J. BIOL. ENVIRON. SCI.,
2007, 1(1), 15-22

Lichen records from Southeast and East Anatolian region (Turkey)

Seyhan Oran* **and Şule Öztürk**
Department of Biology, Faculty of Arts and Sciences, Uludağ University, 16059 Görükle, Bursa, Turkey

ABSTRACT

In this study, 278 lichen specimens, collected from sixteen localities in Adıyaman, Ağrı, Batman, Diyarbakır, Gaziantep, Kars, Mardin and Şanlıurfa provinces, which located in Southeast and East Anatolian regions, were investigated. Onehundered and nine taxa were determined belonging to thirty six genera. Among the specimens that we are collected from the study region, 85 of them were reported previously. Our results indicated that 24 taxa are new to Southeast and East Anatolian region. *Rinodina rinodinoides* (Anzi) H. Mayrhofer & Scheid. is new record for Turkey.

Key Words: Lichen, Biodiversity, Turkey

INTRODUCTION

Despite, many studies on lichens in various regions in our country (John, 1996; John and Breuss, 2004; Özdemir Türk and Güner, 1998; Öztürk and Güvenç, 2003) the lichen diversity of Turkey has not completed for now. A forthcoming checklist of the lichens of Turkey at the present consist of approximately 1200 taxa (Breuss and John, 2004).

So far, there have been several publised studies on lichens from Southeast Anatolian region (Steiner, 1921; Szatala, 1927, 1941, 1960; Knoph, 1990; Nimis and John,1998; John, 1996, 1999).

Previous lichen records from the East Anatolian region were published by Steiner (1899), Hertel (1970), Poelt and Obermayer (1990), Aslan and Öztürk (1994), Aslan and Öztürk (1998), Aslan (2000), Candan and Özdemir Türk (2000), John et al. (2000), Aslan et al. (2002), Yazıcı and Aslan (2003), and Candan (2006).

We believe that our present study will make significant conributions to the lichen diversity of Turkey, which is not sufficiently known yet.

Description of the study area

The study area located in the southeast and east of Turkey. The area of Southeast Anatolian region is 75.000 square kilometers, and East Anatolian region is 164.000 square kilometers.

Southeast Anatolian region usually consist of plains such as Şanlıurfa Harran and Gaziantep platteau. The highest summit of the Karacadağ is the Kollubaba top which has an altitude of 1957 m. Southeast Anatolian region is effected by Mediterranean and continental climate. Total annual precipitation of the province is 331 - 796 mm, and the average daily maximum temperature is aproximately 30^{o}C, while the minimum temperature is 1.5 - 6 ^{o}C. Natural plant cover is steppe. Region is very poor in terms of forest area. *Quercus* sp. is common tree in that forest (www.turkcebilgi.com).

Average altitude is between 2000 - 2200 m at East Anatolian region. Ağrı Mountain (5165 m) is the highest mountain in Turkey. Summers tend to be hot and extremely dry. Winters are bitterly cold with frequent, heavy snowfall. Temperature decreases to – 40^{o} C in winter. Natural plant cover is steppe. That's why summer rains steppe is meadow form in some region and high altitudes cover with forests. (http://tr.wikipedia.org)

Localities of the study area are;

1. Ağrı; Doğubeyazıt, Gürbulak border gate, 1650 m, 39° 25' 30" N 44° 22' 30" E, 26.07.2003
2. Kars; Center Ocaklı village, Ani Ruins, 1700 m, 40° 18' 30" N 43° 38' 30" E, 27.07.2003
3. Gaziantep; Nur Mountain, Ak yokuş geçidi, open rocky field, 1111 m, 37° 10' 42" N 36° 58' 45" E, 10.05.2004
4. Gaziantep; entrance of Yeşilce village, open rocky field, 980 m, 37° 10' 25" N 37° 12' 12" E, 10.05.2004
5. Gaziantep; Gaziantep-Yavuzeli road, 20. km, open rocky field, 838 m, 37° 13' 02" N 37° 29' 37" E, 10.05.2004
6. Gaziantep; Gaziantep-Nizip road, rocky area, 773 m, 37° 00' 39" N 37° 37' 47" E, 11.05.2004
7. Şanlıurfa; Birecik Dam (Zeugma), 753 m, 37° 03' 38" N 37° 52' 15" E, 11.05.2004

* Corresponding author: seyhana@uludag.edu.tr

8. Şanlıurfa; entrance of Urfa, open rocky field, 698 m, 37° 08' 41" N 38° 45' 12" E, 11.05.2004
9. Şanlıurfa; Harran Ruins, 370 m, 36° 51' 56" N 39° 01' 54" E, 12.05.2004
10. Şanlıurfa; Viranşehir, before 38 km from Viranşehir, open rocky field, steppe, 695 m, 37° 13' 43" N 39° 15' 56" E, 12.05.2004
11. Mardin; Mardin-Midyat road, Yeşilli place, 946 m, 37° 20' 49" N 40° 49' 35" E, 13.05.2004
12. Batman; Hasankeyf-Batman road, around of Suçeken, 511 m, 37° 44' 19" N 41° 17' 31" E, 13.05.2004
13. Diyarbakır; Batman-Diyarbakır road, around of Murattaş village, rocky area, 602 m, 37° 48' 06" N 40° 22' 47" E, 13.05.2004
14. Şanlıurfa; Karacadağ, open rocky field, 1464 m, 37° 46' 30" N 39° 47' 10" E, 14.05.2004
15. Adıyaman; Nemrut Mountain, rocky slopes, 1415 m, 37° 57' 00" N 38° 45' 36" E, 14.05.2004
16. Adıyaman; Adıyaman-Maraş road, 25. km, open rocky field, vicinity of Atmalı, 730 m, 37° 42' 21" N 38° 00' 44" E, 15.05.2004

MATERIALS AND METHODS

The lichen samples which were collected from 16 localities in the year of 2003 and 2004 were identified with aid of literatures that include identification keys (Clauzade and Roux 1985, Girald 2001, Nash III et al. 2002; 2004; Purvis et al. 1994; Wirth 1995). Likewise, the nomenclature follows a rather modern concept, e.g. Blanco et al. (2004). Morphological and anatomical characters were determined using stereo (40 SZ Olympus) and light microscopes (Krüss). The specimens are kept in the herbarium of the Faculty of Arts and Sciences, Uludağ University (BULU).

RESULTS

The taxa are given in alphabetical order, followed by locality numbers and substrate. A herbarium number for specimens (BULU) were indicated in the parenthesis (10352-10631). The names of the authors are abbreviated according to Brummit and Powel (1992). An asteriks "*" indicates new records for Turkey and "# " indicates new records for Southeast and East Anatolian regions.

Acarospora cervina A.Massal
Loc: 3, 4, 5, 6, 8, 9, 11, 12, 15, on calcareous rock (10354, 10395, 10413, 10427, 10462, 10472, 10502, 10528, 10567)
Acarospora fuscata (Nyl.) Arnold
Loc: 13, on siliceous rock (10535)
Acarospora impressula Th.Fr.
Loc: 13, 14, on siliceous rock (10530, 10563)
Acarospora insolata H.Magn.
Loc: 14, on siliceous rock (10559)
Acarospora smaragdula (Wahlenb.) A.Massal.
Loc: 14, on siliceous rock (10610)
Acarospora veronensis A.Massal
Loc: 3, on fossil mussel shell (10356)
Aspicilia calcarea (L.) Mudd
Loc: 1, 3, 8, 16, on calcareous rock (10615, 10352, 10449, 10589)
Aspicilia cheresina var. *justii* (Servít) Clauzade & Cl.Roux
Loc: 8, on calcareous rock (10457)
Aspicilia cinerea (L.) Körb.
Loc: 13, 14, on siliceous rock (10536, 10543)
Aspicilia contorta (Hoffm.) Kremp. subsp. *contorta*
Loc: 16, on calcareous rock (10595)
Aspicilia contorta subsp. *hoffmanniana* S. Ekman & Fröberg
Loc: 2, 3, 6, 13, on calcareous rock (10623, 10598, 10431, 10609)
Aspicilia desertorum (Kremp.) Mereschk.
Loc: 14, on siliceous rock (10542)
Aspicilia farinosa (Flörke) Motyka

Loc: 5, 16, on calcareous rock (10417, 10596)
Aspicilia intermutans (Nyl.) Arnold
Loc: 14, on siliceous rock (10564)
Buellia leptocline (Flot.) A.Massal.
Loc: 14, on siliceous rock (10557)
Caloplaca atroflava (Turner) Mong.
Loc: 3, on siliceous rock (10378)
Caloplaca aurantia (Pers.) Steiner
Loc: 5, 10, on calcareous rock (10410, 10489)
Caloplaca biatorina (A.Massal.) J.Steiner
Loc: 2, on calcareous rock (10621)
Caloplaca cerina (Ehrh. ex Hedw.) Th.Fr. var. *cerina*
Loc: 3, *Quercus coccifera* (10387)
Caloplaca chalybaea (Fr.) Müll.Arg.
Loc: 3, 5, 15, on calcareous rock (10359, 10409, 10565)
Caloplaca citrina (Hoffm.) Th.Fr.
Loc: 2, on calcareous rock (10631)
Caloplaca crenularia (With.) J.R.Laundon
Loc: 3, on siliceous rock (10370)
Caloplaca crenulatella (Nyl.) H.Olivier
Loc: 2, on artificial substrate (10628); 6, 11, 15, on calcareous rock (10445, 10510, 10570); 14, on siliceous rock (10548)
Caloplaca decipiens (Arnold) Blomb. & Forssell
Loc: 2, 12, on calcareous rock (10617, 10524)
Caloplaca demissa (Flot.) Zahlbr.
Loc: 2, 7, 8, 12, on calcareous rock (10625, 10448, 10471, 10525)
Caloplaca dolomiticola (Hue) Zahlbr.
Loc: 6, 8, 9, 10, 11, 12, 15, 16, on calcareous rock (10432, 10463, 10481, 10490, 10505, 10522, 10569, 10591)
Caloplaca erythrocarpa (Pers.) Zwackh.
Loc: 12, on calcareous rock (10526)
Caloplaca flavorubescens (Huds.) J.R.Laundon
Loc: 3, *Quercus coccifera* (10386)
Caloplaca holocarpa (Ehrh. ex Ach.) Wade
Loc: 3, 14, on siliceous rock (10376, 10553); 2, 12, on calcareous rock (10626, 10519)
Caloplaca lactea (A.Massal.) Zahlbr.
Loc: 3, 4, 5, 6, 8, 9, 16, on calcareous rock (10375, 10396, 10419, 10444, 10467, 10480, 10583)
Caloplaca polycarpa (A. Massal.) Zahlbr.
Loc: 5 on *Verrucaria* sp. (10600)
Caloplaca saxicola (Hoffm.) Nordin
Loc: 11, 15, on calcareous rock (10512, 10568)
Caloplaca teicholyta (Ach.) J.Steiner
Loc: 9, on calcareous rock (10482)
Caloplaca variabilis (Pers.) Müll.Arg.
Loc: 3, 4, 5, 6, 8, 9, 10, 11, 12, 15, 16, on calcareous rock (10374, 10392, 10422, 10425, 10456, 10484, 10492, 10506, 10521, 10574, 10584)
Caloplaca xantholyta (Nyl.) Jatta
Loc: 6 on log (10442); 9, 10, on calcareous rock (10487, 10497); 16, on moss (10579)
Candelariella aurella (Hoffm.) Zahlbr.
Loc: 6, on siliceous rocks including limestone (10334); 2, 3, 4, 7, 8, 10, 11, 12, on calcareous rock (10620, 10357, 10394, 10447, 10450, 10498, 10503, 10520)
Candelariella coralliza (Nyl.) H.Magn.
Loc: 13, on siliceous rock (10532)
Candelariella vitellina (Hoffm.) Müll.Arg.
Loc: 14, on siliceous rock (10549)
Candelariella xanthostigma (Pers. ex Ach.) Lettau

Loc: 4, on calcareous rock (10402)
Clauzadea monticola (Ach.) Hafellner & Bellem.
Loc: 3, on calcareous rock (10353)
Collema crispum (L.) Weber ex F.H.Wigg.
Loc: 4, 8, on calcareous soil (10404, 10470); 11, 16, on calcareous rock (10516, 10587)
Collema cristatum (L.) Weber ex F.H.Wigg.
Loc: 6, 11, 16, on calcareous rock (10602, 10607, 10611); 10, on calcareous soil (10606)
Collema polycarpon Hoffm.
Loc: 11, 15, on calcareous rock (10515, 10577)
Collema undulatum Laurer ex Flot.
Loc: 3, on calcareous rock (10381)
Collema tenax (Sw.) Ach.
Loc: 8, 12, on calcareous soil (10469, 10529)
Diploschistes gypsaceus (Ach.) Zahlbr.
Loc: 9, on calcareous rock (10603)
Diploschistes ocellatus (Vill.) Norman
Loc: 4, 5, 8, 9, 10, 16, on calcareous rock (10397, 10416, 10466, 10473, 10491, 10581)
Diplotomma epipolium (Ach.) Arnold
Loc: 2, 6, 8, 10, 11, on calcareous rock (10624, 10438, 10465, 10488, 10504)
Endocarpon pusillum Hedw.
Loc: 9, on calcareous rock (10486)
Fulgensia fulgens (Sw.) Elenkin
Loc: 8, on calcareous soil (10452)
Lecania inundata (Hepp ex Körb.) M. Mayrhofer
Loc: 2, on artificial substrate (10627)
Lecanora albescens (Hoffm.) Branth & Rostr.
Loc: 9, 10, on calcareous rock (10604, 10605)
Lecanora chlarotera Nyl.
Loc: 3, *Quercus coccifera* (10385)
Lecanora crenulata (Dicks.) Hook.
Loc: 2, 11, on calcareous rock (10622, 10511)
Lecanora dispersa (Pers.) Röhl.
Loc: 15, on calcareous rock (10572)
Lecanora frustulosa (Dicks.) Ach.
Loc: 14, on siliceous rock (10540)
Lecanora hagenii (Ach.) Ach.
Loc: 3, *Quercus coccifera* (10390) 3, 10, on calcareous rock (10367, 10499)
Lecanora rupicola (L.) Zahlbr. subsp. *rupicola*
Loc: 14, on siliceous rock (10561)
Lecidea atrobrunnea (Ramond) Schaer.
Loc: 14, on siliceous rock (10555)
Lecidea fuscoatra (L.) Ach.
Loc: 3, 6, on siliceous rocks including limestone (10369, 10424); 14, on siliceous rock (10556)
Lecidella carpathica Körb.
Loc: 14, on siliceous rock (10560)
Lecidella elaeochroma (Ach.) M.Choisy
Loc: 3, *Quercus coccifera* (10383)
Lecidella patavina (A.Massal.) Knoph & Leuckert
Loc: 3, on calcareous rock (10379)
Lecidella stigmatea (Ach.) Hertel & Leuckert
Loc: 3, on calcareous rock (10364); 14, on siliceous rock (10541)
Lepraria incana (L.) Ach.
Loc: 3, on moss (10391)
Leptogium corniculatum (Hoffm.) Minks
Loc: 10, on calcareous soil (10500)
Leptogium lichenoides (L.) Zahlbr.

Loc: 3, on calcareous soil (10368); 4, on calcareous rock with moss (10406); 6, on log (10436)
Lobothallia radiosa (Hoffm.) Hafellner
Loc: 2, 3, 4, 6, 9, 12, on calcareous rock (10619, 10365, 10398, 10430, 10474, 10527); 13, on siliceous rocks including limestone (10534); 14, on siliceous rock (10547)
Physcia adscendens (Th.Fr.) H.Olivier
Loc: 3, *Quercus coccifera* (10384)
Physcia aipolia (Ehrh. ex Humb.) Fürnr.
Loc: 3, *Quercus coccifera* (10389)
Physcia caesia (Hoffm.) Fürnr.
Loc: 14, on siliceous rock (10544)
Physcia dimidiata (Arnold) Nyl.
Loc: 6, on log with moss (10441); 9, on calcareous rock (10477)
Physcia dubia (Hoffm.) Lettau
Loc: 14, on siliceous rock (10554)
Physconia enteroxantha (Nyl.) Poelt
Loc: 14, on siliceous rock with moss (10545)
Placidium rufescens (Ach.) A.Massal.
Loc: 3, 8, 16, on calcareous soil (10382, 10464, 10597); 4, 11, on calcareous rock (10407, 10501)
Placocarpus schaereri (Fr.) Breuss
Loc: 3, 4, 6, on calcareous rock (10358, 10393, 10440)
Placynthium nigrum (Huds.) Gray
Loc: 3, 4, 16, on calcareous rock (10373, 10399, 10593)
Protoparmeliopsis muralis (Schreb.) M.Choisy
Loc: 2, 3, 4, 5, 6, 8, 9, 12, 15, 16, on calcareous rock (10616, 10361, 10400, 10414, 10433, 10458, 10479, 10518, 10566, 10590); 13, 14, on siliceous rock (10531, 10546)
Psora decipiens (Hedw.) Hoffm.
Loc: 4, 8, 16, on calcareous soil (10405, 10451, 10582); 3, 9, on calcareous rock (10360, 10478)
Psora testacea Hoffm.
Loc: 16, on calcareous rock (10580)
Rhizocarpon geographicum (L.) DC.
Loc: 3, 14, on siliceous rock (10371, 10537)
Rhizoplaca melanophytalma (DC.) Leuckert
Loc: 14, on siliceous rock (10539)
Rhizoplaca peltata (Ramond) Leuckert & Poelt
Loc: 14, on siliceous rock (10538)
Rimularia insularis (Nyl.) Rambold & Hertel
Loc: 14, on siliceous rock (10562)
Rinodina bischoffii (Hepp) A.Massal.
Loc: 3, 5, 6, 10, 11, 12, 16, on calcareous rock (10380, 10420, 10426, 10493, 10507, 10517, 10585)
Rinodina dubyana (Hepp) J.Steiner
Loc: 3, 5, on calcareous rock (10366, 10412)
Rinodina immersa (Körb.) Arnold
Loc: 8, 11, on calcareous rock (10455, 10513)
Rinodina luridata (Körb.) H. Mayrhofer, Scheid. & Sheard
Loc: 5, on calcareous rock (10612)
* *Rinodina rinodinoides* (Anzi) H. Mayrhofer & Scheid.
Loc: 5, 6, on calcareous rock (10599, 10601)
Rinodina sophodes (Ach.) A.Massal.
Loc: 3, *Quercus coccifera* (10388)
Sarcogyne privigna var. *calcicola* H.Magn.
Loc: 3, 8, 16, on calcareous rock (10362, 10468, 10586)
Sarcogyne regularis Körb.
Loc: 5, 6, 8, 10, on calcareous rock (10614, 10435, 10454, 10494)
Squamarina cartilaginea (With.) P.James
Loc: 3, 5, 9, on calcareous rock (10355, 10415, 10475); 6, on calcareous soil with moss (10437); 4, 8, on calcareous soil (10403, 10453); 16, on moss (10578)

Staurothele frustulenta Vain.
Loc: 2, on calcareous rock (10618)
Staurothele hymenogonia (Nyl.) Th.Fr.
Loc: 3, 5, 11, 15, 16, on calcareous rock (10363, 10423, 10509, 10576, 10588)
Staurothele rugulosa (A. Massal.) Arnold
Loc: 5, on calcareous rock (10418)
Toninia candida (Weber) Th.Fr.
Loc: 4, 6, on calcareous rock with moss (10408, 10443)
Toninia sedifolia (Scop.) Timdal
Loc: 3, 4, on calcareous rock (10377, 10401); 6, 9, 10, on calcareous soil (10446, 10476, 10496)
Verrucaria calciseda DC.
Loc: 5, on calcareous rock (10421)
Verrucaria fuscella (Turner) Winch
Loc: 15, 16, parasitic on *V. nigrescens* (10575, 10594)
Verrucaria lecideoides (A.Massal.) Trevis.
Loc: 12, on calcareous rock (10608)
Verrucaria macrostoma Dufour ex DC.
Loc: 8, 9, on calcareous rock (10460, 10483)
Verrucaria muralis Ach.
Loc: 9, 11, 15, on calcareous rock (10485, 10514, 10573)
Verrucaria nigrescens Pers.
Loc: 2, on artificial substrate (10629); 3, 5, 6, 8, 10, 11, 15, 16, on calcareous rock (10372, 10613, 10429, 10459, 10495, 10508, 10571, 10592)
Verrucaria subfuscella Nyl.
Loc: 6, on siliceous rocks including limestone (10439); 8, 12, on calcareous rock (10461, 10523)
Xanthoparmelia pulla (Ach.) O.Blanco, A.Crespo, Elix, D.Hawksw. & Lumbsch
Loc: 5, 6, 14, on siliceous rock (10411, 10428, 10558)
Xanthoparmelia tinctina (Maheu & A.Gillet) Hale
Loc: 13, on siliceous rock (10533)
Xanthoparmelia verruculifera (Nyl.) O.Blanco, A.Crespo, Elix, D.Hawksw. & Lumbsch
Loc: 14, on siliceous rock (10551)
Xanthoria elegans (Link) Th.Fr.
Loc: 2, on calcareous rock (10630), 14, on siliceous rock (10550)

DISCUSSION

In this study, a total of 278 lichen specimens were collected from 16 localities and 109 taxa belonging to 36 genera were determined. From these taxa 24 of them are new records for the study area.

According to the literatures, *Rinodina rinodinoides* is the new record for Turkey. *Acarospora insolata*, *Buellia leptocline*, *Endocarpon pusillum* and *Rinodina luridata* are the lichen species recorded for the second time from Turkey.

Diploschistes gypsaceus was recorded from Van previously by Szatala (1941). This species was also found in our study at one locality from Şanlıurfa.

According to the literatures, parasitic species *Caloplaca polycarpa* and *Verrucaria fuscella* are found on *Verrucaria* spp. (Wirth, 1995).

The first lichen records from study area were given by Steiner (1899). He recorded 13 lichen specimens from this region. Then, other lichenologists also published several articles on the lichen diversity of this region in different years.

The richest genera are *Caloplaca* (20), *Aspicilia* (8), *Lecanora* (6), *Verrucaria* (6), *Acarospora* (5) and *Physcia* (5). Among all taxa, 82 taxa are saxicolous, 7 taxa are epiphytic, 4 are terricolous, 1 is muscicolous, and 2 taxa are parasitic on the other lichen. Other 13 taxa are observed on two or more substrate.

With respect to substrate of saxicolous specimens, which determined at study area, except localities of 3 (Gaziantep), 13 (Diyarbakır) and 14 (Şanlıurfa-Karacadağ), calcareous rocks are common.

Common Mediterranean specimens on calcareous rocks such as *Aspicilia calcarea*, *A. cheresina* var. *justii*, *A. farinosa*, *Caloplaca aurantia*, *C. dolomiticola*, *C. variabilis*, *Candelariella aurella*, *Collema*

crispum, *C. undulatum*, *Diploschistes ocellatus*, *Lobothallia radiosa*, *Placocarpus schaereri* and *Verrucaria calciseda* were observed at the study area (John, 1996).

Karacadağ differs from other localities with siliceous rock composition. At this locality such as *Acarospora impressula, A. insolata, Aspicilia cinerea, A. intermutans, Buellia leptocline, Candelariella vitellina, Lecanora frustulosa, L. rupicola* subsp. *rupicola, Lecidea atrobrunnea, Lecidea fuscoatra, Lecidella carpathica, Rhizocarpon geographicum, Rhizoplaca melanophytalma, R. peltata, Rimularia insularis, Xanthoparmelia pulla, X. verruculifera* and *Xanthoria elegans* were determined, which prefer exposed sunny siliceous rock at region at high altitudes of mountain (Purvis, 1992; Wirth, 1995).

The species known as "Manna Lichen" which usually grows in steppes, *Aspicilia desertorum* was also found on siliceous rock in open area. It was previously reported that this species found on siliceous rock in open areas, which supports our results on the manna lichen.

Southest Anatolian region is rather poor in terms of woodland area. Therefore epiphytic lichen species are quite few at the study area.

According to geological literatures, a large part of Anatolia was covered with Tethys Ocean million years ago. The sea disappeared owing to the land arise in area of Tethys Ocean by geological events and a lot of mount lines had occured. In this study, *Acarospora veronensis* found on fossil mussel shell from Mount Nur in Gaziantep. This provides an evidence for the presence of the sea in this region in the past (Clauzade and Roux, 1985).

ACKNOWLEDGEMENT

We thank John W. Sheard (Department of Biology, University of Saskatchewan, 112 Science Place, Saskatoon, SK S7N 5E2, CANADA) for the identification of *Rinodina rinodinoides*.

REFERENCES

Aslan A., and Öztürk A. (1994). Oltu (Erzurum) Yöresine Ait Liken Florası Üzerine Çalışmalar. Tr J of Botany 18: 103-106.

Aslan A., and Öztürk Ş. (1998). Lichens of Akdamar Island. Bulletin of Pure and Applied Sciences 17B (2): 67-70.

Aslan A. (2000). Lichens from the regions of Artvin, Erzurum and Kars (Turkey). Israel Journal of Plant Sciences 48: 143-155.

Aslan A., Aproot A., and Yazıcı K. (2002). New lichens for Turkey. Mycotaxon 84: 277-280.

Blanco O., Crespo A., Elix J.A., Hawksworth D.L. and Lumbsch H.T. (2004). A molecular phylogeny and a new classification of parmelioid lichens containing Xanthoparmelia-type lichenan (Ascomycotina: Lecanorales). Taxon 53(4): 959-975.

Breuss O., and John V. (2004). New and interesting records of lichens from Turkey. Österr Z Pilzk 13: 281-294.

Brummit R.K. and Powel C.E. (1992). Authors of Plant Names. Kew: Royal Botanical Gardens.

Candan M., and Özdemir Türk A. (2000). Orduzu - Malatya Bölgesi Likenleri, OT Sistematik Botanik Dergisi 7(1): 219-230.

Candan M. (2006). Elazığ, Adıyaman ve Malatya İlleri Likenleri. Doktora Tezi. Anadolu Üniversitesi, Fen Bilimleri Enstitüsü, Eskişehir.

Clauzade G., and Roux C. (1985). Likenoj De Okcidenta Eûropo Ilustrita Determinlibro, Bulletin de la Société Botanique du Centre-Ouest Nouvelle série- Numéro Spécial, Royan, France.

Giralt M. (2001). The lichen genera Rinodina and Rinodinella (lichenized Ascomycetes, Physciaceae) in the Iberian Peninsula. Bibliotheca Lichenologica, Band 79, Stuttgart.

Hertel H. (1970). Beiträge Zur Kenntnis Der Flechtenfamilie Lecideaceae III.. Herzogia 2: 37-62.

John V. (1996). Preliminary catalogue of lichenized and lichenicolous fungi of Mediterranean Turkey. Bocconea 6: 173-216.

John V. (1999). Lichenes Anatolici Exsiccati, Fasc. 1-3 (no.1-75). Arnoldia, 16: 1-44. Federal Republic of Germany.

John V., Seaward, M.R.D., and Beatty, J.W. (2000). A Neglected Lichen Collection from Turkey: Berkhamsted Scholl Expedition 1971. Turk J Botany 24: 239-248.

John V., and Breuss O. (2004). Flechten der östlichen Schwarzmeer-Region in der Türkei (Blam-Exkursion 1997). Herzogia 17:137-155

Nash III T.H., Ryan B.D., Gries C., and Bungartz F. (2002). Lichen Flora of the Greater Sonoran Desert Region, Volume I. Arizona State University, Tepme, Arizona.

Nash III T.H., Ryan B.D., Diederich P., Gries C., and Bungartz F. (2004). Lichen Flora of the Greater Sonoran Desert Region, Volume II. Arizona State University, Tepme, Arizona.

Nimis P.L., and John V. (1998). A Contribution to the lichen Flora of Mediterranean Turkey. Cryptogamie Bryol Lichénol 19(1): 35-58.

Knoph J.G. (1990). Untersuchungen an gesteinsbewohnenden xanthonhaltigen Sippen der Flechtengattung Lecidella (Lecanoraceae, Lecanorales) unter besonderer Berücksichtigung von auBereuropäischen Proben exklusive Amerika. Bibliotheca Lichenologica Band 36.

Poelt J., and Obermayer W. (1990). Über Thallosporen bei einigen Krusten-flechten. Herzogia 8: 273-288.

Purvis O.W., Coppins B.J., Hawksworth D.L., James P.V. and Moore M. (1994). The Lichen Flora of Great Britain and Ireland. The British Lichen Society, Natural History Museum Publications, London.

Özdemir Türk A. and Güner H. (1998). Lichens of the Trace Region of Turkey. Tr J of Botany 22: 397-407.

Öztürk Ş., and Güvenç G. (2003). Lichens from the western part of the Black Sea region of Turkey. Acta Botanica Hungarica 45(1-2): 169-182.

Steiner J. (1899). Flechten aus Armenien und dem Kaukasus. Österr Bot Z 49: 248-254.

Steiner J. (1921). Lichenes aus Mesopotamien und Kurdistan sowie Syrien und Prinkipo, Gesammelt von Dr. Heinrich Frh. V. Handel-Mazzetti. (Wissen-schaftliche Ergebnisse der Expedition nach mesopotamien 1910. Annalen das Naturhistorischen Museum in Wien 34: 1-68.

Szatala Ö (1927). Lichenes in asia minore ab directore Dre Stefano Györffy de Szigeth (Budapest) et Dre Josefo Andrasovsky collecti. Folia Cryptogamica 1: 272-278.
Szatala Ö. (1941). Lichenes in Armenia, Kurdistania, Palaestina et Syria Annis 1909-1910 A Cl. Fr. Nabelek Collecti. Borbasia 3: 61-80.
Szatala Ö. (1960). Lichenes Turciae asiaticae ab Victor Pietschmann collecti. Sydowia 14: 312-325.
Wirth V. (1995). Die Flechten Baden-Württembergs, Teil 1-2. Eugen Ulmer, Stuttgart.
Yazıcı K., and Aslan A. (2003). Lichens from the regions of Gümüşhane, Erzincan and Bayburt (Turkey), Cryptogamie, Mycologie 24(2): 287-300.
http://www.turkcebilgi.com/Güneydoğu Anadolu Bölgesi.
http://www. tr.wikipedia.org/wiki/Doğu Anadolu.