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The Bryophyte Flora of Erdek, Bandırma, Manyas Districts (Balıkesir, Turkey)

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Abstract: This study was carried out in Erdek, Bandırma and Manyas districts in Balıkesir province in order to contribute to the bryophyte flora of northwest Turkey. In this study, 134 taxa (at species and infraspecific ranks) belonging to 40 families and 77 genera were identified. Among them 25 taxa were defined as new records for the A1 grid-square, which was adopted by Henderson. In the floristic list, all taxa with their Turkish distributions are given. In addition, some aspects of their biogeography and ecology are discussed.

Key words: Bryophyte Flora, Erdek, Bandırma, Manyas, Balıkesir, Turkey

INTRODUCTION

Bryophytes contain approximately 18500 species in nearly 1050 genera worldwide. The division Bryophyta is generally divided into three classes: Hepaticae (liverworts and scale-mosses), Anthocerotae (hornworts) and Musci (mosses). Although these names are used traditionally, the International Rules of Botanical Nomenclature would recommend Hepaticopsida, Anthoceropsida and Bryopsida (Schofield, 2001).

The Turkish bryoflora, in total, comprises 726 species, subspecies and varieties including 164 genera of Bryopsida in 59 genera and 166 species of Hepaticopsida and Anthocerotopsida (Uyar and Çetin, 2004; Kürschner and Erdağ, 2005). Nevertheless, the total number has been increased by native and foreign bryologists with the latest additions to the Turkish bryoflora such as: *Pedinophyllum interruptum* (Nees) Kaal. (Keçeli, 2004), *Riccardia latifrons* (Lindb.) Lindb. (Keçeli *et al.*, 2004), *Orthotrichum leblebicii* Erdag, Kürschner and Parolly (Erdağ *et al.*, 2004), *Harpanthus scutatus* (F. Weber and D. Mohr) Spruce, *Nardia scalaris* Gray, *Scapania subalpina* (Nees ex Lindenb.) Dumort., *Blindia caespiticia* (F. Weber and D. Mohr) Müll. Hal., *Taxiphyllum densifolium* (Lindb. ex Broth.) Reimers (Papp, 2004), *Ptilidium pulcherrimum* (Weber) Hampe (Keçeli and Çetin, 2005), *Isothecium holtii* Kindb. (Uyar and Ören, 2005), *Didymodon bistratosus* Hebr. and R.B. Pierrot (Erdağ and Kürschner, 2005), *Cephaloziella dentata* (Raddi) Mig. (Keçeli and Çetin, 2006), *Eremonotus myriocarpus* (Carrington) Lindb. and Kaal. ex Pearson (Kürschner and Parolly, 2006a), *Warnstorfia*

sarmentosa (Wahlenb.) Hedenäs. (Kürschner and Parolly, 2006b). This situation reveals that our knowledge about the bryophyte flora of Turkey is still incomplete.

Study area is situated in the southwest of the Sea of Marmara within Balıkesir province. The region is surrounded by Çanakkale in the west, Bursa in the east and Balıkesir in the south. The research area is located between 40° 05'N-40° 29'N and 027° 45'E - 028° 56'E in Balıkesir province (Fig. 1). In addition, the area is included in the Sub-Euxine province of the Euro-Siberian floristic region (Zohary, 1973) and in the A1 square in Henderson grid system (Henderson, 1961a).

There are only two published studies carried out in nearby the study area (Erdağ and Yayıntaş, 1999; Abay and Ursavaş, 2005). However, no detailed study has yet been conducted to date on the bryophyte flora of Erdek, Bandırma and Manyas districts in Balıkesir. The aim of this study was to contribute to the knowledge about Balıkesir bryophyte flora.

The geological features of the area are typical with a representation of granite, gneiss, micaschist, partly diorite and occasionally limestone mass and volcanic rocks that belong to Paleozoic age (Ercan *et al.*, 1990). The soils are generally alluvial regasol, brown forest, non-calcareous brown forest, vertisol and non-calcareous brown type originating from conglomerate and sandstone (Atalay, 1989). The altitude of the area varies between sea level and 782 m. The region has the little rainy Mediterranean climate at the lower altitudes of the study area. Nevertheless, at higher altitudes of the area, the influence of the oceanic climate can be seen. The annual rainfall in the region is 528-705 mm, but hills above 700 m (i.e.,

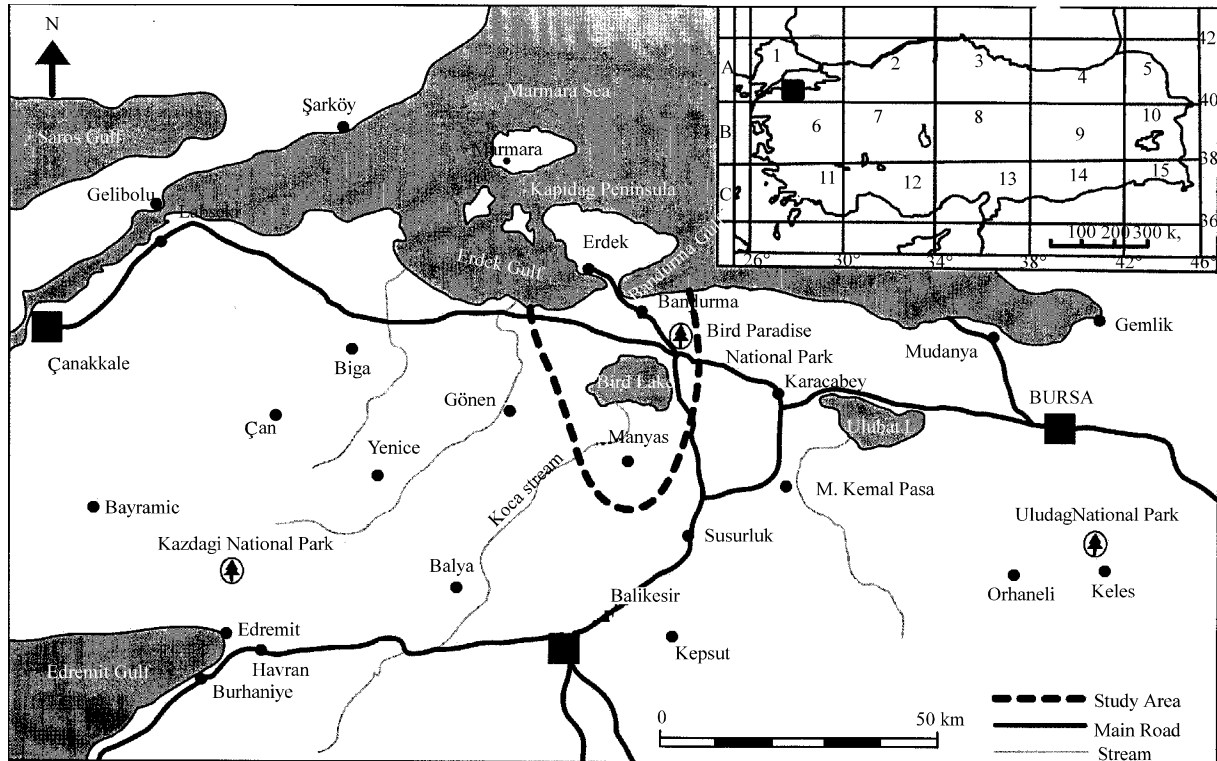


Fig. 1: Geographic location of the study area in Turkey and grid system adopted by Henderson (1961a)

Kese Hill), take up to 1300 mm and the annual average temperatures are between 14 and 15.2 °C according to the data obtained from Bandırma and Erdek meteorology stations in, respectively. The seasonal precipitation regime for a year is as follows: Winter (W), Autumn (A), Spring (S) and Summer (S)-(WASS) (Akman, 1999).

Three main vegetation types are found in the study area: Humid forest, dry forest and macchie. Macchie occurs at shallow soil on calcareous and granite main rock from sea level to 400 meters at the southern slopes. It includes a lot of common tall shrubs such as; *Phillyrea latifolia* L., *Juniperus oxycedrus* L., *Rosa sempervirens* L., *Paliurus spina-christi* Mill., *Cistus creticus* L., *Arbutus unedo* L., *A. andrachne* L., *Erica arborea* L., *Laurus nobilis* L., *Cercis siliquastrum* L., *Styrax officinalis* L., *Spartium junceum* L., *Prunus spinosa* L., *Rubus sanctus* Schreb., *Sarcopoterium spinosum* (L.) Spach, *Quercus coccifera* L. and *Pyrus elaeagnifolia* Pall. can be found locally. The deciduous forests have been formed mainly by *Fagus orientalis* Lipsky, *Castanea sativa* Mill., *Tilia tomentosa* Moench, *Carpinus betulus* L., *Platanus orientalis* L., *Corylus avellana* L., *Populus tremula* L., *Quercus frainetto* Ten., *Q. petrae* (Mattuschka) Liebl., *Q. cerris* L., *Q. infectoria* Oliver, *Q. pubescens* Willd., *Euonymus latifolius* (L.) Miller., *Sorbus torminalis* (L.) Crantz. and *Alnus glutinosa* (L.) Gaertn. The evergreen forest consists

of *Pinus nigra* Arn. subsp. *nigra* var. *caramanica* (Loudon) Rehder, *P. pinea* L., *P. brutia* Ten. Besides, agricultural areas occupy a considerable portion of the province of Balıkesir. Especially, Kapıdağ peninsula is different from other parts of the area in terms of its wealthy flora and its more humid climate. These unique conditions of the study area encouraged us to conduct a study on the bryophytes. It is hoped that this study will contribute to the bryophyte flora of Turkey and be useful as a guide for future studies.

MATERIALS AND METHODS

The moss flora of study area was thoroughly and extensively surveyed between 2003 and 2004. Field notes on individual species and vegetation were made in various field tours. Most of the important altitudes in the area were visited and different habitats were investigated. In the floristic 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.

All specimens are deposited in the personal herbarium of UYAR (Zonguldak). For each taxon, only one collector number was given to avoid repetition in the

Table 1: AA = *Arbutus andrachne*, AG = *Alnus glutinosa*, AU = *Arbutus unedo*, CB = *Carpinus betulus*, CC = *Cistus creticus*, CM = *Crataegus monogya*, CSI = *Cercis siliquastrum*, CS = *Castanea sativa*, CSE = *Cupressus sempervirens*, EA = *Erica arborea*, FO = *Fagus orientalis*, FOR = *Fraxinus ornus*, MG = *Mespilus germanica*, OE = *Olea europea*, PA = *Populus alba*, PB = *Pinus brutia*, PE = *Pyrus elaeagnifolia*, PD = *Prunus dulcis*, PN = *Pinus nigra*, PO = *Platanus orientalis*, PP = *Pinus pinea*, PT = *Pistacia terebinthus*, QC = *Quercus coccifera*, QCE = *Q. cerris*, QI = *Q. infectoria*, QP = *Q. petraea*, RC = *Rosa canina*, RCA = *Rubus canescens*, RP = *Robinia pseudoacacia*, SA = *Salix alba*, SJ = *Spartium junceum*, SO = *Styrax officinalis*, TA = *Tilia argentea*, TT = *Tilia tomentosa*

Site No.	Altitude in metres above sea level (m)	Provinces and geographic coordinates	The list of forest trees and shrubs
1.	15	Bandırma, 40°13'N-028°02'E	SA, RP, CSE
2.	15	Bandırma, 40°13'N-028°02'E	SA, PA
3.	10	Bandırma, 40°14'N-028°02'E	FOR
4.	33	Bandırma, 40°13'N-028°03'E	CSE, PB, PD
5.	24	Bandırma, 40°14'N-028°04'E	QI, QC, RC, CM, RCA
6.	20	Manyas, 40°07'N-028°02'E	SA
7.	16	Manyas, 40°07'N-028°56'E	SA, PA
8.	80	Manyas, 40°05'N-027°55'E	QI, QC, CM, SO, CSI, CC
9.	34	Manyas, 40°06'N-027°58'E	PO
10.	200	Erdek, 40°25'N-027°47'E	PP, PB, QC, RC, EA
11.	120	Erdek, 40°27'N-027°48'E	PO, CB, FO, CS
12.	210	Erdek, 40°26'N-027°49'E	PO, TT, CS, EA
13.	175	Erdek, 40°26'N-027°47'E	AG, PO, FO
14.	135	Erdek, 40°26'N-027°46'E	OE, QCE,
15.	29	Erdek, 40°29'N-027°46'E	CS, QCE, MG
16.	350	Erdek, 40°28'N-027°45'E	CS, QCE, MG, PE
17.	310	Erdek, 40°28'N-027°45'E	EA, QI, AA, AU,
18.	545	Erdek, 40°27'N-027°50'E	FO, QP
19.	730	Erdek, 40°27'N-027°48'E	FO
20.	715	Erdek, 40°28'N-027°50'E	FO, QP, CS
21.	395	Erdek, 40°28'N-027°51'E	FO, CS, TA
22.	448	Erdek, 40°27'N-027°50'E	FO, CS, TA
23.	488	Erdek, 40°28'N-027°52'E	PO, CS, QCE
24.	452	Erdek, 40°28'N-027°52'E	FO, CS
25.	203	Erdek, 40°27'N-027°54'E	FO, CS, PO
26.	400	Erdek, 40°25'N-027°53'E	EA, QCE
27.	25	Manyas, 40°04'N-028°02'E	SA, PA
28.	24	Manyas, 40°06'N-028°03'E	PS
29.	310	Erdek, 40°25'N-027°48'E	PP
30.	460	Erdek, 40°26'N-027°49'E	PN, QC
31.	464	Erdek, 40°26'N-027°49'E	QCE
32.	400	Erdek, 40°27'N-027°50'E	FO, QP
33.	145	Erdek, 40°28'N-027°52'E	FO, CB, CS
34.	255	Erdek, 40°26'N-027°49'E	PB, QC, EA, AA, SJ, PT
35.	325	Erdek, 40°26'N-027°48'E	AG, PO, QCE
36.	245	Erdek, 40°26'N-027°47'E	PO, AG, PB
37.	233	Erdek, 40°27'N-027°45'E	CS, PB, QC, EA
38.	83	Erdek, 40°28'N-027°46'E	CB, CS, TT, EA, AU
39.	275	Erdek, 40°28'N-27°45'E	QCE, CS, EA, MG
40.	50	Erdek, 40°26'N-027°45'E	EA, AU, AA
41.	50	Erdek, 40°26'N-027°53'E	PB, PP
42.	304	Erdek, 40°26'N-027°53'E	QP
43.	156	Erdek, 40°27'N-027°54'E	FO, CB, CS
44.	110	Erdek, 40°28'N-027°54'E	FO, QP, CS, TT
45.	60	Erdek, 40°28'N-027°54'E	PB, PO, CSE
46.	450	Erdek, 40°27'N-027°50'E	FO, CS, QP
47.	520	Erdek, 40°28'N-027°50'E	FO, TT
48.	780	Erdek, 40°28'N-027°50'E	FO
49.	655	Erdek, 40°28'N-027°50'E	FO, CB
50.	199	Erdek, 40°28'N-027°51'E	FO, PO
51.	70	Erdek, 40°29'N-027°51'E	PT, PO, EA, QI
52.	22	Erdek, 40°28'N-027°54'E	PO

floristic list. Thus, the same taxa collected from different localities were represented with the first collector number, i.e., *Orthotrichum affine* Brid. was collected from localities 3, 5, 10, 16, 30 and 39 was identified by the collector number ÖREN 12.

The plant list enumerates the nomenclature for the bryophytes follows Grolle (1983), Casas (1998), Grolle

and Long (2000) and Hill *et al.* (2006). We utilized the works of Schuster (1966, 1969, 1974), Lawton (1971), Grout (1972), Agnew and Vondracek (1975), 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), Cortini Pedrotti (2001, 2006),

Kürschner (2001), Söderström *et al.* (2002). Heyn and Hermstadt (2004) and Hallingbäck *et al.* (2006) in order to identification and nomenclature of the samples.

The new taxa for the A1 grid square are indicated with an asterisk (*) and the second records taxa for the bryophyte flora of Turkey are indicated with two asterisks (**) in the floristic catalogue. In addition, the status of the taxa for Turkey was determined by reviewing the related literature (Uyar and Çetin, 2004; Kürschner and Erdağ, 2005). Information about new taxa for the A1 grid square was obtained from the literature (Walther, 1967, 1970; Henderson, 1961b, 1963; Henderson and Prentice, 1969; Yayınç and Iwatsuki, 1988; Yayınç *et al.*, 1990, 1994, 1996; Yayınç and Tonguç, 1994, 1996; Çetin, 1999a, 1999b; Papp and Sabovljević, 2003; Abay and Ursavş, 2005).

Ecological characteristics (acidity, water requirements and necessity of light) have been assessed using Dierßen (2001). The life forms of the bryophytes in this area have been evaluated using Mägdefrau (1982) and Schofield (2001).

Floristic List

Anthocerotopsida

Anthocerotaceae

1. *Anthoceros punctatus* L. -42: On soil near stream bank, TK3503.

Distribution in Turkey: A1, A3, A4, B6, C11, C12.

Marchantiopsida

Aytoniaceae

*2. *Reboulia hemisphaerica* (L.) Raddi-13: On soil near stream bank, TK3518.

Distribution in Turkey: A2, A4, B6, B7, B8, C11, C12, C13.

Conocephalaceae

3. *Conocephalum conicum* (L.) Dumort. -12, 76 and 78: Near stream bank, TK3524.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B8, C11, C12.

Lumulariaceae

4. *Lumularia cruciata* (L.) Dumort. ex Lindb. -13: On soil near stream bed, TK3507.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B9, C11, C12.

Marchantiaceae

5. *Marchantia polymorpha* L. -24: On wet rock near stream bank, TK3520.

Distribution in Turkey: A1, A2, A4, A5, B6, B8, B9, C11, C12, C13, C15.

Metzgeriaceae

6. *Metzgeria furcata* (L.) Dumort. -18: On rock and 46: on bark of tree, TK3501.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, C11, C12, C13.

Pelliaceae

7. *Pellia endiviifolia* (Dicks.) Dumort. -76, 78: On wet soil near stream bank, TK3525.

Distribution in Turkey: A1, A2, A3, A4, B6, B7, B9, C11, C12.

Fossombroniaceae

8. *Fossombronia pusilla* (L.) Nees-38: On soil, TK3500.

Distribution in Turkey: A1, A2, A3, A4, B6, C11, C12.

Geocalyceae

9. *Lophocolea heterophylla* (Schr.) Dumort. -3: On dead tree trunk, TK3509.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7.

10. *Chiloscyphus polyanthus* (L.) Corda-13: On rock in stream bed, TK3514.

Distribution in Turkey: A1, A2, A4, A5, B6, C11.

Radulaceae

11. *Radula complanata* (L.) Dumort. -11, 12: On the barks and 15: on rocks near stream bank, TK3506.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, C11, C13.

Porellaceae

12. *Porella cordaeana* (Huebener) Moore-13, 18: On rock and 46: on barks near stream banks, TK3502.

Distribution in Turkey: A1, A2, A4, B6, B7, C11, C13.

13. *P. platyphylla* (L.) Pfeiff. -72: On rock and 73: on barks of *Quercus* sp., TK3526.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, C11, C12, C13.

Frullaniaceae

14. *Frullania dilatata* (L.) Dumort. -3, 5, 11, 19 and 73: On tree trunk, TK3505.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, C11, C12, C13.

Lejeuneaceae

15. *Lejeunea cavifolia* (Ehrh.) Lindb. -13: On soil near stream bed, TK3519.

Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11.

BRYOPSIDA

Polytrichaceae Schwägr.

16. *Pogonatum aloides* (Hedw.) P.Beauv. - 18, 19, 22, 40, 43 and 49: On sandy soil in forest track, ÖREN 55.

Distribution in Turkey: A1, A2, A3, A4, B6.

17. *Polytrichastrum formosum* (Hedw.) G.L.Sm. -11, 21: On soil near stream banks in woodland, ÖREN 41.

Distribution in Turkey: A1, A2, A3, A4, A5.

18. *Polytrichum juniperinum* (Hedw.) -22, 26, 43 and 51: sandy gravely in woodland, ÖREN 68.

Distribution in Turkey: A1, A2, A4, A5, B6, B8, B10.

19. *P. piliferum* (Hedw.) -43: On sandy soil in forest track, ÖREN 106.

Distribution in Turkey: A1, A2, A4, B7, B8, C11.

Funariaceae Schwägr.

20. *Funaria hygrometrica* (Hedw.) -1: On mortar wall, 10: on soil covered rocks, ÖREN 20.

Distribution in Turkey: A1, A2, A4, B6, C11, C12, C13, C14.

Grimmiaceae Arn.

21. *Grimmia decipiens* (Schultz) Lindb. -37: On rocks in woodland, ÖREN 109.

Distribution in Turkey: A1, A2, B6, C11, C13.

*22. *G. dissimulata* E.Maier -18, 21, 24 and 49: On rocks near stream bed, ÖREN 57.

Distribution in Turkey: A2.

23. *G. laevigata* (Brid.) Brid. -14, 28: On bare rocks, ÖREN 35.

Distribution in Turkey: A1, A2, A4, B6, B7, B8, B9, C11, C13, C15.

24. *G. montana* Bruch and Schimp. -28: On bare rocks, ÖREN 89.

Distribution in Turkey: A1, B6.

25. *G. pulvinata* (Hedw.) Sm. -1: On bark of tree, 2, 4 and 14: on mortar wall, 25, 34: on bare rocks, ÖREN 13.

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

26. *Racomitrium heterostichum* (Hedw.) Brid. -22, 44: On acidic rocks, ÖREN 66.

Distribution in Turkey: A1, A2, A4.

27. *Schistidium apocarpum* (Hedw.) Bruch and Schimp. -13, 15, 33 and 57: On rocks near stream bed, 14, 47: on rocks in woodland, ÖREN 39.

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

28. *S. confertum* (Funck) Bruch and Schimp. -51: On rock near roadside, ÖREN 118.

Distribution in Turkey: A1, A2, A4, B6, B8, B9, C13, C14.

Fissidentaceae Hedw.

29. *Fissidens bryoides* (Hedw.) -47: On soil near stream banks in woodland, ÖREN 111.

Distribution in Turkey: A1, A2, B6, C11.

*30. *F. crassipes* Wilson ex Bruch and Schimp. -11, 13: On soil near stream banks in woodland, 18: on wet rock near stream banks in woodland, ÖREN 62.

Distribution in Turkey: B6, C11.

*31. *F. exilis* Hedw. -31: on damp soil in sheltered banks, ÖREN 97.

Distribution in Turkey: B6, C11.

*32. *F. rivularis* (Spruce) Schimp. -24, 33, 35, 38 and 50: On wet or submerged rock, ÖREN 69.

Distribution in Turkey: A2, B6.

33. *F. taxifolius* (Hedw.) -8: On soil in woods, 11, 18, 21, 38 and 46: on soil on bank in woodland, ÖREN 16.

Distribution in Turkey: A1, A2, A3, A4, B6, C11.

34. *F. viridulus* (Sw. ex anon.) Wahlenb. -8: On soil in woods, 16, 25: on soil on bank in woodland, ÖREN 21.

Distribution in Turkey: A1, A2, B6, C11, C12, C13.

Ditrichaceae Limpr.

35. *Ceratodon purpureus* (Hedw.) Brid. -16, 29 and 40: On soil in woods and woodland, ÖREN 43.

Distribution in Turkey: A1, A2, A4, A5, B6, B7, B8, C14.

36. *Ditrichum heteromallum* (Hedw.) E.Britton -5, 27: On soil on bank in woods, ÖREN 26.

Distribution in Turkey: A1, A2, A3, A4.

Dicranaceae Schimp.

37. *Dicranella heteromalla* (Hedw.) Schimp. -20, 49: On acidic soil on banks, ÖREN 58.

Distribution in Turkey: A1, A2, A3, A4, B6.

38. *Dicranum scoparium* (Hedw.) -18, 22, 26, 43 and 49: On humus soil in woodland, ÖREN 73.

Distribution in Turkey: A1, A2, A3, A4, A5, B6.
Pottiaceae Schimp.

*39. *Hymenostylium recurvirostrum* (Hedw.) Dixon -16: on soil in rock crevices, ÖREN 48.
Distribution in Turkey: A2, B6, C11.

40. *Trichostomum brachydontium* Bruch-34: On calcareous soil, ÖREN 92.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C12, C13.

41. *Weissia controversa* (Hedw.) var. *controversa*-11, 14: on sandy soil near roadside, 10, 45: on rock crevices, ÖREN 32.
Distribution in Turkey: A1, A2, A4, B6, B7, C11.

42. *W. controversa* (Hedw.) var. *crispata* (Nees and Hornsch.) Nyholm-34: On rock crevices, ÖREN 86.
Distribution in Turkey: A1, A2, A3, A4, B6, B9, C11, C12.

**43. *W. levieri* (Limpr.) Kindb. -5: On soil amongst limestone rock, ÖREN 27.
Distribution in Turkey: B6.

44. *W. longifolia* Mitt. -8, 17 and 26: On bare soil near woods, ÖREN 7.
Distribution in Turkey: A1, B6.

45. *Barbula convoluta* (Hedw.) var. *convoluta* -46: On soil in woods, ÖREN 123.
Distribution in Turkey: A1, A2, A3, A4, B6, C11, C12, C13.

*46. *B. convoluta* (Hedw.) var. *commutata* (Jur.) Husn. -42: On soil in woods, ÖREN 116.
Distribution in Turkey: B6, C11.

47. *B. unguiculata* Hedw. -5, 8, 32, 34 and 38: On soil in deciduous forest, ÖREN 6.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C13.

48. *Didymodon fallax* (Hedw.) R.H. Zander -26, 41: On soil near road side, ÖREN 70.
Distribution in Turkey: A1, A2, A3, B6, B8, B10, C11, C13.

49. *D. insulanus* (De Not.) M.O.Hil (*D. insulanus* (De Not.) M.O.Hil)-16: On soil shady places, ÖREN 67.
Distribution in Turkey: A1, A3, A4, B6, C11, C13.

50. *D. rigidulus* Hedw. -26: On soil near roadside, ÖREN 22.
Distribution in Turkey: A1, A2, A4, B6, B8, C11.

51. *D. vinealis* (Brid.) R.H. Zander -1, 4: on mortar walls, on rocks in woods, ÖREN 1.
Distribution in Turkey: A1, A2, A3, B6, B7, B8, B9, C11, C12, C13, C14.

52. *Phascum cuspidatum* Hedw. -8: On bare soil, ÖREN 60.
Distribution in Turkey: A1, A2, B6, B7, C11.

53. *Syntrichia calcicola* J.J. Amann-2: On mortar walls near roadside, ÖREN 28.
Distribution in Turkey: A1, A2, B6.

54. *S. laevipila* Brid. -9, 27 and 52: On bark of trees, ÖREN 10.
Distribution in Turkey: A1, A2, B6, C11.

55. *Tortula muralis* Hedw. var. *muralis*-2, 4: On mortar walls, 42: on rock in woodland, ÖREN 14.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, B8, B9, C12, C13, C14.

56. *T. muralis* Hedw. var. *aestiva* Brid. ex Hedw. -2, 42: On shaded rocks, ÖREN 117.
Distribution in Turkey: A1, A2, C11, C14.

57. *T. schimperi* M.J.Cano, O.Werner and J.Guerra (*T. subulata* Hedw. var. *angustata* (Schimp.) Limpr.)-11, 32: On soil in woodland ÖREN 61.
Distribution in Turkey: A1, A2, B6, B8, C11.

58. *T. subulata* Hedw. -14, 16, 20 and 39: On soil and rock in woodland, ÖREN 44.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, B8, C11, C12, C13.
Orthotrichaceae Arn.

59. *Orthotrichum affine* Schrad. ex Brid. (*O. fastigiatum* Bruch ex Brid.)-3, 5, 10, 16, 30 and 39: on bark, ÖREN 12.
Distribution in Turkey: A1, A2, A3, A4, B6, C13.

60. *O. anomalum* Hedw. -34: on rocks in woodland, ÖREN 84.
Distribution in Turkey: A1, A2, A3, A4, B6, B8, C11, C13.

61. *O. diaphanum* Schrad. ex Brid. -1, 8 and 9: on bark, ÖREN 3.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, C13.

62. *O. pallens* Bruch ex Brid. -27: on bark, ÖREN 87.
Distribution in Turkey: A1, A2, A3.

63. *O. pumilum* Sw. ex. anon. -5, 25 and 35: on bark, ÖREN 15.
Distribution in Turkey: A1, A3, B6, C12.
64. *O. rupestre* Schleich. ex Schwägr. -14: on bare rocks, ÖREN 36.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B8, C13.
65. *Zygodon rupestris* Schimp. ex Lorentz-35, 45: on bark, ÖREN 120.
Distribution in Turkey: A1, B6, C11, C12.
Hedwigiaceae Schimp.
66. *Hedwigia ciliata* (Hedw.) P.Beauv. -14: on bare rocks, ÖREN 31.
Distribution in Turkey: A1, A2, A4, A5, B6, B7, C11.
Bartramiaceae Schwägr.
67. *Bartramia pomiformis* Hedw. -22: on sandy soil near roadside, ÖREN 63.
Distribution in Turkey: A1, B6, A4, C11, C14.
- *68. *Philonotis arnellii* Husn. -44: on shaded rocks near waterfall, ÖREN 104.
Distribution in Turkey: A2, A4.
Bryaceae Schwägr.
69. *Bryum alpinum* Huds. ex With. - 24: on rocks in woodland, ÖREN 110.
Distribution in Turkey: A1, A2, A3, B6, B7, B8, C11, C13.
70. *B. argenteum* Hedw. (*B. argenteum* var. *lanatum* (P.Beauv.) Hampe)-14: on rocks in open area, ÖREN 34.
Distribution in Turkey: A1, A2, A4, A5, B6, B8, B9, C13, C14.
71. *B. caespiticium* Hedw. -2: on rocks, 10: on soil in open areas, ÖREN 23.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, B8, B9, C11, C13, C15.
72. *B. capillare* Hedw. -4, 14: on rocks, 1, 8: on tree trunk, 10, 17: on soil in open or shaded habitats, ÖREN 8.
Distribution in Turkey: A1, A2, A4, A5, B6, B7, B8, B9, C11, C12, C13.
- *73. *B. gemmiparum* De Not. -2: on rocks crevices near water leakage, ÖREN 119.
Distribution in Turkey: B6, C11.
74. *B. pseudotriquetrum* (Hedw.) P. Gaertn., E. Mey. and Scherb. -24: on wet rocks near water leakage, ÖREN 80.
Distribution in Turkey: A1, A2, A3, A4, B6, B8, C13.
75. *B. torquescens* Bruch and Schimp. -4: on rocks, 5: on tree root ÖREN 24.
Distribution in Turkey: A1, A2, B6, B8, C11, C12.
Mielichhoferiaceae Schimp.
76. *Epipterygium tozeri* (Grev.) Lindb. -25, 31 and 42: on loamy soil near stream bank, ÖREN 115.
Distribution in Turkey: A1.
- *77. *Pohlia elongata* Hedw. -5: on wet soil in woodland, ÖREN 25.
Distribution in Turkey: A2, A4, B6.
- *78. *P. wahlenbergii* (F. Weber and D. Mohr) A.L. Andrews var. *calcareo* (Warnst.) E.F.Warb. -24: on wet rocks, 27, 36: on soil near stream bed, ÖREN 71.
Distribution in Turkey: A2, A3, C11, C12.
Mniaceae Schwägr.
79. *Mnium lycopodioides* Schwägr. (*M. ambiguum* H.Müll)-21, 24 and 43: on wet rocks near stream bed, ÖREN 83.
Distribution in Turkey: A1, A2, A3, A4.
80. *M. hornum* Hedw. -19, 21 and 33: on wet rocks near stream bed, 43, 48: on soil stream bank, ÖREN 64.
Distribution in Turkey: A1, A2, A4.
81. *M. stellare* Hedw. -18, 33, 38 and 46: on soil stream bank, ÖREN 29.
Distribution in Turkey: A1, A2, A4, B6.
Cinclidiaceae Kindb.
82. *Rhizomnium punctatum* (Hedw.) T.J.Kop. -21, 42: on soil stream bank, ÖREN 93.
Distribution in Turkey: A1, A2, A3, A4, B6, B8.
Plagiomniaceae T.J.Kop.
83. *Plagiomnium affine* (Blandow ex Funck) T.J.Kop. -18, 24, 33 and 45: on soil stream bank, ÖREN 33.
Distribution in Turkey: A1, A2, A4, B6, B8.
- *84. *P. elatum* (Bruch and Schimp.) T.J.Kop. -46: on soil stream bank, ÖREN 78.
Distribution in Turkey: A2, A3, A4.

85. *P. undulatum* (Hedw.) T.J.Kop. -21, 24, 25 and 50: on sandy soil stream bank, 15: on wet rocks near stream bed, ÖREN 54.

Distribution in Turkey: A1, A2, A3, A4, B6, C13.

Fontinalaceae Schimp.

86. *Fontinalis antipyretica* Hedw. var. *antipyretica*-31, 46: attached to rocks in moving water, ÖREN 88.

Distribution in Turkey: A1, A2, A4, A5, B6, B7, C11, C12, C13.

**87. *Fontinalis antipyretica* Hedw. subsp. *gracilis* (Lindb.) Kindb. -15: attached to rocks in moving water, ÖREN 85.

Distribution in Turkey: C12.

Amblystegiaceae Kindb.

*88. *Campylium protensum* (Brid.) Kindb. -30: on wet rocks near stream bed, ÖREN 113.

Distribution in Turkey: A2.

89. *Cratoneuron filicinum* (Hedw.) Spruce var. *atrovirens* (Brid.) Ochyra-18: on wet rocks in woodland, ÖREN 50.

Distribution in Turkey: A1, A2, A4, B6, B7, B10, C11, C12.

*90. *Hygroamblystegium fluviatile* (Hedw.) Loeske-50: on rocks in stream bed, ÖREN 98.

Distribution in Turkey: A2, A3, A4, B6.

*91. *H. tenax* (Hedw.) Jenn. -25, 35 and 52: on rocks in stream bed, ÖREN 90.

Distribution in Turkey: A2, A4, B6, B8, B9, C13.

92. *Leptodictyum riparium* (Hedw.) Warnst. -46: on rocks in damp habitats, ÖREN 121.

Distribution in Turkey: A1, A2, A4, A5, B6, B7, C11.

Brachytheciaceae Schimp.

*93. *Plasteurhynchium striatulum* (Spruce) M.Fleisch. (*Eurhynchium striatulum* (Spruce) Schimp.)-31: on rocks near stream bed, ÖREN 99.

Distribution in Turkey: A2, A4, C11.

94. *Eurhynchium striatum* (Hedw.) Schimp. -21: on damp soil in woodland, ÖREN 108.

Distribution in Turkey: A1, A2, A3, A4, B6, C11, C12.

95. *Platyhypnidium riparioides* (Hedw.) Dixon-12, 13, 15, 18, 21, 24, 35, 36, 43 and 44: attached to rocks in moving water, ÖREN 45.

Distribution in Turkey: A1, A2, A4, A5, B6, B8, B9, C11.

96. *Rhynchostegium confertum* (Dicks.) Schimp. -13, 18: damp soil in woodland, 38, 47: on soil in stream banks, ÖREN 74.

Distribution in Turkey: A1, A3, A4, B6, C11.

97. *R. megapolitanum* (Blandow ex F. Weber and D. Mohr) Schimp. -4, 5, 8 and 38: on soil in shaded habitats, ÖREN 2.

Distribution in Turkey: A1, A2, B6, C12.

98. *Rhynchostegiella tenella* (Dicks.) Limpr. -25: on rocks near stream bed, ÖREN 107.

Distribution in Turkey: A1, A3, A4, A5, B6, C11, C12, C13.

*99. *R. teneriffae* (Mont.) Dirkse and Bouman-12, 13 and 35: on wet rocks near stream bed, ÖREN 47.

Distribution in Turkey: A2, B6.

100. *Cirriphyllum crassinervium* (Wilson) Schimp. (*E. crassinervium* (Taylor) Schimp.)-12, 18, 21 and 25: on rocks near stream bed, ÖREN 46.

Distribution in Turkey: A1, A2, A4, B6, B7, C11.

101. *Oxyrrhynchium hians* (Hedw.) Sande Lac. (*Eurhynchium hians* (Hedw.) Sande Lac.)-15: on rocks in water leakage, ÖREN 96.

Distribution in Turkey: A1, A2, A3, A4, B6, C11, C12, C13.

102. *O. pumilum* (Wilson) Loeske (*Eurhynchium pumilum* (Wilson) Schimp.)-11, 32 and 38: on soil in stream banks, ÖREN 81.

Distribution in Turkey: A1, A2, A3, B6, C13.

103. *O. schleicheri* (R. Hedw.) Röhl (*Eurhynchium schleicheri* (R. Hedw.) Jur.)-5, 32: on soil in shaded habitats, ÖREN 95.

Distribution in Turkey: A1, B6, C11.

104. *O. speciosum* (Brid.) Warnst. (*Eurhynchium speciosum* (Brid.) Jur.)-25, 32: on wet rocks near stream bed, ÖREN 91.

Distribution in Turkey: A1, A2, A4, B6, C11, C12.

105. *Kindbergia praelonga* (Hedw.) Ochyra (*Eurhynchium praelongum* (Hedw.) Schimp.)-13, 15, 21, 33, 38, 43, 45 and 50: on soil in stream banks, ÖREN 52.

Distribution in Turkey: A1, A2, A3, A4, B6, B8, C11, C12.

*106. *Sciuro-hypnum oedipodium* (Mitt.) Ignatov and Huttunen (*Brachythecium oedipodium* (Mitt.) A. Jaeger)-11: on fallen and decaying logs, 38, 53: on rocks in woodland, ÖREN 59.

Distribution in Turkey: A2, A3, A4.

*107. *Brachythecium mildeanum* (Schimp.) Schimp. -43: on humus soil in woodland, ÖREN 102.

Distribution in Turkey: A2, A3, A4.

108. *B. rivulare* Schimp. -20, 33, 44 and 45: on submerged or wet rocks in stream bed, ÖREN 56.

Distribution in Turkey: A1, A2, A4, A5, B6, B8, B9, B10, C11, C12.

109. *B. rutabulum* (Hedw.) Schimp. -5: on tree trunk, ÖREN 17.

Distribution in Turkey: A1, A2, A3, A4, B6, B8, C11, C14.

110. *B. salebrosum* (Hoffm. ex F.Weber and D.Mohr) Schimp. -31: on soil in woods, ÖREN 101.

Distribution in Turkey: A1, A2, A3, A4, B6, C11, C13.

111. *Scleropodium tourettii* (Brid.) L.F.Koch-8, 10, 11, 12, 13, 42, 43 and 51: on damp soil in shaded habitats, ÖREN 5.

Distribution in Turkey: A1, A2, A3, B6, C11.

112. *Eurhynchiastrum pulchellum* (Hedw.) Ignatov and Huttunen (*Eurhynchium pulchellum* (Hedw.) Jem.)-24: on rocks in water leakage, 42: on soil in stream banks, ÖREN 81.

Distribution in Turkey: A1, A2, A4, A5, B6, B8, B10.

*113. *E. pulchellum* (Hedw.) Ignatov and Huttunen var. *diversifolium* (Schimp.) Ochyra and Zý arnowiec (*Eurhynchium pulchellum* var. *diversifolium* (Schimp.) C.E.O.Jensen)-42: on rocks in water leakage, ÖREN 65.

Distribution in Turkey: A2.

114. *Brachytheciastrum velutinum* (Hedw.) Ignatov and Huttunen (*Brachythecium velutinum* (Hedw.) Schimp.)-5, 18 and 32: on tree trunk, ÖREN 18.

Distribution in Turkey: A1, A2, A5, B6, B10, C11, C13.

115. *Homalothecium sericeum* (Hedw.) Schimp. -21, 24 and 28: on rocks in shaded and open habitats, 5, 11, 12, 19 and 23: on tree trunk, ÖREN 19.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B8, B9, B10, C11, C12, C13, C14.

Hypnaceae Schimp.

116. *Ctenidium molluscum* (Hedw.) Mitt. -33: on wet rocks in woodland, ÖREN 122.

Distribution in Turkey: A1, A2, A3, A4, B6.

*117. *Hypnum callichroum* Brid. -19: on decaying wood, ÖREN 72.

Distribution in Turkey: A2, A4.

118. *H. cupressiforme* Hedw. var. *cupressiforme*-3, 5, 8, 11, 26, 30 and 36: on tree trunk, 10: on rocks, ÖREN 9

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, C11, C13.

119. *H. cupressiforme* Hedw. var. *lacunosum* Brid. (*H. lacunosum* (Brid.) Hoffm. ex Brid.)-1, 8 and 9: on tree trunk, 25, 28: on rocks, ÖREN 4.

Distribution in Turkey: A1, A2, A3, A4, B6.

120. *H. cupressiforme* Hedw. var. *resupinatum* (Taylor) Schimp. (*H.resupinatum* Taylor)-30: on tree barks, ÖREN 94.

Distribution in Turkey: A1, A2, B6, A4, C11.

121. *Pylaisia polyantha* (Hedw.) Schimp. -8, 11, 16 and 21: on tree trunk, ÖREN 30.

Distribution in Turkey: A1, A2, A3, B6.

Pterigynandraceae Schimp.

122. *Pterigynandrum filiforme* Hedw. -20, 21 and 47: on rocks in shaded habitat, ÖREN 53.

Distribution in Turkey: A1, A2, A3, B6, C11.

Hylocomiaceae (Broth.) M.Fleisch.

*123. *Rhytidiadelphus triquetrus* (Hedw.) Warnst. -22: on damp soil in woodland, ÖREN 42.

Distribution in Turkey: A2, A3, A4, A5, B6.

Plagiotheciaceae (Broth.) M.Fleisch.

124. *Plagiothecium curvifolium* Schlieph. ex Limpr (*P. laetum* var. *curvifolium* (Schlieph. ex Limpr.) Mastracci and M.Sauer)-11, 21, 46 and 47: on damp soil in stream banks, ÖREN 49.

Distribution in Turkey: A1, A2.

125. *P. nemorale* (Mitt.) A.Jaeger-21, 25 and 45: on damp soil in stream banks, ÖREN 82.

Distribution in Turkey: A1, A2, A3, A4, B8.

126. *P. succulentum* (Wilson) Lindb. -15, 24 and 46: on damp soil in stream banks, ÖREN 76.

Distribution in Turkey: A1, A2, A4.

Pylaisiadelphaceae Goffinet and W.R.Buck

127. *Platygyrium repens* (Brid.) Schimp. -3: on tree trunk, 37: on rocks in shaded habitats, ÖREN 11.

Distribution in Turkey: A1, A2, A4, B6, C11.

Leucodontaceae Schimp.

128. *Antitrichia curtispindula* (Hedw.) Brid. -22: on shaded rocks in woodland, ÖREN 40.

Distribution in Turkey: A1, A2, A3, A4, B6, C11.

129. *Leucodon sciuroides* (Hedw.) Schwägr. -10, 16, 20 and 35: on tree trunk, ÖREN 75.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B6, C11, C12, C13.

Neckeraceae Schimp.

130. *Neckera complanata* (Hedw.) Huebener-13: on rocks near stream bed, 33, 38: on tree trunk, ÖREN 51.

Distribution in Turkey: A1, A2, A3, A4, B6, C13.

131. *Thamnobryum alopecurum* (Hedw.) Gangulee-12, 15, 18, 31 and 47: on wet rock in stream bed, ÖREN 37.

Distribution in Turkey: A1, A2, A3, A4, B6, C11, C12.

Lembophyllaceae Broth.

132. *Isothecium alopecuroides* (Lam. ex Dubois) Isov. -43, 48: on rocks near stream bed, ÖREN 103.

Distribution in Turkey: A1, A2, A4, B6, C11, C13.

*133. *I. myosuroides* Brid. var. *brachythecioides* (Dixon) Braithw. -18: on rocks near stream bed, UYAR 753.

Distribution in Turkey: A2.

Anomodontaceae Kindb.

134. *Anomodon viticulosus* (Hedw.) Hook. and Taylor -21: on rocks in damp habitats, ÖREN 105.

Distribution in Turkey: A1, A2, A3, A4, B6, C13.

RESULTS AND DISCUSSION

In this study, a total of 134 taxa belonging to the *Bryopsida* (119 taxa), *Anthocerotopsida* (1 taxon) and *Marchantiopsida* (14 taxa) were determined. According to the grid system described by Henderson (1961a) the number of new records in the study area (A1 square) is 25. These species are; *Reboulia hemisphaerica*, *Fissidens crassipes*, *F. exilis*, *F. rivularis*, *Barbula convoluta* var. *commutata*, *Hymenostylium recurvirostrum*, *Grimmia dissimulata*, *Pohlia elongata*, *P. wahlenbergii* var. *calcareo*, *Bryum gemmiparum*, *Plagiomnium elatum*, *Philonotis arnellii*, *Campylium protensum*, *Hygroamblystegium fluviatile*, *H. tenax*, *Brachythecium mildeanum*, *Sciuro-hypnum oedipodium*, *Eurhynchiastrium pulchellum* var. *diversifolium*, *Plasteurhynchium striatulum*, *Rhynchostegiella teneriffae*, *Hypnum callichroum*, *Rhytidiadelphus triquetrus*, *Fontinalis antipyretica* var. *gracilis*, *Isothecium myosuroides* var. *brachythecioides* and

Weissia levieri (indicated as a rare species in Red Data Book of European Bryophytes) (Schumacker *et al.*, 1995). In addition, *Fontinalis antipyretica* var. *gracilis* which has been only known from Köprülü Kanyon National Park in Antalya province (Çetin, 1989) and *Isothecium myosuroides* var. *brachythecioides* which has been newly reported from Yiğilca district in Düzce province (Uyar and Çetin, 2004), were secondly recorded from Balıkesir province, Erdek town, Kapıdağ peninsula.

The distribution of the bryophyte taxa according to the families are shown in order below (Table 2).

As it is clearly seen in Table 2, Brachytheciaceae is the richest family in the species. Pottiaceae, Grimmiaceae, Orthotrichaceae, Bryaceae, Fissidentaceae Hypnaceae and Amblystegiaceae, are other foremost components of the flora. Nevertheless, 18 families are represented monotypically in the area.

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

Families	No. of species	%
Brachytheciaceae	23	17,2
Pottiaceae	20	14,9
Grimmiaceae	8	6,0
Orthotrichaceae	7	5,2
Bryaceae	7	5,2
Fissidentaceae	6	4,5
Hypnaceae	6	4,5
Amblystegiaceae	5	3,7
Polytrichaceae	4	3,0
Mielichhoferiaceae	3	2,2
Mniaceae	3	2,2
Plagiomniaceae	3	2,2
Plagiotheciaceae	3	2,2
Ditrichaceae	2	1,5
Dicranaceae	2	1,5
Bartramiaceae	2	1,5
Fontinalaceae	2	1,5
Leucodontaceae	2	1,5
Neckeraceae	2	1,5
Lembophyllaceae	2	1,5
Geocalycaceae	2	1,5
Porellaceae	2	1,5
Funariaceae	1	0,7
Hedwigiaceae	1	0,7
Cincliaceae	1	0,7
Pterigynandraceae	1	0,7
Hylcomiaceae	1	0,7
Pylaisiadelphaceae	1	0,7
Anomodontaceae	1	0,7
Aytoniaceae	1	0,7
Conocephalaceae	1	0,7
Lunulariaceae	1	0,7
Marchantiaceae	1	0,7
Metzgeriaceae	1	0,7
Pelliaceae	1	0,7
Fossombroniaceae	1	0,7
Radulaceae	1	0,7
Frullaniaceae	1	0,7
Lejeuneaceae	1	0,7
Anthocerotaceae	1	0,7
Total	134	100

Table 3: Comparison of the largest families in the study area and neighbouring and distance areas (taxa numbers and percentage)

Largest families	Bryofloristic studies (Total taxa)				
	MBE. (134)	Mdr.-Ç.V. (130)	Snp. (131)	WBS. (238)	Cont.Thrc. (142)
Brachytheciaceae	23 (17.2)	15 (11.3)	23 (17.6)	31 (13)	19 (13.4)
Pottiaceae	20 (14.9)	35 (26.3)	12 (9.2)	29 (12.2)	46 (32.4)
Grimmiaceae	8 (6)	7 (5.3)	3 (2.3)	11 (4.6)	4 (2.8)
Orthotrichaceae	7 (5.2)	8 (6.0)	5 (3.8)	12 (5)	10 (7.0)
Bryaceae	7 (5.2)	13 (10)	4 (3.1)	12 (5)	11 (7.7)
Fissidentaceae	6 (4.5)	3 (2.3)	2 (1.5)	4 (1.7)	10 (7.0)
Hypnaceae	6 (4.5)	2 (1.5)	8 (6.1)	13 (5.5)	3 (2.1)
Amblystegiaceae	5 (3.7)	3 (2.3)	9 (6.9)	5 (2.1)	4 (2.8)
Polytrichaceae	4 (3)	2 (1.5)	3 (2.3)	6 (2.5)	1 (0.7)

Abbreviations: MBE: Manyas, Bandırma and Erdek (Balıkesir), Mdr.-Ç.V.: Madran Mountain and Çine Valley (Aydn) (Erdag, 2002), Snp.: Sinop and its environs (Ayancık, Boyabat and Gerze) (Çetin & Uyar, 1997; Çetin, 1999c). WBS.: Western Black Sea Region (Uyar and Çetin 2006; Keçeli and Çetin, 2006), Cont.Thrc.: Contribution to the Bryophyte Flora of Turkish Thrace (Papp and Sabovljeviæ, 2003)

Table 4: Comparison of the largest genera in the study area and neighbouring and distance areas (taxa numbers and percentage)

Largest genera	Floristic Studies				
	MBE.	Mdr.-Ç.V.	Snp.	WBS	Cont. Thrc.
Bryum	7 (5.2)	11 (8.3)	4 (3.1)	12 (5)	11 (7.7)
Fissidens	6 (4.5)	3 (2.3)	2 (1.5)	4 (1.7)	10 (7.0)
Orthotrichum	6 (4.5)	7 (5.3)	5 (3.8)	8 (3.4)	9 (6.3)
Grimmia	5 (3.7)	7 (5.3)	1 (0.8)	5 (2.1)	3 (2.1)
Brachythecium	4 (3)	2 (1.5)	9 (6.9)	5 (2.1)	3 (2.1)
Didymodon	4 (3)	6 (4.5)	3 (2.3)	6 (2.5)	8 (5.6)
Hypnum	4 (3)	2 (1.5)	4 (3.1)	7 (2.9)	2 (1.4)
Oxyrrhynchium	4 (3)	3 (2.3)	1 (0.8)	2 (0.8)	2 (1.4)
Tortula	4 (3)	7 (5.3)	1 (0.8)	4 (1.7)	6 (4.2)
Weissia	4 (3)	2 (1.5)	-	2 (0.8)	4 (2.8)

* Abbreviations are below Table 3

In Table 3, the largest 9 families according to taxa number in the study compared with studied carried out in the Black Sea region (Uyar and Çetin 2006; Keçeli and Çetin, 2006; Çetin and Uyar, 1997), the Marmara region (Çetin, 1999b, 1999c; Papp and Sabovljeviæ, 2003) and Aegean region (Erdag, 2002).

The major families' order in present study is similar to Western Black Sea Region and Sinop. This situation can be explained by the similarities of vegetation types and climatic conditions between especially Kapıdağ peninsula in the study area and studies in Black Sea region.

Concerning the taxa number of ratios, the major genera in this region are as follows: *Bryum* Hedw. (7), *Fissidens* Hedw. (6), *Orthotrichum* Hedw. (6), *Grimmia* Hedw. (5), *Brachythecium* Schimp. (4), *Didymodon* Hedw. (4), *Hypnum* Hedw. (4), *Oxyrrhynchium* (Schimp.) Wamst., *Tortula* Hedw. (4) and *Weissia* Hedw. (4) (Table 4).

Their sum comprise 35.9 percent of total number of species in the area. Thirty-nine genera are represented monotypically. According to major pleurocarpous genera order in our study is similar to Western Black Sea region. Nevertheless, in respect to major acrocarpous genera order in our study is parallel to Madran Mountain and Çine Valley. A comparison between acrocarpous taxa and pleurocarpous taxa shows that the numbers of taxa acrocarpous families are higher than pleurocarpous

families' taxa members in this study area. These values indicate that the investigated area is usually semiarid but sometimes it is relatively humid.

As might be expected from the climate, mesophytic and xerophytic mosses (64.9 %) are dominant in the investigated area. These are followed by hygrophytes (29.1 %), others (5.9 %) occurred in the region (Fig. 2).

According to the light availability for the bryophytes in this region, with a majority of votes are sciophytic (64 %). The rest of taxa are photophytic (36 %). The first preference habitats of the bryophytes in the studied region are subneutrophytic in sequence acidophytic and basiphytic (Fig. 3).

In respect of the life forms of bryophytes in this region, predominant form is short turf (24.6 %) and then in sequence mat and weft (17.9 %), tall turf (11.9 %), cushion (11.1%), fan (8.9%) tail (5.2%) and annual (2.2 %) (Fig. 4).

As a result the bryophytes in the life forms such as wefts, mats, fans and tails are pleurocarpous species (50%) and other bryophyte life forms as short turfs, cushions, tall turfs and annuals are acrocarpous species (50%). 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 mosses generally cover rocks or other substrata in more humid habitats. However,

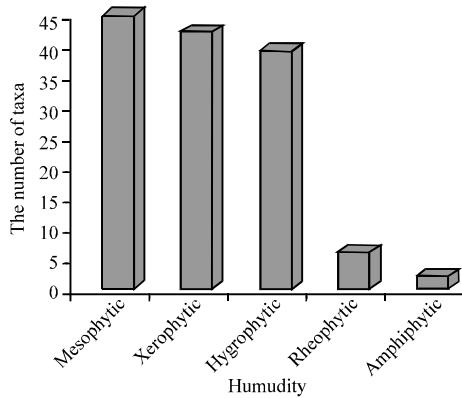


Fig. 2: Groups of bryophytes affinity for humidity preferential in the study area

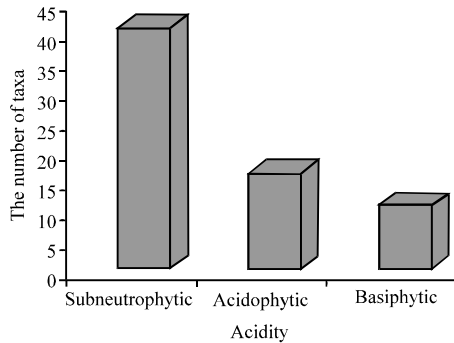


Fig. 3: Preferential acidity of mosses in the study area

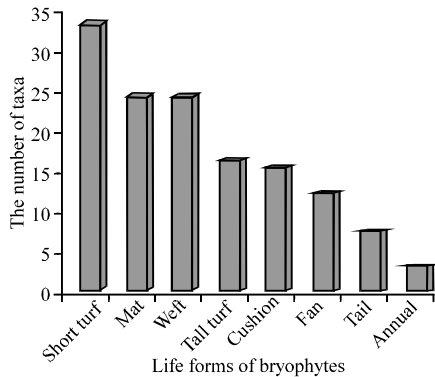


Fig. 4: Life forms among bryophytes in the study area

Abietinella abietina, *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 number of species richness in this area. As acrocarpous found to be 50% in this area may be explained by maquis in the south and southeast of the area. Nevertheless, forests are widespread in the north

and northwest of this region especially in Kapıdağ peninsula. Northern and western zones of the area are exposed to the oceanic climate of Northern Anatolia. On the other hand, its south and southeast regions are exposed little rainy Mediterranean climate of Western Anatolia. This feature seems to have an effect upon the vegetation occurring in these areas. Therefore, pleurocarpic mosses densely occur in north and northwest regions of the area. Besides, the south and southeast parts of the study area is less rugged than its western and northwest parts, the parts cleared of plants or trees have been harnessed as agricultural areas. Hence, there is a spare distribution of mosses here.

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