to be 44 as epiphytic, 10 as saxicolous, 4 as terricolous, 2 as epiphytic and saxicolous, 1 as epiphytic and terricolous, and 1 as epiphytic, saxicolous and terricolous.

The percentage of the saxicolous lichen species growing on calcareous rocks is 67%, growing on siliceous rocks is 25% and growing in two different rock types are 8%, approximately. For the epiphytic lichen species, the percentage of the growing on broad-leaved (decidious) trees is 34%, on pin-leaved (coniferous) trees is 26%, and both of two different substrate types are 40%.

The genera with the most number of taxa; *Cladonia* (6 species), *Physcia* (5 species), and *Ramalina* (4 species). Also, *Xanthoria parietina* (at 11 localities), *Physcia adscendens* (at 10 localities) and *Lecidella elaeochroma* (at 9 localities) are very common species in the research area. Several nitrophilous species, such

as *Lecanora chlarotera*, *Myriolecis hagenii*, *Parmelia sulcata*, *Parmelina tiliacea*, *Phaeophyscia orbicularis*, *Physcia adscendens*, *Physcia stellaris*, *Physcia tenella*, *Pleurosticta acetabulum*, and *Xanthoria parietina* were found frequently due to heavy fertilization in agricultural areas of Agriculture Faculty in the research area.

The 9th locality (133 m) was the richest with 32 species in the study area. Also, 13th (24 species, 84 m), 11th (21 species, 104 m), and 12th (20 taxa, 132 m) the other rich localities were determined in the present study. These localities have rather protected forest features than the other localities. In addition, in this study, 6 *Cladonia* species were found at 4 localities (8., 9., 11., 12.). These localities are relatively protected area and remote from anthropogenic effects.

According to the literature irformation, 2 studies were published about Görükle Campus Area. In the first study, Güvenç and Aslan (1994) were found 37 lichen taxa (60% epiphytic, 27% saxicolous, 13% terricolous) from Görükle Campus and Görükle Village and 33 of these taxa were recorded from Görükle Campus. 17 of these taxa were found in the present study. However, *Aspicilia cinerea* (L.) Körb., *A. contorta* (Hoffm.) Körb., *Caloplaca chrysodeta* (Vain.) Dombr., *C. flavovirescens* (Wulfen) Dalla Torre & Sarnth., *C. luteoalba* (Turner) Th. Fr., *Cladonia arbuscula* (Wallr.) Flot., *C. convoluta* (Lam.) Anders, *Collema crispum* Weber ex F.H. Wigg., *Lecanora pallida* (Schreb.) Rabenh, *Lecidella stigmatea* (Ach.) Hertel und Leuckert, *Lepraria candelaris* (L.) Fr., *Parmelia conspersa* (Ehrh. ex Ach.) Ach., *P. pulla* Ach., *Ramalina subfarinacea* (Nyl. ex Cromb.) Nyl., *R. thrausta* (Ach.) Nyl., and *Usnea hirta* (L.) Weber ex F.H. Wigg. were not found this study.

In the second study, lichenized and lichenicolous fungi diversity were investigated on *Quercus* taxa found in the Marmara region by Oran and Öztürk (2011) and a total of 162 taxa were recorded. They were recorded 10 lichen species on *Quercus* sp. from Görükle Campus Area and all of these species were found in this study.

Growth Forms and Photobionts

A number of morphological, anatomical, ecological and distributional features of examined taxa were given in Table 2, based on Nimis and Martellos (2017). Crustose lichens were dominated with 28 taxa. Foliose and fruticose lichens were represented by 20 and 12 taxa, respectively. Leprose and minute squamulose to coarsely granular forms which collected samples were represented by a 1 taxon. Only 1 lichen species has cyanobacteria, the other taxa have green algae as photobiont.

Ecological Features

The aridity and eutrophication classes of the determined taxa were evaluated adapted from Nimis and Martellos (2017) in Table 2. Based on the aridity properties, detected taxa were determined into 5 classes. According this classification 20 taxa were mesophytic-xerophytic (class 3-4), 15 taxa were rather hygrophytic and mesophytic (class 2-3), 14 taxa were mesophytic (class 3), and 13 taxa were include other classes.

Lichen taxa were also utilized in terms of the sensitivity to eutrophication. These features were evaluated into five classes (Table 2). 11 taxa include class 1-2 (no eutrophication to very weak eutrophication levels), 15 taxa include class 1-3 (no eutrophication to weak eutrophication levels), 10 taxa include class 2-3 (very weak eutrophication to weak eutrophication levels), 6 taxa include class 2-4 (very weak eutrophication to rather high eutrophication levels), 8 taxa include class 3-4 (weak eutrophication to rather high eutrophication levels). The other classes were found less often. 1 taxon (*Ramalina obtusata*) preferred no eutrophication level (class 1) while, rather high and very high eutrophication levels included 3 lichen taxa (class 4, class 4-5).

Distributional Features

Distributional features of the recorded taxa were utilized according to Nimis and Martellos (2017) in Table 2. Lichen taxa were seperated into 5 classes, referring to the distribution. 26 taxa belong to class 1-4 (eu-Mediterranean belt to Oroboreal belt of the Alps), 18 taxa belong to class 1-3 (eu-Mediterranean belt to montane belt), 13 taxa belong to class 1-5 (eu-Mediterranean belt to above treeline). The other classes were observed less than in this study.

Grf: Growth-form; **Cr.pl:** crustose placodiomorph, **Cr:** crustose **Fol.b:** foliose broad-lobed (*Parmelia*-type), **Fol.n:** foliose narrow-lobed (*Physcia*-type), **Fr:** fruticose, **Fr.f:** fruticose filamentous, **Gr:** minutely squamulose to coarsely granular, **Lep:** leprose
Pho: Photobiont; **Ch:** green algae, other than *Trentepohlia*, **Cy:** cyanobacteria
Ar: Aridity; **1:** hygrophytic, **2:** rather hygrophytic, **3:** mesophytic, **4:** xerophytic, **5:** very xerophytic
Eu: Sensivity to eutrophication; **1:** no eutrophication, **2:** very weak eutrophication, **3:** weak eutrophication, **4:** rather high eutrophication, **5:** very high eutrophication
Dis: Distribution; **1:** eu-Mediterranean belt (potential vegetation: evergreen *Quercus ilex* forest), **2:** submediterranean belt (deciduous *Quercus-Carpinus* forests), **3:** montane belt (*Fagus* forests, marking treeline in the Apennines), **4:** Oroboreal belt of the Alps (natural *Picea abies*, and *Larix-Pinus cembra* stands), **5:** above treeline (both Alpine and oromediterranean)

CONCLUSIONS

The former study on the Görükle Campus lichen biodiversity has been carried out about 25 years ago (Güvenç and Aslan 1994).

Table 2. Some morphological, anatomical, ecological and distributional features of detected taxa.

	Morpho-anatomical, ecological and distributional characteristics				
Taxa	**Grf**	**Pho**	**Ar**	**Eu**	**Dis**
Amandinea punctata	Cr	Ch	3-4	2-4	1-4
Anaptychia ciliaris	Fr	Ch	3	2-3	1-3
Athallia holocarpa	Cr	Ch	3-5	2-5	1-5
A. cerinella	Cr	Ch	3-4	3-4	1-3
Bacidia arceutina	Cr	Ch	2-3	1-2	1-3
Blastenia ferruginea	Cr	Ch	3	1-3	1-3
Calogaya decipiens	Cr.pl	Ch	4	4-5	2-4
Caloplaca cerina	Cr	Ch	3-4	3-4	1-4
Candelariella aurella	Cr	Ch	3-5	2-4	1-5
C. xanthostigma	Gr	Ch	3	2-3	1-4
Catillaria nigroclavata	Cr	Ch	3	2-3	1-3
Cladonia chlorophaea	Fr	Ch	2-3	1-2	1-5
C. foliacea	Fr	Ch	3	1-2	1-3
C. fimbriata	Fr	Ch	2-3	1-3	1-5
C. furcata	Fr	Ch	3	1-2	1-5
C. pyxidata	Fr	Ch	2-3	1-3	1-5
C. rangiformis	Fr	Ch	3	1-3	1-4
Diplotomma alboatrum	Cr	Ch	4-5	3-4	1-3
Evernia prunastri	Fr	Ch	2-3	1-3	1-4
Flavoparmelia caperata	Fol.b	Ch	3	1-3	1-3
Hyperphyscia adglutinata	Fol.n	Ch	3-4	3-5	1-3
Hypogymnia physodes	Fol.n	Ch	2-3	1-2	1-4
H. tubulosa	Fol.b	Ch	2-3	1-2	1-4
Lecania cyrtella	Cr	Ch	3-4	2-3	1-3
L. naegelii	Cr	Ch	3	1-3	1-3
Lecanora carpinea	Cr	Ch	3-4	1-3	1-4
L. chlarotera	Cr	Ch	3-4	2-5	1-4
L. symmicta	Cr	Ch	2-3	1-2	1-4
Lecidella elaeochroma	Cr	Ch	2-5	2-4	1-4
Lepraria incana	Lep	Ch	2-4	1-2	1-4
Melanelixia glabratula	Fol.b	Ch	2-3	2-3	1-4
M. subaurifera	Fol.b	Ch	2-3	1-3	1-4
Myriolecis dispersa	Cr	Ch	4-5	2-4	1-3
M. hagenii	Cr	Ch	3-5	2-4	1-4
Parmelia saxatilis	Fol.b	Ch	2-3	1-3	1-5
P. sulcata	Fol.b	Ch	2-3	1-3	1-4
Parmelina tiliacea	Fol.b	Ch	3	2-3	1-4
Phaeophyscia orbicularis	Fol.n	Ch	3-4	4-5	1-4
Phlyctis argena	Cr	Ch	2-3	1-2	1-3
Physcia adscendens	Fol.n	Ch	3-4	3-5	1-5
P. aipolia	Fol.n	Ch	3	3-4	1-4
P. leptalea	Fol.n	Ch	3-4	2-3	1-3
P. stellaris	Fol.n	Ch	3	2-4	2-4
P. tenella	Fol.n	Ch	3-4	3-4	1-3
Physconia enteroxantha	Fol.n	Ch	3	3-4	1-3
Pleurosticta acetabulum	Fol.b	Ch	3-4	2-3	1-4
Protoparmeliopsis muralis	Cr.pl	Ch	3-4	3-5	1-5
Pseudevernia furfuracea	Fol.b	Ch	3-4	1-2	2-4
Ramalina farinacea	Fr	Ch	1-2	1-2	1-4
R. fastigiata	Fr	Ch	2-3	1-3	1-4
R. fraxinea	Fr	Ch	2-3	2-3	2-3
R. obtusata	Fr	Ch	1-2	1	3-4
Rinodina exigua	Cr	Ch	3-4	3	1-3
R. pyrina	Cr	Ch	3	2-3	1-3
Sarcogyne regularis	Cr	Ch	3-5	1-3	1-5
Scytinium lichenoides	Fol.n	Cy	2-4	1-3	1-5
Verrucaria macrostoma	Cr	Ch	3-4	3-5	1-4
V. muralis	Cr	Ch	3-4	1-3	1-5
V. nigrescens	Cr	Ch	2-5	2-5	1-5
V. lecideoides	Cr	Ch	3-4	3-4	1-4
Xanthocarpia crenulatella	Cr	Ch	3-4	4	1-4
Xanthoria parietina	Fol.b	Ch	3-4	3-4	1-4

Over the past twenty-five years, there were several structural changes happened in Görükle Campus Area of Bursa Uludag University. Construction of new buildings and roads destroyed some habitats which have suitable conditions for lichen development. This phenomenon is considered the reason of while some species which have determined in former study, but not found in this study. Also, vehicle traffic in Görükle Campus Area may have resulted in the decrease of pollution sensitive species.

The number of species determined in the present study shows there are an increment when compare with the former study. Trees in the study area were much younger when the former study carried out, then year after year trees grew and become older and more suitable substrates for lichen development. Moreover, lichens grow quite slowly. For that reason, some species may not be determined and even not observed in the former study.

It is hoped that this study will be useful as a guide for future Turkish lichenological studies. As the same time, it will help assess the anthropogenic effect on lichens on the Görükle Campus Area.

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