

LICHEN RECORDS FROM TWO MILITARY BASES IN THE ASIAN SIDE OF ISTANBUL

ÇOBANOĞLU ÖZYİĞİTOĞLU Gülşah, YAVUZ Mustafa

Abstract. A list of 65 lichenized fungi taxa and a lichenicolous fungus is reported from two military bases: Infantry Academy and Naval Academy in Tuzla district, Istanbul province. 15 lichen species and a lichenicolous fungus are new records for the province. This paper is a first among equals (*primus inter pares*) since it mentions lichen records for the first time from military bases in Turkey.

Keywords: lichenized fungi, lichenicolous fungus, biodiversity, military bases, Turkey.

Rezumat. Semnalări de licheni din două baze militare din partea asiatică a orașului Istanbul. Este prezentată o listă cu 65 ciuperci lichenizate și o ciupercă lichenicolă din două baze militare: Academia de Infanterie și Academia Navală din districtul Tuzla a Provinciei Istanbul. Dintre aceștia, 15 specii de licheni și o ciupercă lichenicolă sunt semnalări noi pentru provincie. Lucrarea este prima care semnalează licheni pentru baze militare din Turcia.

Cuvinte cheie: ciuperci lichenizate, ciuperci lichenicole, biodiversitate, baze militare, Turcia.

INTRODUCTION

Studies on lichen mycota of several provinces in Turkey have become more numerous in the last decades. Although there is still a high number of deficient records for lichen species throughout the country, many papers with various impacts mark records or new records in course of time. In the literature, there is not any paper dealing with lichen records from military bases or areas. The present study aims at a contribution to the first lichen records in two military bases in Tuzla district of Istanbul, Turkey. Tuzla district is located in the eastern region of the Asian Part of Istanbul (Figure 1). Turkish Armed Forces have two major military security zones in the vicinity of Tuzla, Istanbul. Infantry Academy covers 1,700 ha surface area and Naval Academy 78 ha while the total surface area of Tuzla district is 12,363 ha (IBB, 2015).

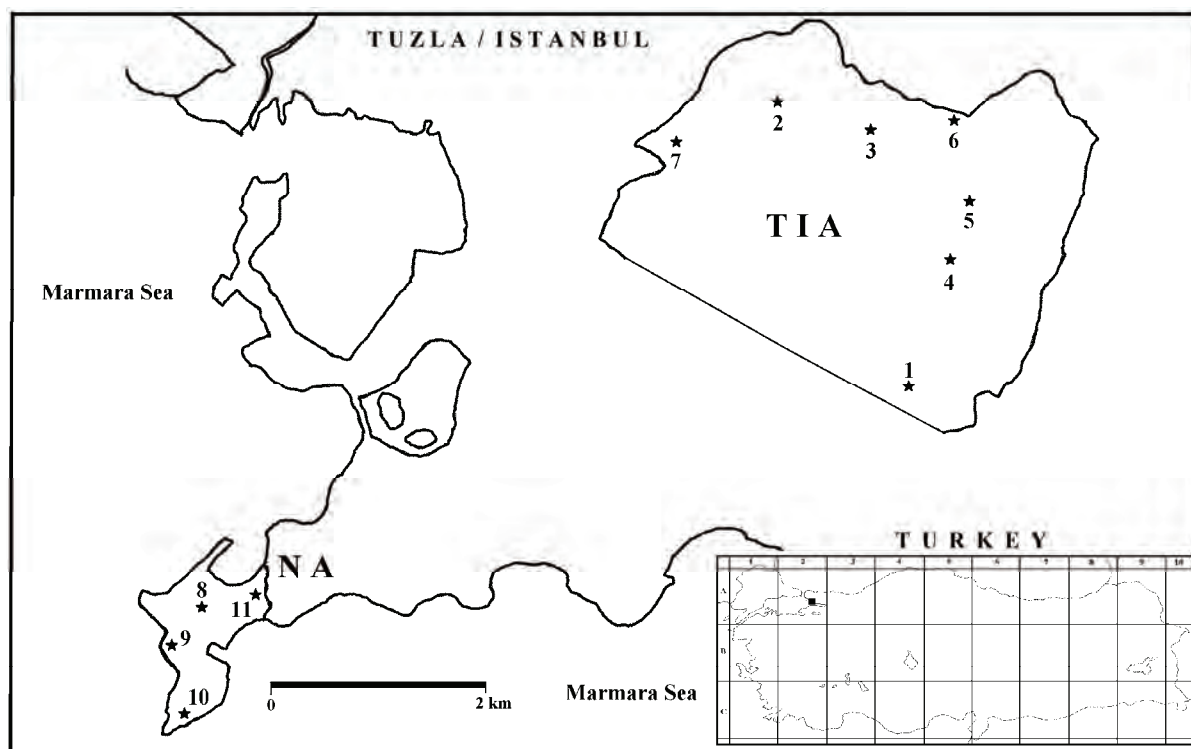


Figure 1. The Collecting Sites in the two military zones in Tuzla District of Istanbul.

TIA: Tuzla Infantry Academy, NA: Naval Academy.

According to the literature investigated, the first lichen samples from Istanbul were collected by J. Nemetz, between 1894 and 1897. These samples were determined by Dr. Karl Fritsch, a professor of systematic botany at the University of Vienna, and were published by STEINER (1899). The rest of the papers dealing with lichens from

Istanbul are as follows: SZATALA (1927); YALTIRIK (1966); ÇOBANOĞLU (1996); ÇOBANOĞLU & AKDEMİR (1997); ÖZDEMİR TÜRK & GÜNER (1998); ÇOBANOĞLU (2005); ÇOBANOĞLU (2007); GÖKMEN et al. (2007); GÖKMEN et al. (2008); ÇOBANOĞLU et al. (2008); YAZICI et al. (2010); ORAN & ÖZTÜRK (2011) and ORAN (2011). A total of 223 taxa from Istanbul have been recorded so far.

Table 1. Istanbul / Asian Side Long Term Climate Data.

| Months | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Yearly |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|-------|--------|
| Mean Temperature | 5.7 | 5.7 | 7.2 | 11.7 | 16.4 | 21.1 | 23.5 | 23.5 | 19.8 | 15.6 | 11.5 | 7.9 | 14.1 |
| Mean Precipitation | 88.1 | 74.5 | 62.0 | 44.7 | 30.8 | 24.5 | 22.4 | 25.6 | 44.4 | 70.5 | 86.3 | 103.9 | 677.7 |

The general climatic features of Tuzla (Istanbul) are presented in (Table 1) and according to this table the ombrothermic diagram is created as in Figure 2. According to the data from Göztepe Meteorological Station, the climate is generally Temperate Mediterranean with a shift to Oceanic in the north. The average annual mean temperature is 14.1 C° and the annual precipitation is about 677.7 mm (MGM, 2015).

As it regards to the ombrothermic diagram given in Figure 2, the area scanned by the first and second junctions of mean temperature and mean precipitation curves is the dry session which includes April – October term for Istanbul.

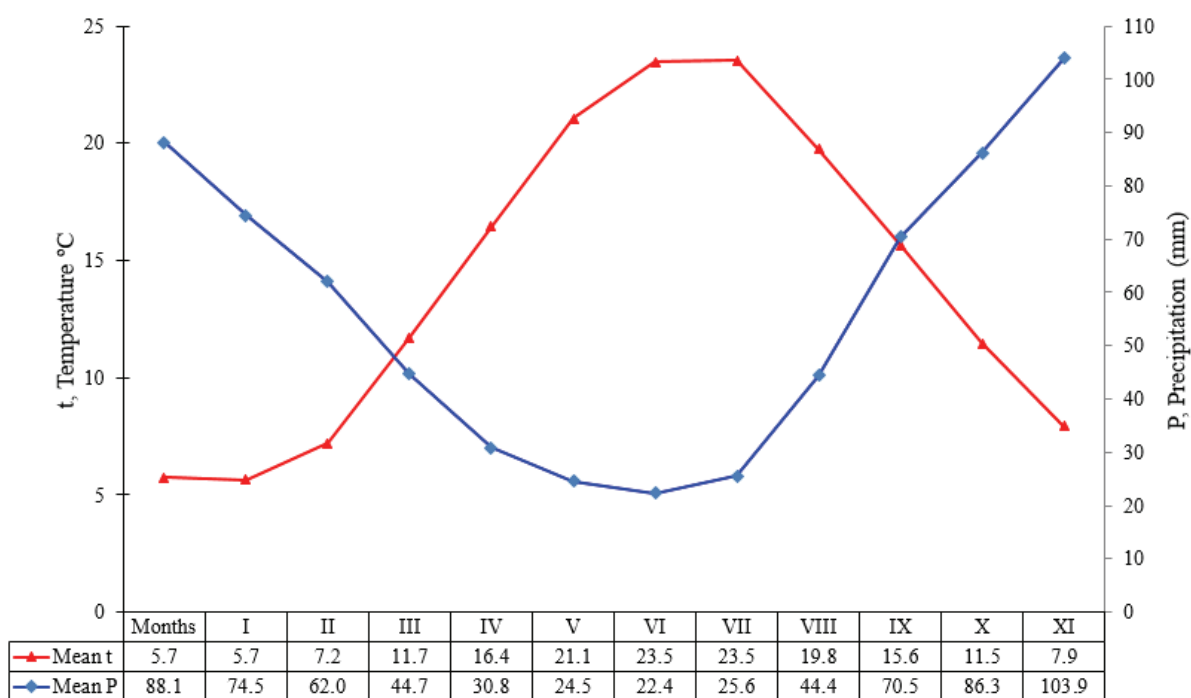


Figure 2. Ombrothermic Diagram of Tuzla, İstanbul.

MATERIALS AND METHODS

A special decree of authorisation and permission is given to the authors by the Ministry of National Defence (Turkey) with the date 17th May 2005 and number 2943-8456 in order to enter in and collect lichen materials from military bases in Tuzla, Istanbul. The lichen material was collected from seven sites in Tuzla Infantry Academy and four sites in Naval Academy between 2005 and 2006. The geographic coordinates and elevations were recorded by a *Garmin e-trex Summit*, GPS navigation instrument and the necessary data such as the substrate and habitat types were noted during the collection works. The lichen samples were placed in paper bags and after a visual observation taken out of the military zones. The taxa were identified with the aid of flora books and identification keys (CLAUZADE & ROUX, 1985; PURVIS et al., 1992; WIRTH, 1995). The lichen specimens are preserved in the Herbarium of the Faculty of Science and Arts, Marmara University, Istanbul (MUFE) with numbers given by Gülşah Çobanoğlu, (G.Ç. 2495-2646). A list of the collecting sites; locality, habitat and substrate properties are presented below under the following title.

Collection Sites and Localities

1. Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, on *Cupressus sempervirens*, on *Pinus nigra*, on Siliceous Rocks and on Soil, 40°49'52.20" N, - 29°20'28.50" E, May 25, 2005.
2. Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Bark, on Siliceous Rocks and on Soil, 40°51'09.20" N, - 29°19'39.30" E, May 25, 2005.

3. Tuzla Infantry Academy, Northern Hill, 167 m, on Bark, on Siliceous Rocks and on Soil, 40°51'12.00" N, - 29°20'15.60" E, May 25, 2005.
4. Tuzla Infantry Academy, Umur Creek, on Siliceous Rocks and on Soil, 63 m, 40°50'32.00" N, - 29°20'47.90" E, June 20, 2005.
5. Tuzla Infantry Academy, Pond, 104 m, on Siliceous Rocks, 40° 50' 50.60" N, - 29° 20' 53.20" E, June 20, 2005.
6. Tuzla Infantry Academy, Karakol Hill, 178 m, on Bark, on *Cupressus sempervirens* and on Siliceous Rocks, 40° 51' 03.90" N, - 29° 20' 37.40" E, June 20, 2005.
7. Tuzla Infantry Academy, Komando, 70 m, on *Pinus nigra*, 40° 51' 09.60" N, - 29° 18' 58.20" E, June 20, 2005.
8. Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40°48'47.98"N - 29°15'44.56"E, June 6, 2006.
9. Naval Academy, Near Sport Facilities, 3m, on *Populus* sp., on Wall and on *Washingtonia filifera*, 40°48'38.00"N - 29°15'28.50"E, June 6, 2006.
10. Naval Academy, Near Headquarters, 9 m, on *Cupressus sempervirens* and on *Populus* sp., 40°48'16.20"N - 29°15'38.00"E, June 6, 2006.
11. Naval Academy, Picnic Area, 4 m, on *Phoenix* sp. 40°48'53.00"N - 29°16'3.20"E, June 6, 2006.

RESULTS

65 lichen taxa and a lichenicolous fungus from the two military bases from Tuzla, Istanbul are listed alphabetically. 15 lichen species and a lichenicolous fungus are new records for Istanbul and are indicated with an asterisk (*) in the list. The names of authors are abbreviated according to BRUMMITT & POWELL (1992). The nomenclature follows the recent literature (BLANCO et al., 2004 a, b; SANTESSON et al., 2004). Geographic information about the localities and substrate preferences of the taxa are comparatively given below.

List of Taxa

Acarospora fuscata (Nyl.) Th. Fr.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40°49'52.20"N - 29°20'28.50"E, May 25, 2005, G.Ç. 2495; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40°51'09.20" N - 29°19'39.30"E, May 25, 2005, G.Ç. 2496.

Alyxoria varia (Pers.) Ertz & Tehler

Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40°48'47.98"N - 29°15'44.56"E June 6, 2006, G.Ç. 2497; Naval Academy, Near Sport Facilities, 3 m, on *Washingtonia filifera*, 40°48'38.00"N - 29°15'28.50"E, June 6, 2006, G.Ç. 2498.

Amandinea punctata (Hoffm.) Coppins & Scheid.

Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40°48'47.98"N - 29°15'44.56"E, June 6, 2006, G.Ç. 2499; Naval Academy, Near Sport Facilities, 3 m, on *Washingtonia filifera*, 40°48'38.00"N - 29°15'28.50"E, June 6, 2006, G. Ç. 2500; Naval Academy, Picnic Area, 4 m, on *Phoenix* sp. 40°48'53.00"N - 29°16'3.20"E, June 6, 2006, G.Ç. 2501.

Aspicilia caesiocinerea (Nyl. ex Malbr.) Arnold

Tuzla Infantry Academy, Pond, 104 m, on Siliceous Rocks, 40°50'50.60"N - 29°20'53.20" E, June 20, 2005, G.Ç. 2502.

Aspicilia cinerea (L.) Körb.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40°49'52.20"N - 29°20'28.50"E, May 25, 2005, G. Ç. 2503; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40°51'09.20"N - 29°19'39.30" E, May 25, 2005, G.Ç. 2504; Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40°51'12.00"N - 29°20'15.60"E, May 25, 2005, G.Ç. 2505; Tuzla Infantry Academy, Pond, 104 m, on Siliceous Rocks, 40°50'50.60" N - 29°20'53.20" E, June 20, 2005, G. Ç. 2506; Tuzla Infantry Academy, Karakol Hill, 178 m, on Siliceous Rocks, 40°51' 03.90"N - 29°20'37.40"E, June 20, 2005, G. Ç. 2507.

Aspicilia contorta (Hoffm.) Körb.

Tuzla Infantry Academy, Umur Creek, on Siliceous Rocks, 63 m, 40° 50' 32.00" N - 29° 20' 47.90" E, June 20, 2005, G.Ç. 2508.

Aspicilia recedens (Taylor) Arnold

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2509; Tuzla Infantry Academy, Pond, 104 m, on Siliceous Rocks, 40° 50' 50.60" N, - 29° 20' 53.20" E, June 20, 2005, G.Ç. 2510.

**Bacidia arceutina* (Ach.) Rehm & Arnold

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on *Pinus nigra*, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2511.

Caloplaca arenaria (Pers.) Müll. Arg.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2512.

- Caloplaca carphinea* (Fr.) Jatta
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2513.
- Caloplaca ceracea* J. R. Laundon
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2514; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2515.
- Caloplaca cerina* (Hedw.) Th. Fr.
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on *Pinus nigra*, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2516; Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens* 40° 51' 03.90" N, - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2517.
- Caloplaca saxicola* (Hoffm.) Nordin
Naval Academy, Near Sport Facilities, 3 m, on Wall, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2518.
- **Candelariella coralliza* (Nyl.) H. Magn.
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2519; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2520.
- Candelariella vitellina* f. *flavovirella* (Nyl.) A. Hend.
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2521; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2522; Tuzla Infantry Academy, Karakol Hill, 178 m, on Siliceous Rocks, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2523; Naval Academy, Near Sport Facilities, 3 m, on Wall, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2524.
- Candelariella xanthostigma* (Pers. ex Ach.) Lettau
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on *Pinus nigra*, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2525; Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2526; Naval Academy, Near Sport Facilities, 3 m, on *Populus sp.*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2527.
- Cetraria aculeata* (Schreb.) Fr.
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Soil, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2528.
- **Cladonia caespiticia* (Pers.) Flörke
Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Soil, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2529.
- Cladonia convoluta* (Lam.) Anders
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Soil, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2530; Tuzla Infantry Academy, Northern Hill, 167 m, on Soil, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2531.
- Cladonia foliacea* (Huds.) Willd.
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Soil, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2532; Tuzla Infantry Academy, Umur Creek, on Soil, 63 m, 40° 50' 32.00" N - 29° 20' 47.90" E, June 20, 2005, G.Ç. 2533.
- Cladonia furcata* ssp. *rangiformis* (L.Scriba ex Sandst.) Pišút
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Soil, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2534; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Soil, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2535.
- Cladonia pyxidata* (L.) Hoffm.
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Soil, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2536; Tuzla Infantry Academy, Northern Hill, 167 m, on Soil, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2537; Tuzla Infantry Academy, Umur Creek, on Soil, 63 m, 40° 50' 32.00" N, - 29° 20' 47.90" E, June 20, 2005, G.Ç. 2538.
- Cladonia rangiformis* Hoffm.
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Soil, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2539; Tuzla Infantry Academy, Umur Creek, on Soil, 63 m, 40° 50' 32.00" N - 29° 20' 47.90" E, June 20, 2005, G.Ç. 2540.
- Cladonia symphyrcarpia* (Flörke) Fr.
Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Soil, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2541.

**Diploschistes caesioplumbeus* (Nyl.) Vain.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, on Siliceous Rocks 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2542; Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2543.

Diplotomma alboatrum (Hoffm.) Flot.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, on Siliceous Rocks 40° 49' 52.20" N, - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2544.

Diplotomma epipolium (Ach.) Arnold

Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2545.

**Gloniopsis praelonga* (Schwein.) Underw. & Earle

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Bark, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2546.

Lecanora argentata (Ach.) Malme

Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2547.

Lecanora carpinea (L.) Vain.

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Bark, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2546; Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2549.

Lecanora chlarotera Nyl.

Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2550.

Lecanora dispersa (Pers.) Röhl.

Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40° 48' 47.98" N - 29° 15' 44.56" E, June 6, 2006, G.Ç. 2551; Naval Academy, Near Sport Facilities, 3 m, on *Populus sp.*, and on *Washingtonia filifera*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2552.

Lecanora hagenii (Ach.) Ach.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2553.

Lecanora muralis (Schreb.) Rabenh.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N, - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2554.

Lecanora saligna (Schrad.) Zahlbr.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on *Cupressus sempervirens*, on *Pinus nigra*, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2555; Tuzla Infantry Academy, Komando, 70 m, on *Pinus nigra*, 40° 51' 09.60" N - 29° 18' 58.20" E, June 20, 2005, G.Ç. 2556.

**Lecanora swartzii* (Ach.) Ach.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2557.

**Lecanora symmicta* (Ach.) Ach.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2558.

Lecidea fuscoatra (L.) Ach.

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2559.

**Lecidella anomaloides* (A. Massal.) Hertel & H.Kilias

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2560; Tuzla Infantry Academy, Gölet, 104 m, on Siliceous Rocks, 40° 50' 50.60" N - 29° 20' 53.20" E, 20.VI.2005, G.Ç. 2561.

Lecidella carpathica Körb.

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2562; Tuzla Infantry Academy, Umur Creek, on Siliceous Rocks, 63 m, 40° 50' 32.00" N - 29° 20' 47.90" E, June 20, 2005, G.Ç. 2563; Tuzla Infantry Academy, Pond, 104 m, on Siliceous Rocks, 40° 50' 50.60" N - 29° 20' 53.20" E, June 20, 2005, G.Ç. 2564.

Lecidella elaeochroma (Ach.) M. Choisy

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on *Pinus nigra*, 40° 49' 52.20" N, - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2565; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Bark, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2566; Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2567.

Melanohalea exasperatula (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw & Lumbsch

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2568; Tuzla Infantry Academy, Bayrakepe Hill, 202 m, on Bark, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2569.

Parmelia sulcata Taylor

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2570; Tuzla Infantry Academy, Bayrakepe Hill, 202 m, on Bark, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2571; Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40° 48' 47.98" N - 29° 15' 44.56" E, June 6, 2006, G.Ç. 2572; Naval Academy, Near Sport Facilities, 3 m, on *Washingtonia filifera*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2573.

Parmelina tiliacea (Hoffm.) Hale

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, on *Cupressus sempervirens*, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2574.

Phaeophyscia orbicularis (Neck.) Moberg

Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40° 48' 47.98" N - 29° 15' 44.56" E, June 6, 2006, G.Ç. 2575; Naval Academy, Near Sport Facilities, 3 m, *Washingtonia filifera*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2576.

Physcia adscendens (Fr.) H. Olivier

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, on *Cupressus sempervirens*, on *Pinus nigra*, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2577; Tuzla Infantry Academy, Bayrakepe Hill, 202 m, on Bark, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2578; Tuzla Infantry Academy, Northern Hill, 167 m, on Bark, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2579; Tuzla Infantry Academy, Karakol Hill, 178 m, on Bark, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2580; Tuzla Infantry Academy, Komando, 70 m, on *Pinus nigra*, 40° 51' 09.60" N - 29° 18' 58.20" E, June 20, 2005, G.Ç. 2581; Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40° 48' 47.98" N - 29° 15' 44.56" E, June 6, 2006, G.Ç. 2582; Naval Academy, Near Sport Facilities, 3 m, on *Populus sp.*, on *Washingtonia filifera*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2583; Naval Academy, Near Headquarters, 9 m, on *Cupressus sempervirens* and on *Populus sp.*, 40° 48' 16.20" N - 29° 15' 38.00" E, June 6, 2006, G.Ç. 2584; Naval Academy, Picnic Area, 4 m, on *Phoenix sp.* 40° 48' 53.00" N - 29° 16' 3.20" E, June 6, 2006, G.Ç. 2585.

Physcia tenella (Scop.) DC.

Tuzla Infantry Academy, Karakol Hill, 178 m, on Bark, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2586; Tuzla Infantry Academy, Komando, 70 m, on *Pinus nigra*, 40° 51' 09.60" N - 29° 18' 58.20" E, June 20, 2005, G.Ç. 2587; Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40° 48' 47.98" N - 29° 15' 44.56" E, June 6, 2006, G.Ç. 2588; Naval Academy, Near Sport Facilities, 3 m, on *Washingtonia filifera*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2589; Naval Academy, Near Headquarters, 9 m, on *Cupressus sempervirens* and on *Populus sp.*, 40° 48' 16.20" N - 29° 15' 38.00" E, June 6, 2006, G.Ç. 2590; Naval Academy, Picnic Area, 4 m, on *Phoenix sp.* 40° 48' 53.00" N - 29° 16' 3.20" E, June 6, 2006, G.Ç. 2591.

Physconia grisea (Lam.) Poelt

Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2592; Tuzla Infantry Academy, Komando, 70 m, on *Pinus nigra*, 40° 51' 09.60" N - 29° 18' 58.20" E, June 20, 2005, G.Ç. 2593; Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40° 48' 47.98" N - 29° 15' 44.56" E, June 6, 2006, G.Ç. 2594; Naval Academy, Near Sport Facilities, 3m, on *Washingtonia filifera*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2595; Naval Academy, Near Headquarters, 9 m, on *Cupressus sempervirens* and on *Populus sp.*, 40° 48' 16.20" N - 29° 15' 38.00" E, June 6, 2006, G.Ç. 2596; Naval Academy, Picnic Area, 4 m, on *Phoenix sp.* 40° 48' 53.00" N - 29° 16' 3.20" E, June 6, 2006, G.Ç. 2597.

**Pleurosticta acetabulum* (Neck.) Elix & Lumbsch

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Bark, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2598.

**Polychidium muscicola* (Sw.) Gray

Tuzla Infantry Academy, Bayrakepe Hill, 202 m, on Soil, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2599; Tuzla Infantry Academy, Umur Creek, on Soil, 63 m, 40° 50' 32.00" N - 29° 20' 47.90" E, June 20, 2005, G.Ç. 2600.

Polysporina simplex (Taylor) Vězda

Tuzla Infantry Academy, Umur Creek, on Siliceous Rocks, 63 m, 40° 50' 32.00" N - 29° 20' 47.90" E, June 20, 2005, G.Ç. 2601; Tuzla Infantry Academy, Pond, 104 m, on Siliceous Rocks, 40° 50' 50.60" N - 29° 20' 53.20" E, June 20, 2005, G.Ç. 2602.

Protoparmelia montagnei (Fr.) Sancho & A.Crespo

Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2603.

**Ramalina canariensis* J. Steiner

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Bark, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2604; Tuzla Infantry Academy, Northern Hill, 167 m, on Bark, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2605.

**Ramalina pollinaria* (Westr.) Ach.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2606; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2607; Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2608; Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40° 48' 47.98" N - 29° 15' 44.56" E, June 6, 2006, G.Ç. 2609; Naval Academy, Near Sport Facilities, 3 m, on *Washingtonia filifera*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2610.

**Rhizocarpon geminatum* Körb.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2611; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2612; Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2613.

Rhizocarpon geographicum (L.) DC.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2614; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2615; Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2616; Tuzla Infantry Academy, Umur Creek, on Siliceous Rocks, 63 m, 40° 50' 32.00" N - 29° 20' 47.90" E, 20.VI.2005, G.Ç. 2617.

**Rhizocarpon lecanorinum* Anders

Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2618.

**Rhizocarpon postumum* (Nyl.) Arnold

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2619; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2619; Tuzla Infantry Academy, Umur Creek, on Siliceous Rocks, 63 m, 40° 50' 32.00" N - 29° 20' 47.90" E, June 20, 2005, G.Ç. 2620; Tuzla Infantry Academy, Pond, 104 m, on Siliceous Rocks, 40° 50' 50.60" N - 29° 20' 53.20" E, June 20, 2005, G.Ç. 2621.

Rinodina exigua (Ach.) Gray

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on *Pinus nigra*, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2623; Tuzla Infantry Academy, Karakol Hill, 178 m, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2624.

**Romjularia lurida* (Ach.) Timdal

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2625.

Xanthoparmelia conspersa (Ehrh. ex Ach.) Hale

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2626.

Xanthoparmelia mougeotii (Schaer.) Hale

Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2627; Tuzla Infantry Academy, Karakol Hill, 178 m, on Siliceous Rocks, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2628.

Xanthoparmelia pulla (Ach.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2629; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2630; Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2631.

Xanthoparmelia tinctina (Maheu & A.Gillet) Hale

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2632; Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2633; Tuzla Infantry Academy, Pond, 104 m, on Siliceous Rocks, 40° 50' 50.60" N - 29° 20' 53.20" E, June 20, 2005, G.Ç. 2634; Tuzla Infantry Academy, Karakol Hill, 178 m, on Siliceous Rocks, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2635.

Xanthoparmelia verruculifera (Nyl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2636; Tuzla Infantry Academy, Northern Hill, 167 m, on Siliceous Rocks, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2637.

Xanthoria parietina (L.) Th. Fr.

Tuzla Infantry Academy, Tavşantepe Hill, 108 m, on *Cupressus sempervirens*, on *Pinus nigra*, on Siliceous Rocks, 40° 49' 52.20" N - 29° 20' 28.50" E, May 25, 2005, G.Ç. 2638; Tuzla Infantry Academy, Bayraktepe Hill, 202 m, on Bark, on Siliceous Rocks, 40° 51' 09.20" N - 29° 19' 39.30" E, May 25, 2005, G.Ç. 2639; Tuzla Infantry Academy, Northern Hill, 167 m, on Bark, 40° 51' 12.00" N - 29° 20' 15.60" E, May 25, 2005, G.Ç. 2640; Tuzla Infantry Academy, Karakol Hill, 178 m, on Bark, on *Cupressus sempervirens*, 40° 51' 03.90" N - 29° 20' 37.40" E, June 20, 2005, G.Ç. 2641; Tuzla Infantry Academy, Komando, 70 m, on *Pinus nigra*, 40° 51' 09.60" N - 29° 18' 58.20" E, June 20, 2005, G.Ç. 2642; Naval Academy, Main Avenue, 4 m, on *Acer negundo*, 40° 48' 47.98" N - 29° 15' 44.56" E, June 6, 2006, G.Ç. 2643; Naval Academy, Near Sport Facilities, 3 m, on *Populus sp.*, on *Washingtonia filifera*, 40° 48' 38.00" N - 29° 15' 28.50" E, June 6, 2006, G.Ç. 2644; Naval Academy, Near Headquarters, 9 m, on *Populus sp.*, 40° 48' 16.20" N - 29° 15' 38.00" E, June 6, 2006, G.Ç. 2645; Naval Academy, Picnic Area, 4 m, on *Phoenix sp.* 40° 48' 53.00" N - 29° 16' 3.20" E, June 6, 2006, G.Ç. 2646.

CONCLUSIONS

The present study reports a total of 65 lichenized fungi taxa and 1 lichenicolous fungus from the two military bases in Tuzla. The study results contribute to the Turkish lichen mycota as well as to the lichen diversity of Istanbul with a good ratio of 15/65 taxa. Fifteen lichen species, *Bacidia arceutina* (Ach.) Rehm & Arnold, *Candelariella coralliza* (Nyl.) H. Magn., *Cladonia caespiticia* (Pers.) Flörke, *Diploschistes caesioplumbeus* (Nyl.) Vain., *Lecanora swartzii* (Ach.) Ach., *Lecanora symmicta* (Ach.) Ach., *Lecidella anomaloides* (A. Massal.) Hertel & H. Kiliyas, *Pleurosticta acetabulum* (Neck.) Elix & Lumbsch, *Polychidium muscicola* (Sw.) Gray, *Ramalina canariensis* J.Steiner, *Ramalina pollinaria* (Westr.) Ach., *Rhizocarpon geminatum* Körb., *Rhizocarpon lecanorinum* Anders, *Rhizocarpon postumum* (Nyl.) Arnold, *Romjularia lurida* (Ach.) Timdal, and one lichenicolous fungus species, *Glioniopsis praelonga* (Schwein.) Underw. & Earle are new records for the province. Earlier records in the literature show that 223 lichen taxa have been recorded from Istanbul. Since the military fields are protected and special permission is required to enter and make a botanical study, lichens of these areas have remained intact. Therefore the data is valuable in terms of lichen diversity of both the province and the country.

The list given in this study includes 31 genera and the most frequent genera within the study area are *Lecanora* (represented by 9 species), *Cladonia* (represented by 7 species), *Caloplaca* (represented by 5 species) and *Xanthoparmelia* (represented by 5 species).

Table 2. Distribution of taxa within the study area according to the substrate types.

| Substrate | Terricolous Taxa | Saxicolous Taxa | | Epiphytic Taxa | | | | | | Total | |
|------------|------------------|-----------------|-----------------|----------------|-------------------|------------------------|--------------------|-----------------|--------------------|-------|--------------------|
| | Soil | Wall | Siliceous Rocks | Bark | <i>A. negundo</i> | <i>C. sempervirens</i> | <i>W. filifera</i> | <i>P. nigra</i> | <i>Populus sp.</i> | | <i>Phoenix sp.</i> |
| Number | 9 | 2 | 32 | 12 | 10 | 14 | 10 | 10 | 6 | 5 | 110 |
| | 9 | 34 | | 67 | | | | | | 110 | |
| Percentage | 8.18 % | 30.91 % | | 60.91 % | | | | | | 100 % | |

From a total of 110 collected lichen samples from the study area, Table 2 depicts the distribution of taxa according to substrate types. As a result of the Mediterranean climate, maquis vegetation is present in the region. Thus, the epiphytic taxa are rather abundant and higher in number with a sum of 60.91% in the collection sites, scattered on *Cupressus sempervirens* L. (substrate for 14 taxa), on bark (substrate for 12 taxa) and on *Washingtonia filifera* (J.Linden ex Andre) H.Wendl and *Pinus nigra* J.F.Arnold (both substrates for 10 taxa). Saxicolous taxa that follow the epiphytes with 30.91 % of the whole have been collected majorly on siliceous rocks (32 taxa). The only two taxa collected from cement-wall are *Caloplaca saxicola* (Hoffm.) Nordin and *Candelariella vitellina* f. *flavovirella* (Nyl.) A.Hend. Terricolous taxa hold only 8.18 % of the total samples and are represented by 9 taxa.

According to the data recorded in the field, *Xanthoria parietina* (L.) Th. Fr. prefers 8 of 10 different substrate types while both *Physcia adscendens* (Fr.) H. Olivier and *P. tenella* (Scop.) DC. prefer 7, *Physconia grisea* (Lam.) Poelt prefers 6. These species have an ability to adapt on a diversity of substrata. The relation between substrate types and the taxa correspond with the literature.

Xanthoria parietina (L.) Th. Fr. and *Physcia adscendens* (Fr.) H. Olivier have been collected from 9, *Physcia tenella* (Scop.) DC. and *Physconia grisea* (Lam.) Poelt have been collected from 6, and *Ramalina pollinaria* (Westr.) Ach. has been collected from 5 different localities of total 11 collecting sites. These species show a frequency of abundance in the study area.

This paper is a primus inter pares since it mentions lichen records for the first time from military bases in Turkey. The distribution of taxa according to localities is 13.8 on average. The first locality is represented by 40 taxa while the second by 27, the sixth by 16 and the third by 15 taxa. These localities indicate most protected areas by means of habitats and substrates in Tuzla Infantry Academy field. The localities in the Naval Academy have lower number of taxa (below the average) due to the artificial terrain. Human intervention on the natural environment such as man-made

landscapes, have resulted in lichen-deserts in the Naval Academy Field. It is obvious that, due to the number, frequency and distribution of lichen taxa, variety of substrate and habitat types, Tuzla Infantry Academy field is better protected than that of the Naval Academy. It is still unclear if there is a prominent distinction in the understanding and use of nature between Land Forces and Naval Forces in the army.

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