

The Bryophyte Flora of Yenice Forests (Karabük, Turkey)

¹Güray Uyar, ¹Mevlüt Alataş, ¹Muhammet Ören and ²Tamer Keçeli

¹Department of Biology, Faculty of Sciences and Arts, Zonguldak Karaelmas University,
Zonguldak, Turkey

²Department of Biology, Faculty of Sciences and Arts, Kırıkkale University, Kırıkkale, Turkey

Abstract: This study presents a survey on bryophyte flora of Yenice Forests (Karabük, Turkey). One hundred seventy three bryophyte taxa (18 liverworts and 155 mosses) belonging to 47 families and 99 genera were recorded from the area. Among them, 10 taxa were defined as new records for the A2 grid-square in the grid system adopted by Henderson. In the floristic list, all taxa with their Turkey distributions, which are determined by reviewing the related all literature, are given. In addition, some aspects of their ecology are discussed.

Key words: Bryophyte flora, Yenice Forests, Turkey

INTRODUCTION

Turkey is one of the richest countries in terms of biodiversity in the temperate zone as situated on a crossroad between Europe and Asia, giving a unique geographic position to the country.

Although the investigations of *Pteridophyta* and *Spermatophyta* in Turkey have been thoroughly researched in 11 volumes, the studies on *Bryophyta* are still continuing. The studies on bryophytes of western Black Sea region can be divided into two periods in terms of their conductors and realization times: The first is from 1860 to 1979 and the second is from 1985 to date. The second period of studies was mostly performed by native bryologists. Although a few researchers have studied on the bryophyte flora in Western Black Sea region of Turkey, (Çetin and Yurdakulol, 1985, 1986, 1988; Keçeli and Çetin, 2000; Uyar and Çetin, 2001; Çetin *et al.*, 2002; Abay and Çetin, 2003; Uyar, 2003; Keçeli and Çetin, 2006; Uyar and Çetin, 2006), no detailed study has yet been made on the Bryophyte flora of Yenice Forests (Karabük) which was chosen as the study area.

Our main aim in this study was to determine the bryophyte flora of the Yenice forests and to provide more data about Turkish bryophytes.

DESCRIPTION OF THE STUDY AREA

There are 9 forest hot spots of Turkey listed in the priority forest areas of Europe in terms of their richness in biodiversity and under serious threat that need to be protected. This list was prepared within the context of

Gifts to the Earth by The World Wide Fund for Nature (WWF) International (1997). The 9 forest hot spots are as follows: Küre Mountains, İstanbul Forests, İbradı-Akseki Forests, Amanos Mountains, Karçal Mountains, Dağça Peninsula-Bozburun, Fırtına Valley, Babadağ and Yenice Forests. Among them, Küre Mountains was declared a national park in 2000. In 2002, another hot spot, the Karçal Mountains, provided a legal status for protection. Yenice Forests have two Nature Reserves in the area but these areas do not cover the whole area for complete protection. Therefore, there is a need for enlarging these protection areas including all the intact forests.

Yenice Forests are situated in western Black Sea region of Anatolia (including Karabük province). The study area is surrounded in the north by Bartın, in the north-west by Zonguldak, in the south by Bolu, in the east by Karabük. The altitude of the study area varies between 175 and 1999 meters. The region lies approximately at the latitude between 41°11'N and 41°03', longitude 32°19'E and 32°28'E. According to Henderson (1961), it belongs to the A2 grid-square (Fig. 1).

The common bedrock types in the study area are dolomitic limestone, sandstone and clay stone which belong to Mesozoic age. The common soil types in the region are brown forest, redzina and in patches terra fusca soils, which are the richest soils in organic matter (Koy and Mudurluu, 1989).

The study area is under the effect of a less rainy cool of the Mediterranean type of climate and it has a Central Mediterranean precipitation regime (Akman, 1999). The annual rainfall average is 720.96 mm and the annual average temperature is 13.5°C. The rainfall

Fig. 1: Study area and the grid system adopted by Henderson (1961) for Turkey

regime is SSWA (Spring, Summer, Winter and Autumn) (DMIGM, 2005). Due to the topographical features of the region, there exist some differences between the east and west parts with respect to climatic conditions. In the study area, at higher altitudes and in north-west faced localities such as Keltepe and Çitdere oceanic climate influence can be seen, nevertheless east and south-east faced localities as Karabük province are characterized by the less rainy cool of Mediterranean climatic type. The ombro-thermic climate diagram (Fig. 2) for Yenice was drawn using Gaussen's method (Akman, 1999). As seen on the ombro-thermic climatic diagram an arid period was not observed in Yenice.

The study area is included in the Euxine province of the Euro-Siberian floristic region (Zohary, 1973). The general vegetation in the study area is made up of forest and pseudomacchie. Forest vegetation is the most common formation type in this area. Pseudomacchie vegetation was distributed in the lower parts of the

Fig. 2: Ombro-thermic diagram for the study area

area (the location of Incidere and Şimşirdere mix into Filyos River). The forest vegetation consists of mainly the following taxa: *Fagus orientalis* Lipsky, *Carpinus betulus* L., *Alnus glutinosa* (L.) Gaertner., *Quercus cerris* L., *Q. hartwisiana* Steven, *Q. macranthera*

Fisch. and C.A. Mey. ex Hohen. subsp. *syspirensis* (C.Koch) Menitsky, *Q. petraea* (Mattuschka) Liebl. subsp. *iberica* (Stevon ex Bieb) Krassiln, *Acer platanoides* L., *A. hyrcanum* subsp. *hyrcanum* Fisch. and C.A. Mey., *Fraxinus excelsior* L., *Tilia rubra* DC. subsp. *caucasica* (Rupr.) V. Engler and locally especially in Şimşirdere district; *Platanus orientalis* L. and *Buxus sempervirens* L. up to summits *Abies nordmanniana* (Stev) Spach. *bornmülleriana* (Mattf.) Coode et Cullen. and *Pinus sylvestris* L. are seen. The pseudomacchie has been formed by *Arbutus andrachne* L., *Cistus salvifolius* L., *Erica arborea* L., *Juniperus oxycedrus* L., *Phillyrea latifolia* L. and *Pistacia terebinthus* L. (Aksoy, 1985; Özalp, 1992; Akman, 1995, Avci, 2005).

The region is very interesting in terms of its rich biodiversity, natural structure and climate. These conditions encouraged us to conduct a study on the bryophytes. The localities, which were surveyed, were chosen to cover as many different biotopes and ecosystems and as many microhabitats and specific niches as possible.

MATERIALS AND METHODS

The materials for this study were collected during periodic field trips between 2002 and 2005 in different seasons. Materials are deposited in the herbarium of UYAR (Zonguldak).

In our enumeration the nomenclature for the mosses and liverworts were determined with using relevant literatures (Grolle, 1983; Casas, 1998; Grolle and Long, 2000; Hill *et al.*, 2006. Moreover we followed the study of

Brummitt and Powell (1992) in use of authors' names and abbreviations. We utilized the works of Schuster (1966, 1969, 1974), Lawton (1971), Grout (1972), Agnew and Vondracek (1975), Landwehr *et al.* (1980), Watson (1981), Arnell (1981), Hallingbäck and Holmäsén (1985), Bischler and Jovet-Ast (1986), Greven (1995, 2003), Smith (1980, 1996, 2004), Nyholm (1981), Hedenäs (1992), Lewinsky (1993), Frey *et al.* (1995), Paton (1999), Cortini-Pedrotti (2001, 2006), Kürschner (2000, 2001), Söderström *et al.* (2002). Heyn and Herrstadt (2004), Guerra *et al.* (2006) and Hallingbäck *et al.* (2006) in order to identification of the samples.

The ecological characteristics such as; acidity, water requirements and necessity of light and life forms of bryophytes in the study area have been assessed using Dierßen (2001) and Mägdefrau (1982) and also, they are given in the floristic list for each taxon. In addition, the status of the taxa for Turkey was determined by reviewing the related literature (Uyar and Çetin, 2004; Kürschner and Erdağ, 2005).

The new taxa for the A2 grid square are indicated with an asterisk (*). In the florist list for each taxon, the numbers of the sites where they have been found are given, followed by the description of the habitat occupied in the study area. Table 1 lists the sites sampled, all of which belong to the study region.

For each taxon, only one collector number was given to avoid repetition in the floristic list. Thus, the same taxa collected from different localities were represented with the first collector number, i.e., *Platyhypnidium riparioides* (Hedw.) Dixon was collected from localities 5, 9, 10, 17, 30 and 38 was identified by the collector number ALATAS 28.

Table 1: Details of the study sites

Site No.	Altitude in metres above sea level (m)	Localities and geographic coordinates	Trees and some tall shrubs
1	1460 m	Sorgun, 41° 03' N - 032° 28' E	PS, PN, AB
2	1525 m	Sorgun, 41° 03' N - 032° 27' E	PS
3	1275 m	Sangöl, 41° 02' N - 032° 26' E	CB, FO, QP, FE, TB, AP, QM
4	980 m	Kabaklı, 41° 03' N - 032° 28' E	CB, FO, FE, UM
5	825 m	Meyri, 41° 03' N - 032° 24' E	QP, TB, CB
6	670 m	Şekermeşe, 41° 04' N - 032° 23' E	AP, FE, AG, PS
7	175 m	Şeker, 41° 11' N - 032° 22' E	CB, AP, BS
8	180 m	Şeker, 41° 11' N - 032° 20' E	PO, AG, JO
9	200 m	Şeker, 41° 11' N - 032° 20' E	AG, BS, FC, SA, PL
10	287 m	Yazı village, 41° 10' N - 032° 21' E	QP, PO, SAU
11	315 m	Yazı village, 41° 10' N - 032° 21' E	SA, PO, AG, EA
12	436 m	Fı ndı kaltı, 41° 09' N - 032° 21' E	FO, CB, UG
13	496 m	Fı ndı kaltı, 41° 09' N - 032° 21' E	QP, CB, CA, FE
14	528 m	Fı ndı kaltı, 41° 08' N - 032° 21' E	QP, CB, AT
15	416 m	Fı ndı kaltı, 41° 08' N - 032° 21' E	CB, BS, FE,
16	450 m	Fı ndı kaltı, 41° 07' N - 032° 21' E	FE, CB
17	340 m	Fı ndı kaltı, 41° 07' N - 032° 16' E	FO, PN, AP, CB, AG, SA, PT, FE, CA
18	624 m	Babaagaç, 41° 02' N - 032° 15' E	FO, PT, CB, AG, PN, UG, AP
19	1055 m	Yaylacı k, 40° 59' N - 032° 15' E	FO, CB, PN, AB, SA, FE, QM
20	918 m	Yaylacı k, 41° 00' N - 032° 15' E	CB, FO, PT, AB, SA, AP, PN
21	502 m	Tarla, 41° 04' N - 032° 15' E	QP, PN, FE, AP
22	1412 m	Çitdere, 41° 02' N - 032° 28' E	PS, AB, FO,
23	1414 m	Çitdere, 41° 02' N - 032° 28' E	AB, FO,
24	1429 m	Çitdere, 41° 02' N - 032° 29' E	PS, AB, FO,

Table 1: Continued

Site No.	Altitude in metres above sea level (m)	Localities and geographic coordinates	Trees and some tall shrubs
25	1385 m	Sorgun, 41° 03' N - 032° 28' E	Meadow
26	1324 m	Karaağaç, 41° 03' N - 032° 28' E	PS, PN
27	1124 m	Karaağaç, 41° 04' N - 032° 29' E	FO, PN, QM, AH, TR
28	860 m	Sipahiler, 41° 06' N - 032° 30' E	PN, QP,
29	165 m	Kayadibi, 41° 13' N - 032° 11' E	PO, FO, CB, PN, AG, QP
30	200 m	Kale, 41° 13' N - 032° 10' E	PN, PO, FO, AG, PT
31	205 m	Kale, 41° 13' N - 032° 11' E	PN, AA, AU, QP
32	261 m	Kale, 41° 13' N - 032° 10' E	SD, PN, QP, FO, CM
33	451 m	Kale, 41° 13' N - 032° 09' E	QP, PN, FO, CB,
34	495 m	Çeşme, 41° 12' N - 032° 09' E	FO, CB, OC, CA
35	580 m	Makas, 41° 12' N - 032° 09' E	QP, FO, CB, OC, CA, TR
36	155 m	Kabalaklı, 41° 15' N - 032° 09' E	FO, CB, AP, PN, TA
37	121 m	Kabalaklı, 41° 15' N - 032° 09' E	TA, AP, AG, PO,
38	1050m	Keltepe, 41° 06' N - 032° 30' E	PS, CA
39	1400 m	Keltepe, 41° 04' N - 032° 29' E	AB, FO, CB
40	1350 m	Keltepe, 41° 05' N - 032° 29' E	PS, AB, FO
41	1525 m	Keltepe, 41° 04' N - 032° 28' E	PS, PN
42	1620 m	Keltepe, 41° 05' N - 032° 28' E	PS, PN
43	1780 m	Keltepe, 41° 05' N - 032° 28' E	Bare field
44	1840 m	Keltepe, 41° 04' N - 032° 27' E	PS, AB
45	1905 m	Keltepe, 41° 04' N - 032° 27' E	Bare field
46	1980 m	Keltepe, 41° 05' N - 032° 27' E	JO
47	1900 m	Keltepe, 41° 05' N - 032° 27' E	JO
48	1720 m	Keltepe, 41° 04' N - 032° 27' E	AB
49	1720 m	Keltepe, 41° 04' N - 032° 27' E	AB
50	1540 m	Keltepe, 41° 04' N - 032° 26' E	AB
51	1500 m	Keltepe, 41° 04' N - 032° 26' E	PS
52	240 m	Keltepe, 41° 11' N - 032° 23' E	Meadow
53	1200 m	Keltepe, 41° 07' N - 032° 23' E	PN
54	1320 m	Keltepe, 41° 07' N - 032° 23' E	PN
55	1450 m	Keltepe, 41° 06' N - 032° 24' E	AB, PS
56	1500	Keltepe, 41° 06' N - 032° 24' E	AB, PS
57	1560 m	Keltepe, 41° 06' N - 032° 25' E	Bare field
58	1999 m	Keltepe, 41° 05' N - 032° 27' E	Bare field

AB = *Abies bornmuelleriana*, AG = *Alnus glutinosa*, CB = *Carpinus betulus*, EA = *Erica arborea*, FO = *Fagus orientalis*, FE = *Fraxinus excelsior*, PN = *Pinus nigra*, PO = *Platanus orientalis*, PS = *Pinus sylvestris*, TB = *Taxus baccata*, TA = *Tilia argentea*, QP = *Quercus petraea* subsp. *iberica*, AP = *Acer platanoides*, QM = *Quercus macranthera* subsp. *sympirensis*, UM = *Ulmus minor*, BS = *Buxus sempervirens*, JO = *Juniperus oxycedrus*, FC = *Ficus carica*, SA = *Salix alba*, PL = *Phillyrea latifolia*, SAU = *Sorbus aucuparia*, UG = *Ulmus glabra*, CA = *Corylus avellana*, AT = *Acer trautvetteri*, PT = *Populus tremula*, CA = *Cerasus avium*, TR = *Tilia rubra* subsp. *caucasica*, PT = *Pistacia terebinthus*, AA = *Arbutus andrachne*, AU = *Arbutus unedo*, SD = *Sorbus domestica*, CM = *Cornus mas*, OC = *Ostrya carpinifolia*

Floristic List

MARCHANTIOPSIDA

Conocephalaceae

Conocephalum conicum (L.) Dumort. - 3: on wet soil, 7: on rock, 9: stream bank, on soil and rocks TK3408.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B8, C11, C12), C. and N. Europe, Asia, N. America, N. Africa, Japan.

Ecological features: Basiphyte, hygrophyte, sciophyte, mat.

Lunulariaceae

Lunularia cruciata (L.) Lindb. - 10: on soil, TK3431.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B9, C11, C12), Europe, Asia, Africa, C. and S. America, Australia, New Zealand.

Ecological features: Subneutrophyte, mesophyte, photophyte; mat.

Metzgeriaceae

Metzgeria furcata (L.) Dumort. - 5: on the bark of tree, 10: on the bark of tree, 11: on the bark of tree, associated with *Porella platyphylla*, 15: on the bark of tree, 18: on trees and on the bark of dead tree TK3415.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7, C11, C12, C13), C. Europe, Asia, N. America, Faroe Islands, Japan.

Ecological features: Acidophyte, mesophyte, photophyte; mat.

Pelliaceae

Pellia endiviifolia (Dicks.) Dumort. - 3: on wet soil, 8: on rock, 9: on rock, 13: on rock TK3404.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, B9, C11, C12), C. Europe, N. America, Asia, N. Africa.

Ecological features: Basiphyte, hygrophyte, photophyte; mat.

Jungermanniaceae

Jungermannia atrovirens Dumort. - 3: on soil, 3: stream bank, on rock, 8: on rock, TK3405.

Distribution: Turkey (A1, A4, C11, C12), Europe, Faroe Islands, N. America, Caucasus, Iceland, Japan, Greenland. Ecological features: Basiphyte, hygrophyte, photophyte; short turf.

Plagiochilaceae

Plagiochila porelloides (Torrey ex Nees) Lindenb. - 3: on rock, 5: on soil, 16: on wet rock, 18: on rock, TK3406.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, C11), Europe, Asia, N. Africa, N. America, Greenland.

Ecological features: Basiphyte, mesophyte, photophyte; tall turf.

Geocalyceae

Lophocolea bidentata (L.) Dumort. - 9: stream bank, on rock, TK3427.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7) Europe, Asia, Africa, Australia, New Zealand, Faroe Islands.

Ecological features: Subneutrophyte, hygrophyte, photophyte; tall turf.

Lophocolea heterophylla (Schrad.) Dumort. 17: on the bark of dead tree, 20: on decayed log, TK3449.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7), Europe, Asia, N. Africa, America, Azores, Madeira, Canaries.

Ecological features: Subneutrophyte, mesophyte, sciophyte; mat.

Chiloscyphus polyanthos (L.) Corda - 16: stream bank, on rock, TK3446.

Distribution: Turkey (A1, A2, A4, A5, B6, C11), Europe, Asia, N. America, Faroe Islands, Iceland, Japan, Azores, Madeira, Tunisia.

Ecological features: Acidophyte, hygrophyte, sciophyte; mat.

Scapaniaceae

Scapania verrucosa Heeg - 9: near stream bank, on rock, TK3424.

Distribution: Turkey (A3, A4), Europe, Asia, Mexico.

Ecological features: Acidophyte, hygrophyte, photophyte; short turf.

Calypogeiaceae

Calypogeia fissa (L.) Raddi - 14: on rock, TK3441.

Distribution: Turkey (A1, A3, A4, B6), C. and N. Europe, Asia, Africa, N. America.

Ecological features: Acidophyte, hygrophyte, photophyte; mat.

Radulaceae

Radula complanata (L.) Dumort. - 1: on the bark of tree, 5: on the bark of tree, 11: on the bark of tree, associated with *Frullania dilatata*, 15: on decayed log, 15: on the bark of tree, TK3400.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, C11, C13), Africa, Asia, N. America, Japan, Azores, Madeira, Iceland, Greenland.

Ecological features: Subneutrophyte, hygrophyte, photophyte, mat.

Porellaceae

Porella arboris-vitae (With.) Grolle - 21: on rock, TK3459.

Distribution: Turkey (A2, A4, B6, C11), Europe, Asia, N. Africa, Faroe Islands, Iceland.

Ecological features: Basiphyte, xerophyte, sciophyte; mat.

Porella platyphylla (L.) Pfeiff. - 1: on the bark of tree, 2: on the bark of tree, 4: near the stream bank, on rock, 10: on the bark of tree, 11: on the bark of tree, together with *Metzgeria furcata*, 20: on rock, TK3401.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7, C11, C12, C13), C. Europe, Asia, N. America, Greenland, Madeira.

Ecological features: Basiphyte, mesophyte, sciophyte, fan.

Frullaniaceae

Frullania tamarisci (L.) Dumort. - 11: on rock, 19: on the bark of tree, TK3435.

Distribution: Turkey (A1, A2, A3, A4, B6, C13) Europe, Asia, N. Africa, Faroe Islands, Iceland.

Ecological features: Acidophyte, mesophyte, sciophyte, weft.

Frullania dilatata (L.) Dumort. - 1: on the bark of tree, 6: on the bark of tree, 10: on the bark of tree, 11: on the bark of tree, associated with *Radula complanata*, 12: on the bark of tree, 15: on the bark of tree, TK3402.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, C11, C12, C13), Europe, Asia, N. Africa.

Ecological features: Acidophyte, xerophyte, photophyte; mat.

Lejeuneaceae

Lejeunea cavifolia (Ehrh.) Lindb. - 5: on the bark of tree, 5: on rock, 9: near stream bank, on wet rock, TK3411.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, C11), Europe, Asia, N. Africa, N. America, Azores, Madeira, Canaries, Tenerife.

Ecological features: Subneutrophyte, mesophyte, sciophyte, mat.

**Lejeunea patens* Lindb. - 18: stream bank, on rock, TK3456.

Distribution: Turkey (A4), Europe, Asia, Faroe Islands, Madeira, Azores.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, mat.

BRYOPSIDA

BRYOPSIDA

Polytrichaceae

Atrichum undulatum (Hedw.) P.Beauv. - 17, 18, 22: on soil ALATAS 128.

Distribution: Turkey (A2, A3, A4, B6), Europe, Asia, N. America, N. Africa.

Ecological features: Acidophyte, mesophyte, sciophyte, tall turf.

Pogonatum aloides (Hedw.) P.Beauv. - 19: on soil ALATAS, 135, 56: ÖREN 201

Distribution: Turkey (A1, A2, A4), Europe, N. America.

Ecological features: Acidophyte, mesophyte, sciophyte, short turf.

Pogonatum urnigerum (Hedw.) P.Beauv. - 20: on rocks, 20: on soil ALATAS 134.

Distribution: Turkey (A1, A2, A3, A4, B6), Europe, Asia.

Ecological features: Acidophyte, mesophyte, sciophyte, tall turf.

Polytrichastrum formosum (Hedw.) G.L.Sm. (*Polytrichum formosum* Hedw.) - 8: on rocks, 20: on soil ALATAS 119.

Distribution: Turkey (A1, A2, A4, A5), Europe, Iceland, Asia, N. America, S. Africa.

Ecological features: Acidophyte, mesophyte, photophyte, tall turf.

Tetraphidaceae

Tetraphis pellucida Hedw. - 18: on soil ALATAS 12.

Distribution: Turkey (A2, A4), Europe, Asia.

Ecological features: Acidophyte, mesophyte, sciophyte, short turf.

Buxbaumiaceae

Buxbaumia viridis (DC.) Moug. and Nestl. - 2: on stump, ALATAS 126.

Distribution: Turkey (A2), Europe, Asia, N. America.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, annual.

Encalyptaceae

Encalypta streptocarpa Hedw. - 7, 50: on soil, 2, 18, 27 and 29: on rocks ALATAS 2; 54, 55: on soil, ÖREN 192.

Distribution: Turkey (A1, A2, A3, B6, B7, C12), Europe, N. America, N. W. Asia.

Ecological features: Subneutrophyte, xerophyte, sciophyte, tall turf.

Funariaceae

Funaria hygrometrica Hedw. - 8, 24: on soil, 10: on rocks, ALATAS 59.

Distribution: Turkey (A1, A2, A4, B6, C11, C12, C13, C14), Cosmopolitan.

Ecological features: Subneutrophyte, mesophyte, photophyte, annual.

Grimmiaceae

Grimmia alpestris (F.Weber and D.Mohr) Schleich. - 46: on rocks, 58: on soil, ALATAS 34.

Distribution: Turkey (A1, A2, A4, B8, B10) N. and C. Europe, N. America, Iceland, N. W. Asia.

Ecological features: Acidophyte, xerophyte, photophyte, cushion.

Grimmia dissimulata E.Maier - 55: on shaded rocks, ÖREN 219.

Distribution: Turkey (A2, A4), Europe.

Ecological features: Acidophyte, xerophyte, photophyte, short turf.

Grimmia ovalis (Hedw.) Lindb. - 2, 8, 10, 25: on rocks, ALATAS 101.

Distribution: Turkey (A1, A2, A3, A5, B6, B7, B8, C11, C12, C13), Europe, Asia, N. Africa, N. America, Maderia, Canaries.

Ecological features: Subneutrophyte, xerophyte, photophyte, cushion.

Grimmia pulvinata (Hedw.) Sm. - 38: on soil, 2, 10, 17, 24 and 25: on rocks, ALATAS 23; 53: on rocks, ÖREN 204.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, B8, B9, C11, C12, C13, C14), Cosmopolitan.

Ecological features: Basiphyle, xerophyte, photophyte, cushion.

Grimmia trichophylla Grev. - 33: on soil, ALATAS 15.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, C11, C12, C13, C14), Cosmopolitan.

Ecological features: Subneutrophyte, xerophyte, photophyte, cushion.

Racomitrium canescens (Hedw.) Brid. - 29, 30: on rocks, ALATAS 133.

Distribution: Turkey (A1, A2, A4), Europe, America, N. and W. Asia, Japan.

Ecological features: Subneutrophyte, xerophyte, photophyte, tall turf.

Schistidium apocarpum (Hedw.) Bruch and Schimp. - 2, 24, 27, 38, 40, 51: on rocks ALATAS 16; 55: on soil, ÖREN 197.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, B8, B9, C11, C12, C13, C14), Europe, Asia.

Ecological features: Acidophyte, xerophyte, photophyte, tall turf.

Schistidium atrofusum (Schimp.) Limpr. (*S. apocarpum* var. *atrofusum* (Schimp.) C.E.O.Jensen) - 53: on rocks, ÖREN 212.

Distribution: Turkey (A2, B6, B8, C11), Europe, N. America.

Ecological features: Basiphyte, xerophyte, photophyte, cushion.

Schistidium confertum (Funck) Bruch and Schimp. (S. apocarpum var. confertum (Funck) H.Möller) - 29, 17: on rocks, ALATAS 142; 53, 55 and 56: on rocks, ÖREN 185. Distribution: Turkey (A2, A4, B6, B8, B9, C13, C14), N. Europe, Caucasus, China, N. America, Greenland.

Ecological features: Subneutrophyte, xerophyte, photophyte, cushion.

Fissidentaceae

Fissidens viridulus (Sw. ex anon.) Wahlenb. (F. bambergeri Milde.) - 7: on rocks, ALATAS 100.

Distribution: Turkey (A1, A2, B6, C11, C13), Europe, Asia, N. America, N. Africa.

Ecological features: Subneutrophyte, mesophyte, sciophyte, short turf.

Fissidens bryoides Hedw. - 7: on soil, ALATAS 99.

Distribution: Turkey (A1, A2, B6, C11), Europe, Asia.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, short turf.

Fissidens dubius P.Beauv. (F. cristatus Wilson ex Mitt.) - 29, 33: on wet rocks, ALATAS 124.

Distribution: Turkey (A1, A2, A4, B6), Asia, N. Africa, N. and C. America.

Ecological features: Subneutrophyte, mesophyte, sciophyte, short turf.

Fissidens rivularis (Spruce) Schimp. - 36: on wet rocks, ALATAS 123.

Distribution: Turkey (A2, B6, C11), Europe, E. Asia, N. Afrika, Australia.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, short turf.

**Fissidens serrulatus* Brid. - 1: on rocks in stream, ALATAS 78.

Distribution: Turkey (A1, A4), Europe, Africa.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, short turf.

Fissidens taxifolius Hedw. - 5, 7, 11, 12, 13, 16, 19, 22, 32, 39, 40: on soil, 7, 18, 30: on rocks, ALATAS 18.

Distribution: Turkey (A1, A2, B6, C11), Europe, Asia, N. America, Japan.

Ecological features: Subneutrophyte, mesophyte, sciophyte, short turf.

Ditrichaceae

Ceratodon purpureus (Hedw.) Brid. - 19: on soil, ALATAS 118.

Distribution: Turkey (A1, A2, A4, A5, B6, B7, B8, C14), N. Europe, Asia, Japan, N. America, Greenland.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

Ditrichum flexicaule (Schwägr.) Hampe - 53, 56: on soil, ÖREN 182.

Distribution: Turkey (A2, A4, B7, B8, C12), Europe, Asia, N. America, Greenland.

Ecological features: Subneutrophyte, xerophyte, photophyte, tall turf.

Ditrichum heteromallum (Hedw.) E.Britton - 5, 8: on soil ALATAS 113; 57: on stump, ÖREN 200.

Distribution: Turkey (A1, A2) Europe, N. America.

Ecological features: Acidophyte, hygrophyte, photophyte, short turf.

Ditrichum pallidum (Hedw.) Hampe - 39: on bark, ALATAS 38.

Distribution: Turkey (A2), Europe, Asia, Africa.

Ecological features: Acidophyte, mesophyte, sciophyte, short turf.

**Ditrichum subulatum* Hampe - 6: on rocks, 23: on soil near stream bed, ALATAS 54.

Distribution: Turkey (B6), Europe, Asia, Africa.

Ecological features: Acidophyte, xerophyte, sciophyte, short turf.

Trichodon cylindricus (Hedw.) Schimp. (*Ditrichum cylindricum* (Hedw.) Grout) - 1, 10: on rocks, ALATAS 66.

Distribution: Turkey (A2, B8), Europe, N. America, N. Asia, Japan, New Zealand.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

Dicranaceae

Dicranella heteromalla (Hedw.) Schimp. - 9: on calcareous rocks, ALATAS 116.

Distribution: Turkey (A1, A2, A3, B6), Europe, N. America, N. Asia.

Ecological features: Acidophyte, mesophyte, photophyte, tall turf.

Dicranella varia (Hedw.) Schimp. - 5: on wet soil on rocks ALATAS 95; 52: on rocks near stream bed, ÖREN 215.

Distribution: Turkey (A1, A2, A3, A4, B6, C11, C12), Europe, Asia.

Ecological features: Basiphyte, hygrophyte, photophyte, short turf.

Dicranum fuscescens Sm. - 2: on rocks, ALATAS 106.

Distribution: Turkey (A2, A4), Europe, Asia.

Ecological features: Acidophyte, mesophyte, photophyte, tall turf.

Dicranum majus Sm. - 39, 50: on bark, 20: on soil, ALATAS 43.

Distribution: Turkey (A1, A2, A3, A4, A5, C13), Europe, N. America, Iceland, Asia, Japan.

Ecological features: Acidophyte, mesophyte, sciophyte, tall turf.

Dicranum scoparium Hedw. - 2, 39: on bark, 11, 23, 31: on soil, 20: on rocks, ALATAS 3; 53, 55: on soil, 57: on stump, ÖREN 207.

Distribution: Turkey (A1, A2, A3, A4, A5, B6), Europe, America, New Zealand.

Ecological features: Acidophyte, mesophyte, photophyte, tall turf.

Dicranum tauricum Sapjegin - 2, 3 and 22: on bark ALATAS 114; 56: on bark, ÖREN 196.

Distribution: Turkey (A2, A3, B6), Europe, N. America, N. Asia.

Ecological features: Acidophyte, mesophyte, photophyte, tall turf.

Leucobryaceae

**Dicranodontium demudatum* (Brid.) E.Britton. - 2: on stump, ALATAS 94.

Distribution: Turkey (A4), Europe, Asia.

Ecological features: Acidophyte, mesophyte, photophyte, tall turf.

Pottiaceae

Eucladium verticillatum (With.) Bruch and Schimp. - 6: on water reservoir, 15: on rocks in water, ALATAS 107.

Distribution: Turkey (A1, A2, A4, B6, C11, C12, C13), Europe, Asia, America, Africa.

Ecological features: Basiphyte, hygrophyte, sciophyte, cushion.

**Gyroweisia tenuis* (Schrad. ex Hedw.) Schimp. - 5: on wet rocks, ALATAS 109.

Distribution: Turkey (A1, B6, C11), Europe, Asia, N. America.

Ecological features: Basiphyte, hygrophyte, sciophyte, cushion.

Pleurochaete squarrosa (Brid.) Lindb. - 8: on soil, ALATAS 14.

Distribution: Turkey (A2, B6, C11, C13), Europe, Asia, Africa, N. America.

Ecological features: Basiphyte, xerophyte, photophyte, short turf.

Tortella tortuosa (Hedw.) Limpr. - 8, 11, 23, 39 and 50: on rocks, 1, 18 and 51: on soil, ALATAS 41; 53: on rocks, 56: on soil, ÖREN 178.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7, B8, C11, C12, C13), Europe, America, Greenland, Canaries, Asia. Ecological features: Basiphyte, xerophyte, photophyte, cushion.

Weissia controversa Hedw. - 38: on bark, 18: on rocks, 31: on soil, ALATAS 37.

Distribution: Turkey (A2, A4, B6, C11), Europe, N. and C. Amerika, India, New Zealand.

Ecological features: Subneutrophyte, xerophyte, photophyte, short turf.

Weissia controversa var. *crispata* (Nees and Hornsch.) Nyholm - 21: on soil, ALATAS 120; 54: on rocks, ÖREN 216.

Distribution: Turkey (A2, A4, B6, C11), Europe, N. and C. Amerika, Asia, New Zealand.

Ecological features: Subneutrophyte, xerophyte, photophyte, short turf.

Barbula convoluta Hedw. - 8: on soil, 17, 37: on rocks, ALATAS 82.

Distribution: Turkey (A1, A2, A3, A4, B6, C11, C12, C13), Europe, Asia.

Ecological features: Basiphyte, mesophyte, photophyte, short turf.

Barbula unguiculata Hedw. - 10, 33: on rocks, 5: on wet soil, ALATAS 104; 53, 56: on soil, 54: on rocks near water leakage, ÖREN 211.

Distribution: Turkey (A1, A2, A3, B6, B7, C11), Europe, Asia.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

Bryoerythrophyllum recurvirostrum (Hedw.) P.C.Chen - 5: on rocks, ALATAS 88.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B8, B9, C13, C15), Europe, Asia, N. and C. Africa, N. and C. America, Greenland.

Ecological features: Basiphyte, hygrophyte, sciophyte, cushion.

Didymodon fallax (Hedw.) R.H.Zander - 26: roadside on soil, ALATAS 48; 52: on rocks near stream bed, ÖREN 188.

Distribution: Turkey (A1, A2, A3, B6, B8, B10, C11, C13), Europe, Asia, N. America, N. Africa, Maderia.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

Didymodon ferrugineus (Schimp. ex Besch.) M.O.Hill - 6, 7: on wet soil, 10, 18: on rocks, ALATAS 61.

Distribution: Turkey (A1, A2, B6, C11), Europe, N. America, Asia, N. Africa.

Ecological features: Basiphyte, hygrophyte, sciophyte, short turf.

Didymodon nicholsonii Culm. - 5: on rocks, ALATAS 108.

Distribution: Turkey (A2, A3), Europe.

Ecological features: Basiphyte, hygrophyte, photophyte, short turf.

Didymodon tophaceus (Brid.) Lisa - 52, 54: on rocks near water leakage, ÖREN 193.

Distribution: Turkey (A1, A2, A4, B6, C11, C12), Europe, Iceland, Asia, Africa, America, Canaries.

Ecological features: Basiphyte, hygrophyte, photophyte, short turf.

Didymodon vinealis (Brid.) R.H.Zander - 2, 5: on humid soil, 23: near stream bed on wet rocks, ALATAS 105; 54: on rocks near water leakage, ÖREN 214

Distribution: Turkey (A1, A2, A3, B6, B7, B8, B9, C11, C12, C13, C14) Europe, Iceland, Asia, N. Africa, America, Jamaica.

Ecological features: Subneutrophyte, xerophyte, photophyte, short turf.

**Microbyum starkeanum* (Hedw.) R.H.Zander (*Pottia starkeana* (Hedw.) Müll.Hal.) - 10: on rocks, ALATAS 98.

Distribution: Turkey (B6, C12, C13), Europe, N. America, N. Africa, Madeira, Canaries, Australia, New Zealand.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

Phascum cuspidatum Hedw. - 56: on soil, ÖREN 180

Distribution: Turkey (A1, A2, B6, B7, C11), Europe, Asia, N. America, Madeira, Canaries.

Ecological features: Subneutrophyte, mesophyte, photophyte, annual.

Syntrichia norvegica F.Weber - 19: on bark, ALATAS 127.

Distribution: Turkey (A1, A2, B9), Europe, N. Asia.

Ecological features: Acidophyte, mesophyte, photophyte, cushion.

Syntrichia ruralis (Hedw.) F.Weber and D.Mohr - 1, 5 and 43: on rocks, 2: on bark, ALATAS 9; 53, 56 and 58: on rocks, ÖREN 183.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, B8, B9, B10, C11, C12, C13, C14, C15), Europe, Asia, Africa, Asia, N. America, Australia, Greenland.

Ecological features: Subneutrophyte, mesophyte, photophyte, cushion.

Tortula muralis Hedw. - 10, 38: on rocks, 17, 5 and 10: on soil, ALATAS 17; 53: on rocks, ÖREN 218.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, B8, B9, C12, C13, C14), Cosmopolitan.

Ecological features: Subneutrophyte, mesophyte, photophyte, cushion.

Tortula subulata Hedw. (*Tortula subulata* Hedw. var. *graeffii* Warnst.) - 17, 39 and 50: on soil, 14: on rocks, 2: on bark, ALATAS 10: on soil, 53: on rocks, ÖREN 205.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, B8, C11, C12, C13), Europe, Asia, N. America, Canaries, Madeira.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

Orthotrichaceae

Orthotrichum affine Schrad.ex Brid. - 3, 14, 18, 19, 22: on bark, 2, 40: on rocks, ALATAS 36.

Distribution: Turkey (A1, A2, A3, B6, B8), C. Europe, N. America, N. W. Asia, N. Afrika

Ecological features: Subneutrophyte, xerophyte, sciophyte, cushion.

Orthotrichum anomalum Hedw. - 25: on soil and rocks ALATAS 143, 53: on rocks, ÖREN 186.

Distribution: Turkey (A1, A2, A3, A4, B6, B8, C11, C13), Asia, C. Europe, N. Africa, N. and C. America, Greenland. *Orthotrichum cupulatum* Hoffm. ex Brid. - 26, 50: on rocks, ALATAS 19.

Distribution: Turkey (A1, A2, B6, B7, B8, B9, C11, C12, C13, C14, C15), Europe, Iceland, N. Asia, N. America, N. Africa, Australia, New Zealand.

Ecological features: Subneutrophyte, xerophyte, photophyte, cushion.

Orthotrichum diaphanum Schrad. ex Brid. - 7, 37: on bark, 29: on rocks, ALATAS 64.

Distribution: Turkey (A1, A2, A3, A4, B6, B7), Europe, Asia, America, N. Africa, Madeira, Canaries.

Ecological features: Subneutrophyte, xerophyte, photophyte, cushion.

Orthotrichum lyellii Hook. and Taylor - 1: on rocks, 22, 31: on bark, ALATAS 96.

Distribution: Turkey (A2, A4), Europe, America, N. W. Asia, N. Africa.

Ecological features: Subneutrophyte, mesophyte, photophyte, tall turf.

Orthotrichum rupestre Schleich. ex Schwägr. - 38: on rocks ALATAS 32.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7, B8, C13), Europe, Asia, N. W. America, N. and W. Afrika, Greenland, Madeira, Canaries.

Ecological features: Acidophyte, xerophyte, photophyte, short turf.

Orthotrichum speciosum Nees - 53: on bark ÖREN 206.

Distribution: Turkey (A1, A2, A3), Europe, N. and C. Asia, N. W. America, Greenland.

Ecological features: Subneutrophyte, mesophyte, photophyte, cushion.

Ulota crispa (Hedw.) Brid. - 18, 30, 36: on bark, 37: on rocks, ALATAS 137; 53, 56: on bark, ÖREN 181.

Distribution: Turkey (A2, A3, B6), Europe, N. and C. Asia, N. Africa, N. America, Madeira, Canary Island.

Ecological features: Subneutrophyte, hygrophyte, photophyte, cushion.

Hedwigiaceae

Hedwigia ciliata (Hedw.) P. Beauv. - 33, 35: on rocks, ALATAS 131.

Distribution: Turkey (A1, A2, A4, A5, B6, B7, C11), Europe, N. Africa, Japan.

Ecological features: Acidophyte, xerophyte, photophyte, short turf.

Bartramiaceae

Bartramia halleriana Hedw. - 20: on rocks, ALATAS 122. Distribution: Turkey (A2, A4, B6), Europe, Asia.

Ecological features: Acidophyte, mesophyte, sciophyte, tall turf.

**Bartramia pomiformis* Hedw. - 11: on rocks, ALATAS 81.

Distribution: Turkey (A1, A4, A5, B6, C11, C14), Europe, Asia, N. America, New Zealand, Japan.

Ecological features: Acidophyte, mesophyte, sciophyte, cushion.

Philonotis calcarea (Bruch and Schimp.) Schimp. - 2: on wet soil, ALATAS 89.

Distribution: Turkey (A2, A4, B7, B9, C10, C11, C13), Europe, Asia, Africa.

Ecological features: Basiphyte, hygrophyte, photophyte, tall turf.

Philonotis fontana (Hedw.) Brid. - 10: on rocks near stream bed, ALATAS 52.

Distribution: Turkey (A2, A4, B6, B7, B8, B9, B10), Europe, Asia, N. Africa, America, Greenland.

Ecological features: Subneutrophyte, hygrophyte, photophyte, tall turf.

Bryaceae

Bryum alpinum Huds. ex With. - 29: on sandy soil, ALATAS 132.

Distribution: Turkey (A2, B6, B7, B8, C11), Europe, Asia, America, C. and S. Afrika, Madeira, Canaries.

Ecological features: Subneutrophyte, mesophyte, photophyte, tall turf.

Bryum argenteum Hedw. - 8: on rocks, 29: on sandy soil, ALATAS 92.

Distribution: Turkey (A1, A2, A4, A5, B6, B8, B9, C13, C14), Cosmopolitan.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

Bryum caespiticium Hedw. - 5, 17: on rocks, 19, 25: on soil, ALATAS 67.

Distribution: Turkey (A1, A2, A3, A4, B6, B7, B8, B9, C11, C13, C15), Cosmopolitan.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

Bryum capillare Hedw. - 38: on bark, 2, 8, 22, 29, 50: on soil, 1, 10, 17, 29: on rocks, ALATAS 35; 53, 56: on soil, ÖREN 213.

Distribution: Turkey (A1, A2, A4, A5, B6, B7, B8, B9, C11, C12, C13), Cosmopolitan.

Ecological features: Subneutrophyte, mesophyte, photophyte, cushion.

Bryum mildeanum Jur. - 53: on soil, ÖREN 217

Distribution: Turkey (A1, A2, A4, C11, C13, C14), Europe, S. Asia, N. Africa.

Ecological features: Subneutrophyte, mesophyte, photophyte, short turf.

**Bryum pallens* Sw. ex anon. - 52: on calcareous rocks near stream bed, ÖREN 194.

Distribution: Turkey (A1, A3, A4), Europe, Asia, America, N. Africa, Iceland, Japan, Greenland.

Ecological features: Subneutrophyte, hygrophyte, photophyte, short turf.

Bryum radiculosum Brid. - 29: on sandy soil, ALATAS 73.

Distribution: Turkey (A1, A2, B6, C11), Europe, Asia, N. Africa, Madeira, Canaries, Japan.

Ecological features: Basiphyte, xerophyte, photophyte, cushion.

Bryum torquescens Bruch and Schimp. - 6: on water reservoir, 11: on rocks, ALATAS 57.

Distribution: Turkey (A1, A2, B6, B8, C11, C12), Europe, Asia, Africa, America, Australia, New Zealand.

Ecological features: Basiphyte, mesophyte, photophyte, short turf.

Rhodobryum roseum (Hedw.) Limpr. - 11, 18: on rocks ALATAS 91.

Distribution: Turkey (A2, A4), Europe, Asia, N. America.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, dendroid.

Mielichhoferiaceae

Pohlia wahlenbergii (F.Weber and D.Mohr) A.L.Andrews - 52: on rocks near stream bed, ÖREN 195.

Distribution: Turkey (A2, A4, B6, B10), Europe, Asia, America, Australia, Greenland.

Ecological features: Acidophyte, hygrophyte, photophyte, tall turf.

Pohlia wahlenbergii (F.Weber and D.Mohr) A.L.Andrews var. *calcarea* (Warnst.) E.F.Warb. - 5, 6: on soil, 30: on wet rocks, ALATAS 60.

Distribution: Turkey (A2, A3, C11, C12), Europe, Asia, America.

Ecological features: Basiphyte, hygrophyte, photophyte, short turf.

Mniaceae

Mnium hornum Hedw. - 13: on soil, ALATAS 72.

Distribution: Turkey (A2, A4), Europe, N. America, N. Africa, Japan.

Ecological features: Acidophyte, hygrophyte, sciophyte, tall turf.

Mnium marginatum (Dicks.) P.Beauv. - 50: on bark, 18: on rocks, ALATAS 42.

Distribution: Turkey (A2, A4), Europe, N. Amerika, N. and W. Asia.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, fan.

Mnium stellare Hedw. - 6: on soil, 23, 34: on rocks, 29: on bark, ALATAS 112.

Distribution: Turkey (A1, A2, A4), Europe, C. Asia, Japan, N. America.

Ecological features: Basiphyte, hygrophyte, sciophyte, tall turf.

Cinclidaceae

Rhizomnium punctatum (Hedw.) T.J.Kop. - 5, 16, 19, 23: on wet soil, ALATAS 30.

Distribution: Turkey (A1, A2, A3, A4, B6), C. Europe, Asia, N. America.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, tall turf.

Plagiomniaceae

Plagiomnium affine (Blandow ex Funck) T.J.Kop. - 16: on bark, 7, 8: on wet rocks, ALATAS 50.

Distribution: Turkey (A1, A2, A4, B6, B8), Europe, Asia.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, tall turf.

Plagiomnium elatum (Bruch and Schimp.) T.J.Kop. - 5, 16, 18, 22, 40, 50: on soil, 7: on bark, 34: on wet rocks, ALATAS 45.

Distribution: Turkey (A2, A3, A4), Europe.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, tall turf.

Plagiomnium undulatum (Hedw.) T.J.Kop. - 5, 8, 11, 18: on wet rocks, 19, 22: on humid soil, ALATAS 77.

Distribution: Turkey (A1, A2, A3, A4, B6, C13), Asia, N. and W. Africa, N. Europe, Japan.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, dendroid.

Amblystegiaceae

Amblystegium confervoides (Brid.) Schimp. - 13: on rocks, ALATAS 102.

Distribution: Turkey (A1, A2), Europe, Africa.

Ecological features: Subneutrophyte, mesophyte, sciophyte, tail.

Amblystegium serpens (Hedw.) Schimp. - 32: on rocks, 40: on bark and soil, ALATAS 70.

Distribution: Turkey (A1, A2, A4, B7, B8, C11), Europe, N. America, C. Asia.

Ecological features: Acidophyte, hygrophyte, sciophyte, weft.

Campyliadelphus chrysophyllus (Brid.) R.S.Chopra (*Campylium chrysophyllum* (Brid.) Lange) Lange - 23: on soil ALATAS 140.

Distribution: Turkey (A2), Europe, Asia.

Ecological features: Subneutrophyte, mesophyte, sciophyte, weft.

Cratoneuron filicinum (Hedw.) Spruce - 6, 16 and 37: on rocks near stream bed, 2, 17 and 25: on humid soil near stream bed, ALATAS 53; 52, 56: on calcareous rocks, ÖREN 179.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7, B8, B9, B10, C11, C13, C15), Europe, Asia, America, Africa, New Zealand.

Ecological features: Basiphyle, hygrophyte, photophyte, weft.

Cratoneuron filicinum (Hedw.) Spruce var. *atrovirens* (Brid.) Ochyra - 50: on bark, 2, 23: on soil, 18: on calcareous rocks, ALATAS 44.

Distribution: Turkey (A1, A2, A4, B6, B7, B10, C11, C12), Europe, Asia, N. America, N. Africa.

Ecological features: Basiphyle, hygrophyte, photophyte, weft.

Hygroamblystegium humile (P.Beauv.) Vanderp., Goffinet and Hedenas (*Amblystegium humile* (P.Beauv.) Crundw., *Leptodictyum humile* (P.Beauv.) Ochyra,) - 53: on rocks, ÖREN 209.

Distribution: Turkey (A2, A4, A5), Europe, Asia, America.

Ecological features: Acidophyte, hygrophyte, photophyte, mat.

Hygrohypnum luridum (Hedw.) Jenn. - 10, 30 and 36: on wet rocks, 5: on wet soil, ALATAS 111.

Distribution: Turkey (A2, A4, B6), Europe, Asia, Japan, N. America.

Ecological features: Basiphyle, hydrophyt, photophyte, weft.

Palustriella commutata (Hedw.) Ochyra - 44: on calcareous rocks, water leakage, ÖREN 184.

Distribution: Turkey (A2, B7, B9, B10, C11, C13, C15), N. Europe, Asia, N. Africa, Japan.

Ecological features: Basiphyle, amphiphyle, photophyte, weft.

Sanionia uncinata (Hedw.) Loeske - 38: on rocks, 9, 20: on calcareous rocks, ALATAS 21.

Distribution: Turkey (A1, A2, A4, A5), Europe, Asia, America, Greenland.

Ecological features: Subneutrophyte, mesophyte, photophyte, tall turf.

Calliergonaceae

Warnstorfia exannulata (Schimp.) Loeske - 2: on rocks, ALATAS 84.

Distribution: Turkey (A1, A2, B6), Europe, N. America, Asia, Japan, New Zealand, Greenland.

Ecological features: Acidophyte, hygrophyte, photophyte, tall turf.

Leskeaceae

Pseudoleskeella catenulata (Brid. ex Schrad.) Kindb. - 1: on rocks ALATAS 86.

Distribution: Turkey (A2, A3), Europe, Asia.

Ecological features: Basiphyle, xerophyte, photophyte, tail.

Thuidiaceae

Abietinella abietina (Hedw.) M.Fleisch. (*Thuidium abietinum* (Hedw.) Schimp.) - 1, 47: on rocks, 1, 18: on soil, ALATAS 22.

Distribution: Turkey (A1, A2, A3, A4, B9), Europe, Asia, N. America, Greenlands. Ecological features: Subneutrophyte, xerophyte, photophyte, weft.

Abietinella abietina (Hedw.) M.Fleisch. var. *hystricosus* (Mitt.) Sakurai (*Thuidium abietinum* (Hedw.) Schimp. var. *hystricosum* (Mitt.) Loeske and Lande ex Loeske) - 53: on soil, ÖREN 187.

Distribution: Turkey (A2, A3, A4, B9), Europe, Asia.
Ecological features: Subneutrophyte, xerophyte, photophyte, weft.

Thuidium tamariscinum (Hedw.) Schimp. - 7: on bark, 11, 18: on soil, ALATAS 90.

Distribution: Turkey (A2, A3, A4, C13), Europe, N. and C. America, Japan.

Ecological features: Subneutrophyte, mesophyte, sciophyte, weft.

Brachytheciaceae

Pseudoscleropodium purum (Hedw.) M.Fleisch. (*Scleropodium purum*

(Hedw.) Limpr.) - 39, 51: on soil, 11, 40: on rocks, 7: on bark and soil ALATAS 6; 53, 54: on soil, ÖREN 190.

Distribution: Turkey (A1, A2, A3, A4), Europe, Asia, N. And C. America, N. Africa, New Zealand.

Ecological features: Subneutrophyte, mesophyte, sciophyte, weft.

Scorpiurium circinatum (Brid.) M. Fleisch. and Loeske - 29: on rocks, ALATAS 68.

Distribution: Turkey (A1, A2, A4, B6, B7, C11, C12, C13), Europe, Asia, Africa.

Ecological features: Basiphyte, xerophyte, sciophyte, tail.

Eurhynchium striatum (Hedw.) Schimp. - 5, 7 and 34: on rocks, 2, 6: on soil, ALATAS 56.

Distribution: Turkey (A1, A2, A4, B6), Europe, Asia, Iceland, Japan.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, weft.

Platyhypnidium riparioides (Hedw.) Dixon - 5, 10, 17, 30 and 38: on rocks near stream bed, 9: on calcareous rocks, ALATAS 28.

Distribution: Turkey (A1, A2, A4, A5, B6, B8, B9, C11), Europe, Asia, America.

Ecological features: Basiphyte, amphiphyte, sciophyte, tail.

Rhynchostegium confertum (Dicks.) Schimp. - 8: on soil, 5, 7, 16: on rocks, ALATAS 103.

Distribution: Turkey (A1, A3, A4, B6, C11), Europe, Asia, N. Africa, Maderia, Canaries.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, weft.

Rhynchostegium megapolitanum (Blandow ex F.Weber and D.Mohr) Schimp. - 19: on soil, ALATAS 129.

Distribution: Turkey (A2, B6, C12), Europe, Asia, N. Africa.

Ecological features: Subneutrophyte, xerophyte, sciophyte, weft.

Rhynchostegium murale (Hedw.) Schimp. - 7: on rocks, 30: on wet rocks, ALATAS 69.

Distribution: Turkey (A2, B6), Europe, N. Africa, Asia, Japan.

Ecological features: Subneutrophyte, mesophyte, sciophyte, tail.

Rhynchostegiella teneriffae (Mont.) Dirkse and Bouman - 32: on rocks ALATAS 125.

Distribution: Turkey (A2), Europe, N.Asia, N. Africa, Madeira, Canaries.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, mat.

Cirriphyllum crassinervium (Taylor) Loeske and M.Fleisch. (*Eurhynchium crassinervium* (Wilson) Schimp.) - 39: on bark, 5, 6, 12: on rocks, near stream bed, ALATAS 40.

Distribution: Turkey (A1, A2, A4, B6, B7, C11), C. Europe, N. Africa, Japan.

Ecological features: Subneutrophyte, mesophyte, sciophyte, weft.

Oxyrrhynchium pumilum (Wilson) Loeske (*Eurhynchium pumilum* (Wilson) Schimp.) - 39: on bark, 36: on rocks, ALATAS 20.

Distribution: Turkey (A1, A2, A3, B6), Europe, N. Africa.

Ecological features: Subneutrophyte, xerophyte, sciophyte, mat.

Oxyrrhynchium schleicheri (R.Hedw.) Röhl (*Eurhynchium schleicheri* (R. Hedw.) Jur.) - 10: on rocks, 5: on humid soil, ALATAS 63.

Distribution: Turkey (A1, B6, C11), Europe, Asia, Africa.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, weft.

Oxyrrhynchium speciosum (Brid.) Warnst. (*Eurhynchium speciosum* (Brid.) Jur.) - 10, 16: on soil, ALATAS 62.

Distribution: Turkey (A2, B6), Europe, Madeira, Azores, Canaries.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, weft.

Kindbergia praelonga (Hedw.) Ochyra (*Eurhynchium praelongum* (Hedw.) Schimp.) - 5, 7: on rocks, 5, 36: on humid soil, ALATAS 55; 53, 55: on rocks, 56: on soil, ÖREN 210.

Distribution: Turkey (A1, A2, A3, B6, B8, C11, C12), Europe, N. America, N. Asia.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, weft.

Sciuro-hypnum starkei (Brid.) Ignatov and Huttunen (*Brachythecium starkei* (Brid.) Schimp.) - 10: on soil, 5: on humid soil, ALATAS 87.

Distribution: Turkey (A1, A2, A4, B6) Europe, Asia, N. America, Japan.

Ecological features: Subneutrophyte, hygrophyte, photophyte, weft.

Brachythecium albicans (Hedw.) Schimp. - 24: on rocks, ALATAS 121.

Distribution: Turkey (A2, A4, A5, B6, B9, C11), N. W. Asia, N. America, Australia, New Zealand.

Ecological features: Subneutrophyte, mesophyte, photophyte, weft.

Brachythecium glareosum (Bruch ex Spruce) Schimp. - 10: on rocks, ALATAS 115; 56: on soil, ÖREN 198.

Distribution: Turkey (A2, A4, B6, B8), Europe, N. America, N. Asia.

Ecological features: Subneutrophyte, mesophyte, sciophyte, weft.

Brachythecium mildeanum (Schimp.) Schimp. - 36: on rocks, ALATAS 139.

Distribution: Turkey (A2), Europe, N. America.

Ecological features: Subneutrophyte, hygrophyte, photophyte, weft.

Brachythecium rivulare Schimp. - 5, 10, 17, 19, 35, 36 and 38: on rocks, 2, 3 and 5: on wet soil, ALATAS 29; 56: on soil, ÖREN 208.

Distribution: Turkey (A1, A2, A4, B8, C11, C12), Europe, Asia, N. America.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, cushion.

Brachythecium rutabulum (Hedw.) Schimp. - 6: on water reservoir, ALATAS 65.

Distribution: Turkey (A1, A2, A3, A4, B6, B8), Europe, Asia, N. America, Australia.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, weft.

Brachythecium salebrosum (Hoffm. ex F.Weber and D.Mohr) Schimp. - 39: on bark, ALATAS 47.

Distribution: Turkey (A2, A4, B6, C13), Europe, Asia, N. America.

Ecological features: Acidophyte, mesophyte, photophyte, weft.

Scleropodium cespitans (Müll. Hal.) L.F.Koch - 40: on bark, ALATAS 33.

Distribution: Turkey (A2, B6), Europe, N. America.

Ecological features: Subneutrophyte, mesophyte, photophyte, weft.

Eurhynchiastrum pulchellum (Hedw.) Ignatov and Huttunen (*Eurhynchium pulchellum* (Hedw.) Jenn.) - 5, 7: on rocks, ALATAS 49.

Distribution: Turkey (A1, A2, A4, B6, B8, B10), Europe, Asia, N. America, Japan.

Ecological features: Subneutrophyte, mesophyte, sciophyte, weft.

Brachytheciastrum velutinum (Hedw.) Ignatov and Huttunen (*Brachythecium velutinum* (Hedw.) Schimp.) - 5, 39 and 40: on bark, 7: on rocks, 10, 19: on soil, ALATAS 4; 54: on decaying stump, ÖREN 203.

Distribution: Turkey (A1, A2, B6, C12), Europe, Asia, N. America.

Ecological features: Subneutrophyte, mesophyte, sciophyte, cushion.

Homalothecium lutescens (Hedw.) H.Rob. - 39: on bark, 40: on soil, 1,9,50 and 51: on rocks, ALATAS 7; 56: on tree, 55: on rocks, ÖREN 191.

Distribution: Turkey (A1, A2, A3, B6, B7, C11, C12, C13), Europe, C. Asia, N. America.

Ecological features: Subneutrophyte, mesophyte, photophyte, mat.

Homalothecium lutescens (Hedw.) H. Rob. var. *fallax* (H.Philib.) Hedenäs and L. Söderstr. - 18: on rocks, ALATAS 130.

Distribution: Turkey (A1, A2, A4, B7, B10, C13), Europe.

Ecological features: Subneutrophyte, mesophyte, photophyte, mat.

Homalothecium sericeum (Hedw.) Schimp. - 32, 39: on bark, 18, 39: on rocks, ALATAS 11; 56: on root of tree, ÖREN 202.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7, B8, B9, B10, C11, C12, C13, C14), Europe, Asia, N. America, N. Africa, Iceland.

Ecological features: Basiphyte, xerophyte, sciophyte, mat. Hypnaceae

Calliargonella cuspidata (Hedw.) Loeske - 2, 10, 40 and 47: on soil, 2: on bark and rocks, ALATAS 24; 53: on soil, 52: on calcareous rocks near stream bed, ÖREN 189.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, C13, C15), Europe, Asia, America, Australia, New Zealand.

Ecological features: Subneutrophyte, amphiphyte, sciophyte, tall turf.

Campylophyllum calcareum (Crundw. and Nyholm) Hedenäs (*Campyllum calcareum* (Crundw. and Nyholm) - 2, 17: on rocks, ALATAS 74.

Distribution: Turkey (A2), Europe.

Ecological features: Basiphyte, xerophyte, photophyte, weft.

Ctenidium molluscum (Hedw.) Mitt. - 2, 5, 6, 23 and 29: on rocks ALATAS 75.

Distribution: Turkey (A2, A3, A4, B6), Europe, Asia, N. America.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, weft.

Hypnum callichroum Brid. - 39: on bark, ALATAS 39.

Distribution: Turkey (A2, A4), Europe, Asia, N. America, Japan.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, weft.

Hypnum cupressiforme Hedw. - 7, 12, 22, 24, 39 and 40: on bark, 7: on rocks, 9: on soil ALATAS 8.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B7, C11, C13), Cosmopolitan.

Ecological features: Subneutrophyte, xerophyte, photophyte, weft.

Hypnum cupressiforme Hedw. var. *lacunosum* Brid. (*Hypnum lacunosum* (Brid.) Hoffm. ex. Brid.) - 3: on soil, 1: on rocks ALATAS 83.

Distribution: Turkey (A1, A2, B6), Europe, C. America.
Ecological features: Basiphyte, xerophyte, photophyte, weft.

Hypnum imponens Hedw. - 7, 39: on bark, 1: on soil ALATAS 1.

Distribution: Turkey (A2, A3), Europe, C. Asia, N. America.

Ecological features: Acidophyte, hygrophyte, photophyte, weft.

Pylaisia polyantha (Hedw.) Schimp. - 3, 6, 11, 12: on rocks, 13: on bark, ALATAS 110.

Distribution: Turkey (A1, A2, A3, B6), Europe, N. America, Japan.

Ecological features: Acidophyte, mesophyte, sciophyte, weft.

Taxiphyllum wissgrillii (Garov.) Wijk and Margad. - 55: on rocks, UYAR 847.

Distribution: Turkey (A1, A2, A4), Europe, Iceland, Caucasus.

Ecological features: Basiphyte, hygrophyte, sciophyte, mat.

Pterigynandraceae

Heterocladium heteropterum (Brid.) Schimp. - 1: on rocks, ALATAS 76.

Distribution: Turkey (A2, A3, C11), Europe.

Ecological features: Subneutrophyte, mesophyte, sciophyte, weft.

Pterigynandrum filiforme Hedw. - 3, 5, 12, 17, 32, 40: on bark, 12: on soil, ALATAS 26.

Distribution: Turkey (A2, A3, B6, C11), Europe, Asia, N. America, Japan.

Ecological features: Subneutrophyte, mesophyte, sciophyte, tail.

Hylocomiaceae

Rhytidiadelphus triquetrus (Hedw.) Warnst. - 23: on soil ALATAS 93.

Distribution: Turkey (A2, A3, A4, A5, B6), Europe, Asia, N. America, Japan.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, tall turf.

Plagiotheciaceae

Herzogiella seligeri (Brid.) Z.Iwats. - 50: on soil, 19, 22 and 39: on bark, ALATAS 5; 57: on bark, ÖREN 199.

Distribution: Turkey (A2, A3), Europe, N. America, Japan.
Ecological features: Subneutrophyte, mesophyte, sciophyte, tail.

**Plagiothecium denticulatum* (Hedw.) Schimp. var. *obtusifolium* (Turner) Moore - 24: on bark, ALATAS 136.
Distribution: Turkey (A1), Europe, Asia, America, New Zealand.

Ecological features: Acidophyte, hygrophyte, sciophyte, mat.

**Plagiothecium latebricola* Schimp. - 40: on bark, ALATAS 46.

Distribution: Turkey (A4), Europe, Asia.

Ecological features: Acidophyte, hygrophyte, sciophyte, mat.

Plagiothecium nemorale (Mitt.) A. Jaeger - 34: on soil, ALATAS 138.

Distribution: Turkey (A1, A2, A3, A4, B8) Europe, Asia, N. America, N. Africa, New Zealand, Azores, Madeira, Canaries.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, mat.

Pylaisiadelphaceae

Platygyrium repens (Brid.) Schimp. - 17: on bark, 18: on rocks, ALATAS 141.

Distribution: Turkey (A2, B6), Europe, Asia, N. America.
Ecological features: Acidophyte, mesophyte, photophyte, mat.

Sematophyllaceae

Sematophyllum demissum (Wilson) Mitt. - 6: on rocks, ALATAS 117.

Distribution: Turkey (A4), Europe, S. Asia, N. America, N. Africa, Japan.

Ecological features: Acidophyte, hygrophyte, sciophyte, mat.

Leucodontaceae

Antitrichia curtispindula (Timm ex Hedw.) Brid. - 11, 13, 35: on rocks, 17, 22: on bark, ALATAS 51.

Distribution: Turkey (A2, A3, A4, B6), Europe, C. and S. Africa.

Ecological features: Subneutrophyte, mesophyte, sciophyte, tail.

Leucodon sciuroides (Hedw.) Schwägr. - 2, 3, 17, 40: on bark, ALATAS 31.

Distribution: Turkey (A1, A2, A3, A4, A5, B6, B6, C11, C12, C13), Europe, Asia, Iceland.

Ecological features: Acidophyte, xerophyte, photophyte, tail.

Neckeraceae

Neckera bessi (Lobarz.) Jur. (*Homalia bessi* Lobarz.) - 55: on shaded rocks, ÖREN 220.

Distribution: Turkey (A2, B6, C12), Europe, Caucasus.
Ecological features: Subneutrophyte, xerophyte, sciophyte, fan.

Neckera complanata (Hedw.) Huebener - 4, 5, 7, 13, 36, 40: on bark, 29: on soil near stream bed, ALATAS 25.

Distribution: Turkey (A1, A2, A3, A4, B6, C13), Europe, N. America, N. W. Asia.

Ecological features: Subneutrophyte, mesophyte, sciophyte, fan.

Neckera crispa Hedw. - 6: on soil near stream bed, 18: on rocks, ALATAS 71; 55: on shaded rocks, ÖREN 222.

Distribution: Turkey (A2, A3, A4, B6, C13), Europe, Asia.

Ecological features: Subneutrophyte, mesophyte, sciophyte, fan.

Thamnobryum alopecurum (Hedw.) Gangulee - 7: on bark, 6, 4: on rocks, ALATAS 58.

Distribution: Turkey (A1, A2, A4, B6, C12), Europe, Asia, N. America, N. Africa.

Ecological features: Subneutrophyte, hygrophyte, sciophyte, fan.

Lembophyllaceae

Isothecium alopecuroides (Lam ex Dubois) Isov. - 4, 5, 17, 22, 31, 39 and 40: on bark, 4, 15 and 23: on rocks, 5, 19: on soil, ALATAS 13.

Distribution: Turkey (A1, A2, A4, B6, C13), Europe, N. W. Asia.

Ecological features: Subneutrophyte, mesophyte, sciophyte, fan.

Isothecium myosuroides Brid. - 55: on shaded rocks, ÖREN 221.

Distribution: Turkey (A2, A3, A4, B6), Europe, Asia, Iceland.

Ecological features: Subneutrophyte, mesophyte, sciophyte, fan.

Anomodontaceae

Anomodon attenuatus (Hedw.) Huebener - 4: on rocks, 13, 14, 17: on bark, ALATAS 80.

Distribution: Turkey (A2, A3, A4), Europe, N. America, N. W. Asia, Japan.

Ecological features: Subneutrophyte, mesophyte, sciophyte, tail.

Anomodon viticulosus (Hedw.) Hook. and Taylor - 2, 3, 8, 18, 34: on rocks, 5, 13, 27, 36: on bark, ALATAS 79; 55: on shaded rocks, ÖREN 223.

Distribution: Turkey (A2, A3, A4, B6, C13), Europe, C. Asia, N. America.

Ecological features: Subneutrophyte, mesophyte, sciophyte, tail.

RESULTS AND DISCUSSION

In this study, a total of 173 taxa belonging to the *Bryopsida* (155 taxa), *Marchantiopsida* (18 taxa) were determined. According to the grid system described by

Henderson (1961), the number of new records in the study area in the A2 square is 10. These species are; *Lejeunea patens*, *Fissidens serrulatus*, *Ditrichum subulatum*, *Dicranodontium demudatum*, *Gyroweisia tenuis*, *Microbyum starkeanum*, *Bartramia pomiformis*, *Bryum pallens*, *Plagiothecium denticulatum* var. *obtusifolium* and *Plagiothecium latebricola*. Moreover *Buxbaumia viridis* has indicated as a vulnerable species in Red Data Book of European Bryophytes (ECCB, 1995).

The richness of families in terms of species in the research area is given in Table 2. As it can be seen in the Table 2, Brachytheciaceae is the richest family in the species. Pottiaceae, Amblystegiaceae, Bryaceae, Orthotrichaceae, Grimmiaceae, Hypnaceae, Dicranaceae

Table 2: The distribution of the taxa according to the families

Families	Number of taxa	%
Brachytheciaceae	26	15.02
Pottiaceae	20	11.56
Amblystegiaceae	9	5.20
Bryaceae	9	5.20
Grimmiaceae	9	5.20
Hypnaceae	9	5.20
Orthotrichaceae	8	4.62
Dicranaceae	6	3.46
Ditrichaceae	6	3.46
Fissidentaceae	6	3.46
Bartramiaceae	4	2.31
Plagiotheciaceae	4	2.31
Polytrichaceae	4	2.31
Neckeraceae	4	2.31
Geocalycaceae	3	1.73
Mniaceae	3	1.73
Plagiomniaceae	3	1.73
Thuidiaceae	3	1.73
Anomodontaceae	2	1.15
Frullaniaceae	2	1.15
Lejeuneaceae	2	1.15
Lembophyllaceae	2	1.15
Leucodontaceae	2	1.15
Mielichhoferiaceae	2	1.15
Porellaceae	2	1.15
Pterigynandraceae	2	1.15
Buxbaumiaceae	1	0.57
Calliergonaceae	1	0.57
Calypogeiaceae	1	0.57
Cinclidaceae	1	0.57
Conocephalaceae	1	0.57
Encalyptaceae	1	0.57
Funariaceae	1	0.57
Hedwigiaceae	1	0.57
Hylocomiaceae	1	0.57
Jungermanniaceae	1	0.57
Leskeaceae	1	0.57
Leucobryaceae	1	0.57
Lunulariaceae	1	0.57
Metzgeriaceae	1	0.57
Plagiochilaceae	1	0.57
Pylaisiadelphaceae	1	0.57
Pelliaceae	1	0.57
Radulaceae	1	0.57
Scapaniaceae	1	0.57
Sematophyllaceae	1	0.57
Tetraphidaceae	1	0.57
Total: 47	173	100

Fig. 3: Groups of bryophyte affinity for humidity preferential in the study area

and Mniaceae are other foremost components of the flora. These 9 families make up 64.2% of the total taxa in the study area and other 29 families constitute 35.8% (Table 2).

As might be expected from climate in this area, mesophyte mosses (41.6%) are dominant in the investigated area. These are followed by hygrophytes (36.4%) and then xerophytes (22%), others (2.3%) occurred in the region (Fig. 3).

According to the light availability in bryophytes in this region, with a majority of votes are photophyte (53%). The rest of taxa are sciophyte (47%).

The first preference of the bryophyte flora of the studied region is Subneutrophyte in sequence Acidophyte and Basiphyte (Fig. 4).

Predominant life form is short turf (21.4%) and then in sequence weft (19.7%), tall turf (17.3%), mat (15.0%), cushion (13.3%), tail (6.4%), fan (4.6%), annual (1.7%) and dendroid (1.2%), (Fig. 5).

As a result the bryophytes in the life forms such as weft, mat, tail and fan are pleurocarpous species (45.44%) and other bryophyte life forms as short turf and cushion and the majority portion of tall turf are acrocarpous species (54.56%). Since acrocarpous species have quill-edged leaves and grow in cushion form, they can endure longer periods of heat and dryness better than pleurocarpous species. As for pleurocarpous bryophytes generally cover rocks or other substrata in more humid habitats. However, *Thuidium abietinum*, *Hypnum cupressiforme* and *Homalothecium lutescens* are common in all kinds of habitats because of their high tolerance to desiccation during the long dry season between May and October. Therefore, it is not a surprise that *Brachytheciaceae* and *Pottiaceae* have great species richness in this area. As acrocarpous found to be 55% in this area may be explained by transitional zone in the

Fig. 4: Preferential acidity of bryophytes in the study area

Fig. 5: Life forms among bryophytes in the study area

south of the area. Also forests are almost widespread whole parts of the study area; the high rate of pleurocarpous found in these areas is meaningful. These values indicate that the investigated area is sometimes dry, especially in southern parts of the area but it is relatively humid in its other parts.

ACKNOWLEDGMENTS

We would like to thank forest engineer Ahmet Şükrü Elbir for his help during the field studies.

REFERENCES

- Abay, G. and B. Çetin, 2003. The Moss Flora (Musci) of Ilgaz Mountain National Park. Turk. J. Bot., 27: 321-332.
- Agnew, S.Z. and M. Vondracek, 1975. A Moss Flora of Iraq. Feddes Repertorium, 86: 341-489.
- Akman, Y., 1995. Türkiye Orman Vejetasyonu. [Forest Vegetation of Turkey] In: Kuzey Anadolu Orman Vejetasyonu. Kariyer Matbaacılık, Ankara, pp: 244-287.

- Akman, Y., 1999. İklim ve Biyoiklim, (Biyoiklim Metodları ve Türkiye İklimleri). [Climate and Bioclimate (Bioclimatic Methods and Climate Types of Turkey)] In: Gaussen Metodu and Türkiye İklimleri. Kariyer Matbaacılık, Ankara, pp: 255-342.
- Aksoy, H., 1985. Yenice Orman işletmesindeki meşe ve porsuk orman kalıntıları örnekleriyle orman rezervleri. [The remainder of Oaks (*Quercus*) and Yews (*Taxus*) forests in Yenice Forests with the typical forest contents]. I.U. Orman Fakültesi Derg., 35: 58-74.
- Arnell, S., 1981. Moss flora of Fennoscandia, fasc. I. Hepaticae. Swedish Natural Science Research Council, Stockholm.
- Avcı, M., 2005. Yenice Ormanları. [Yenice Forests]. Türkiye'nin 122 Önemli Bitki Alanı, WWF Türkiye, İstanbul, pp: 98-99.
- Bischler, H., S. Jovet-Ast, 1986. The Hepatic Flora South-West Asia: A survey. Proceeding of the Royal Society of Edinburgh, 89B: 229-241.
- Brummitt, R.K. and C.E. Powell, 1992. Authors of plant names. Royal Botanic Gardens, Kew.
- Casas, C., 1998. The Anthocerotae and Hepaticae of Spain and Balearic Islands: A Preliminary Checklist. Orsis 13: 17-26.
- Cortini-Pedrotti, C., 2001. Flora dei muschi d'Italia, Sphagnopsida andreaeopsida, Bryopsida (I parte). [The Moss Flora of Italy, Sphagnopsida andreaeopsida, Bryopsida (Part I)]. Antonio Delfino Editore, Roma.
- Cortini-Pedrotti, C., 2006. Flora dei muschi d'Italia, Bryopsida (II parte). [The Moss Flora of Italy, Bryopsida (Part II)]. Antonio Delfino Editore, Roma.
- Çetin, B. and E. Yurdakulol, 1985. Gerede-Aktaş (Bolu) Ormanlarının Karayosunları (Musci) Florası. [The Moss Flora of Gerede-Aktas forest in Bolu Province]. Turk. J. Bot., 91: 29-39.
- Çetin, B. and E. Yurdakulol, 1986. The liverworts (Hepaticae) of Bolu district (Gerede-Aktas forest-Yedigöller National Park). Doga, Turk. J. Biol., 10: 53-56.
- Çetin, B. and E. Yurdakulol, 1988. Yedigöller Milli Parkının Karayosunu Florası. [The Moss Flora of Yedigöller National Park]. Turk. J. Bot., 12: 128-146.
- Çetin, B., E. Unç and G. Uyar, 2002. The Moss Flora of Ankara-Kızılcahamam-Çamkoru and Çamlıdere Districts. Turk. J. Bot., 26: 91-101.
- Dierßen, K., 2001. Distribution, ecological amplitude and phytosociological characterization of European bryophytes. Bryophytorum Bibliotheca, 56: 1-289.
- DMİGM., 2005. Turkish state meteorological service, the climatic datas between 1989 and 2005. Devlet Meteoroloji İleri Genel Mudurluu, Belong to Yenice District in Karabuk Province. Meteoroloji Bulteni, Ankara.
- ECCB., 1995. Red Data Book of European Bryophytes. European Committee for Conservation of Bryophytes, Torndheim.
- Frey, W., J.P. Frahm, E. Fischer and W. Lobin, 1995. Kleine Kryptogamenflora, Die Moos-und Franplanzen Europas. [Cryptogamic flora (Bryophytes and Pteridophytes) in Europe]. Gustav Fischer Verlag, Stuttgart.
- Greven, H.C., 1995. *Grimmia* Hedw. (Grimmiaceae, Musci) in Europe. Backhuys Publishers, Leiden.
- Greven, H.C., 2003. Grimmias of the World. Backhuys Publishers, Leiden.
- Grolle, R., 1983. Hepatics of Europe including the Azores: an annotated list of species, with synonyms from recent literature. J. Bryol., 12: 403-459.
- Grolle, R. and D.G. Long, 2000. An Annotated Check-list of the Hepaticae and Anthocerotae of Europe and Macaronesia. J. Bryol., 22: 103-140.
- Grout, A.J., 1972. Moss Flora of North America, North Mexico Volume I-III. Hafner Publishing Company, New York.
- Guerra, J., M.J. Cano and R.M. Ros, 2006. Flora Briofítica Ibérica Volumen III Pottiales, Encalyptales. [The Bryophyte Flora of Iberian Volume III Pottiales, Encalyptales]. Universidad de Murcia Sociedad Española de Briología, Murcia.
- Hallingbäck, T. and I. Holmåsen, 1985. Mossor En fälthandbok. [A handbook of Mosses]. Interpublishing, Stockholm.
- Hallingbäck, T., N. Lönnell, H. Weibull, L. Hedenäs and P. Von Knorring, 2006. Nationalnyckeln till Sveriges flora och fauna, Bladmossor Sköldmossor-blåmossor. Bryophyta: Buxbaumia- Leucobryum. [The Swedish Flora and Fauna Encyclopedia, Mosses: Buxbaumia -Leucobryum]. ArtDatabanken, Sveriges lantbruksuniversitet SLU, Uppsala.
- Hedenäs, L., 1992. Flora of Madeiran pleurocarpous mosses (Isobryales, Hypnophyales, Hookeriales). Bryophytorum Bibliotheca, 44: 1-165.
- Henderson, D.M., 1961. Contributions to the Bryophyte Flora of Turkey V: Summary of Present Knowledge. Notes Roy. Bot. Gard. Edinb., 10: 279-301.
- Heyn, C.C. and I. Hermsstadt, 2004. The Bryophyte flora of Israel and Adjacent Regions. The Israel Academy of Sciences and Humanities, Jerusalem.

- Hill, M.O., N. Bell, M.A. Bruggeman-Nannenga, S.M. Brugue, M.J. Cano, J. Enroth and K.I. Flatberg *et al.*, 2006. An annotated checklist of the mosses of Europe and Macaronesia. *J. Bryol.*, 28: 198-267.
- Keçeli, T. and B. Çetin, 2000. The Moss Flora of Çankırı-Eldivan Mountain. *Turk. J. Bot.*, 24: 249-258.
- Keçeli, T. and B. Çetin, 2006. A Contribution to the Liverwort Flora of Western Black Sea Region, Northern Turkey and a new record (*Cephaloziella dentata*, Cephaloziellaceae) to Southwest Asia. *Cryptogamie Bryologie*, 27: 459-470.
- Koy, H. and G. Mudurluu, 1989. General directorate of rural services. The Country land Presence Report of Zonguldak Bartın and Karabük Provinces, pp: 2-7.
- Kürschner, H., 2000. Bryophyte Flora of the Arabian Peninsula and Socotra. *Bryophytorum Bibliotheca*, 55: 1-131.
- Kürschner, H., 2001. Towards a Bryophyte Flora of the Near and Middle East 3. An Artificial Key to the Anthocerotophytina and Hepaticophytina of the Near and Middle East. *Nova Hedwigia*, 72: 161-200.
- Kürschner, H. and A. Erdağ, 2005. Bryophytes of Turkey: An Annotated Reference List of the Species with Synonyms from the Recent Literature and an Annotated List of Turkish Bryological Literature. *Turk J. Bot.*, 29: 95-154.
- Lewinsky, J., 1993. Monographic studies on *Orthotrichum* (Musci). *Bryobrothera*, 2: 1-59.
- Landwehr, S., S.R. Gradstein and H. Von Melick, 1980. Atlas Nederlandse Levermossen. [Liverworts Atlas of Netherlands]. Koninklijke Nederlandse Natuurhistorische Vereniging, Zwijndrecht.
- Lawton, E., 1971. Moss Flora of the Pacific Northwest. Suppl. No: 1 Hattori Botanical Laboratory, Nichinan.
- Mägdefrau, K., 1982. Life-Forms of Bryophytes, in Smith AJE, ed. *Bryophyte Ecology*. Chapman and Hall, London, Chapter, 2: 45-58.
- Nyholm, E., 1981. Illustrated Moss Flora of Fennoscandia Fasc. 1-6. Swedish Natural Science Research Council, Lund.
- Özalp, G., 1992. Çitdere (Yenice-Zonguldak) bölgesindeki orman toplulukları ve silvikültürel değerlendirilmesi. [An evaluation of forest cultivation in Çitdere district (Yenice-Zonguldak province)] *I.Ü. Orman Fakültesi Derg.*, 42: 119-157.
- Paton, J.A., 1999. The Liverwort Flora of the British Isles. Harley Books, Colchester.
- Schuster, R.M., 1966. The Hepaticae and Anthocerotae of North America, Vol-I., Columbia University Press, New York.
- Schuster, R.M., 1969. The Hepaticae and Anthocerotae of North America, Vol-II., Columbia University Press, New York.
- Schuster, R.M., 1974. The Hepaticae and Anthocerotae of North America, Vol-III., Columbia University Press, New York.
- Smith, A.J.E., 1980. The moss flora of Britain and Ireland. Cambridge University Press, Cambridge.
- Smith, A.J.E., 1996. The Liverworts of Britain and Ireland. Cambridge University Press, Cambridge.
- Smith, A.J.E., 2004. The Moss Flora of Britain and Ireland (Second Edition). Cambridge University Press, Cambridge.
- Söderström, L., E. Urmi and J. Vana, 2002. Distribution of Hepaticae and Anthocerotae in Europe and Macaronesia. *Lindbergia* 27: 3-47.
- Uyar, G. and B. Çetin, 2001. The Moss Flora of Ankara-Kızılcahamam Soğuksu National Park. *Turk. J. Bot.*, 25: 261-273.
- Uyar, G. and B. Çetin, 2004. A new check-list of the mosses of Turkey. *J. Bryol.*, 26: 203-220.
- Uyar, G., 2003. The Moss Flora of Akçakoca Mountains (Düzce). *OT Sistemantik Botanik Dergisi*, 10: 77-95.
- Uyar, G. and B. Çetin, 2006. Contribution to the Moss Flora of Turkey: Western Black Sea Region (Bolu, Kastamonu, Karabük, Bartın and Zonguldak). *Intl. J. Bot.*, 2: 229-241.
- Watson, E.V.P., 1981. British Mosses and Liverworts. Cambridge University Press, Cambridge.
- W.W.F. International, 1997. 100 European Forests We Should Protect Now (Map). W.C.M.C.
- Zohary, M., 1973. Geobotanical Foundations of the Middle East. Vol.1-2, Gustav Fisher Press, Stuttgart.