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Contributions to the Moss Flora of Giresun Region (Şebinkarahisar and Alucra District)

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Abstract: The aim of the study was to obtain knowledge on the moss flora of the Giresun Region-rather than to identify the entire range moss flora of the region. After the identification of 287 moss specimens collected from the research area between June and August in 2007 and 2008, total 85 taxa were defined. These taxa belong to 17 families and 37 genera of *Bryopsida* (Musci). Among them, 14 taxa -*Hygroamblystegium irriguum* Hedw., *Rhynchostegium confertum* (Dicks.) B. S. G., *Rhynchostegium alpinum* Huds. ex With., *Bryum dichotomum* Hedw., *Bryum laevifilum* Syed., *Hygrohypnum smithii* (Sw.) Broth., *Grimmia decipiens* (Schultz) Lindb., *Grimmia tergestina* Tomm. Ex Bruch and Schimp., *Schistidium flaccidum* (DeNot.) Ochyra., *Schistidium platyphyllum* (Mitt.) Kindb., *Palustriella decipens* (De Not.) Ochyra., *Desmatodon latifolius* (Hedw.) Brid., *Phascum curvicolle* Hedw., *Syntrichia princeps* (De Not.) Mitt. new for A4 grid square (40°- 42' N, 38°- 42' E) which was adopted by Henderson. Thirty six taxa are new for Giresun Province. All taxa are new for study area. For every each taxon, the habitat pattern and distribution data are presented.

Key words: A4 grid square, mosses, *Bryopsida*, Turkey

INTRODUCTION

The study area is in the A4 grid square according to the system adopted by Henderson. No study had previously been made on the moss flora of Şebinkarahisar and Alucra (Giresun) district the area chosen for this study. The region is very interesting in terms of its natural structure and its climate. Its conditions encouraged us to conduct a study on the Bryophyta (Musci).

It is hoped that this study will contribute to the identification of the moss flora of Turkey and be useful as a guide for future studies.

MATERIALS AND METHODS

Şebinkarahisar is located between Kelkit Valley and Giresun mountains in Eastern part of Black Sea region of Turkey. It is bounded by Alucra, Dereli, Suşehri and Koyulhisar Alucra district in the East where 1618 km², Dereli district in the North where 820 km², Suşehri in the South where 1665 km² and Koyulhisar where 968 km². Şebinkarahisar's area is 1378 km² and its altitude is 1405 m. The mountains, valleys and mountain pastures covers wide place in Şebinkarahisar district. The well-known mountains of the area are Beldiga Mountain and Egma Mountain. Öksürük Hill is in the North part of

Şebinkarahisar where 1970 m altitude and its South is citadel where 1550 m altitude and Dikmen Hill is in the West where 1758 m altitude, Tutak is in the Northwest where 1544 m altitude. The well-known hills are Duman village where 1300 m altitude, Baltaşi Hill and Sarıkaya Hill where 1912 m altitude (Fig. 1).

Şebinkarahisar has middle Anatolian climate. In this climate, summer is hot and rainless, winter is cold and snowy. Its mountains barriers the winds, the maximum hot month is July, on the other hand, the minimum hot month

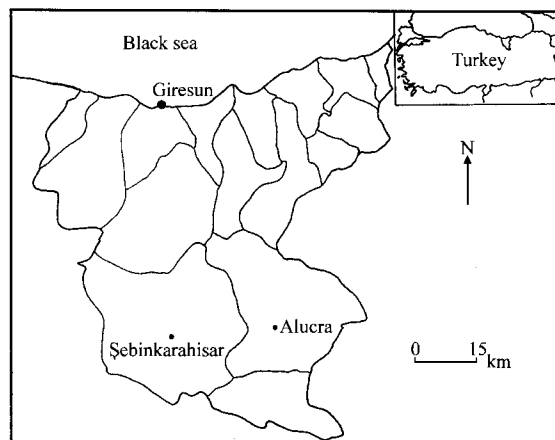


Fig. 1: Map showing the geographical position of the study area

is February. While the maximum rainy month is April, the minimum rainy month is August.

Plant cover of the region is agricultural land where 1378 km². Three thousand two hundred and ninety five ha is vineyards and orchards land, 1054 ha is vegetable garden land, 3954 ha is meadowland, 21747 ha is pasture and mountain pasture, 9385 ha is heavily forested land (*Populus tremula* L., *Abies nordmanniana* (Stev) Spac., *Crataegus pseudoheterophylla* Pojark, *Quercus robur* L., *Quercus petraea* (Mattuschka) Liebl., *Salix viminalis* L., *Pirus elaeagrifolia*, *Rosa canina* L., *Junglans regia* L., *Juniperis communis* L.) and 55680 ha is inactive land. The well-known river is Avutmuş. Its length in district is 40 km. Another river is Darabul. Its length is 20 km. Other river is Çat. Length of Kelkit River's is 40 km. Alucra is located in the South of Giresun province. Gümüşhane province is in the East and Erzincan in the South. It is 131 km at a distance to Giresun. Alucra district is mountain pasture town where 1430 m altitude from Black Sea. Çamoluk is in the South, Şebinkarahisar is in the West, Yağlıdere and Espiye are in the North. Alucra land is mountainous so agricultural land is very less in the region. The well-known mountains are Bedirga mountain where 2333 m altitude, Artabel mountains and Sariyer hills. Its land is fraught with geographic irregularities and there are small valleys between them. Alucra district's well-known rivers are Kelkit and Bağirsak. Other important lakes are Moran and İnce.

Climate of the region is hot in summer and cold and snowy in winter. Contrary to Black Sea climate, Alucra is hot and rainless in summer. The maximum hot month is August. In this month, İncedere's water dries. Alucra district have very rainy in spring. The region have mountain pasture climate in point of plant cover. The mountains hill has very trees but the sides haven't.

The moss samples were collected from 24 localities on 2007 and 2008 in Şebinkarahisar and Alucra (Table 1). The moss specimens were incised by knife or spatula from their habitats. After cleaning, the specimens were preserved in plastic bags, each plastic bag has been labeled a providing the information about the habitat of the area. The bryophyte specimens were dried in shadowy and ventilated room conditions in the laboratory. They have been identified by reference books (Watson, 1981; Frey *et al.*, 1995; Cortini-Pedrotti, 2001; Smith, 2004; Herrstadt and Heyn, 2004; Jimenez, 2006).

The status of taxa for Turkey was determined by reviewing the related literature (Çetin, 1988a, b; Frey and Kürschner, 1991; Keçeli and Çetin, 2000; Uyar and Çetin, 2004; Papp, 2004; Kürschner and Erdağ, 2005).

The information about the taxa new to A4 square was determined by investigating the studies about A4 square grid. (Özdemir, 1994; Özdemir and Baydar, 1996; Özdemir and Çetin, 1999; Özdemir, 2001a, b; Koz and Özdemir, 2005; Özdemir and Koz, 2006; Abay *et al.*, 2006;

Table 1: Sites details of the study area

Station	Localities	Stations	Altitudes (m)	Latitudes longitudes	Date
1	Şebinkarahisar	Avutmuş village	1340	40° 22' 480'' N, 38° 24' 386'' E	20.05.2008
2	Şebinkarahisar	Asarcik village	1564	40° 24' 552'' N, 38° 24' 123'' E	20.05.2008
3	Şebinkarahisar	Aslanşah village	883	40° 17' 272'' N, 38° 12' 270'' E	27.05.2007
4	Şebinkarahisar	Alışar village	1409	40° 15' 998'' N, 38° 34' 461'' E	28.05.2007
5	Şebinkarahisar	Bayram village	1188	40° 15' 506'' N, 38° 25' 229'' E	28.05.2007
6	Şebinkarahisar	Baltaşi village	1841	40° 12' 313'' N, 38° 19' 340'' E	28.05.2007
7	Şebinkarahisar	Buzkeçi village	1503	40° 12' 108'' N, 38° 27' 987'' E	28.05.2007
8	Şebinkarahisar	Doğanyuva village	1351	40° 10' 709'' N, 38° 25' 610'' E	28.05.2007
9	Şebinkarahisar	Ekecek village	1374	40° 16' 747'' N, 38° 21' 470'' E	28.05.2007
10	Şebinkarahisar	Hasauşeyh village	1630	40° 12' 662'' N, 38° 30' 443'' E	28.05.2007
11	Şebinkarahisar	Kinik village	1330	40° 16' 049'' N, 38° 21' 075'' E	28.05.2007
12	Şebinkarahisar	City center	1400	40° 17' 328'' N, 38° 23' 393'' E	27.05.2007
13	Şebinkarahisar	Ockaşı village	1540	40° 13' 078'' N, 38° 33' 758'' E	27.05.2007
14	Şebinkarahisar	Şahinler village	1274	40° 11' 017'' N, 38° 25' 333'' E	27.05.2007
15	Şebinkarahisar	Tepeltepe village	1195	40° 15' 917'' N, 38° 13' 518'' E	27.05.2007
16	Şebinkarahisar	Tamzara village	1275	40° 19' 628'' N, 38° 26' 097'' E	20.05.2008
17	Şebinkarahisar	Yeni yol village	1529	40° 14' 052'' N, 38° 34' 061'' E	27.05.2007
18	Şebinkarahisar	Yıldırac village	1128	40° 19' 697'' N, 38° 29' 786'' E	27.05.2007
19	Şebinkarahisar	Aktepe village	1600	40° 20' 061'' N, 38° 43' 048'' E	27.05.2007
20	Alucra	Doludere village	1608	40° 17' 551'' N, 38° 42' 021'' E	27.05.2007
21	Alucra	Demirözü village	1667	40° 25' 275'' N, 38° 53' 897'' E	29.05.2007
22	Alucra	Dereçiftlik village	1522	40° 15' 898'' N, 38° 36' 896'' E	29.05.2007
23	Alucra	Konak village	1645	40° 20' 814'' N, 38° 47' 271'' E	29.05.2007
24	Alucra	Subaşı village	1430	40° 21' 350'' N, 38° 45' 902'' E	29.05.2007
25	Alucra	Yeşilyurt village	1709	40° 19' 018'' N, 38° 52' 219'' E	29.05.2007
26	Alucra	Yükselen village	1562	40° 24' 002'' N, 38° 51' 450'' E	29.05.2007

Özdemir and Koz, 2008) Vouchers are deposited in the herbarium of Karadeniz Technical University, Faculty of Science and Arts, Department of Biology.

RESULTS AND DISCUSSION

The taxonomic survey yielded 85 taxa (*Bryopsida*) belonging to 37 genera of 17 families in the region of Artvin Hatila Valley National Park, Artvin (Turkey). The families seen in Table 2 with high taxa numbers are Pottiaceae (-15), -Brachytheciaceae (15), -Grimmiaceae (14), Bryaceae (10), Amblystegiaceae (5), Campylaceae (5), Hypneaceae (5), Thuidiaceae (4), Batramiaceae (3), Dicranaceae (2), Orthotrichaceae (2), Mniaceae (1), Helodiaceae (1), Leucodontaceae (1), Anomodontaceae (1) (Table 2).

Fifteen-new taxa (*Hygroamblystegium irriguum* Hedw., *Rhynchostegium confertum* (Dicks.) B. S. G., *Rhynchostegium alpinum* Huds. ex With., *Bryum dichotomum* Hedw., *Bryum laevifilum* Syed., *Hygrohypnum smithii* (Sw.) Broth., *Grimmia decipiens* (Schultz) Lindb., *Grimmia tergestina* Tomm. Ex Bruch and Schimp., *Schistidium flaccidum* (DeNot.) Ochyra., *Schistidium platyphyllum* (Mitt.) Kindb., *Palustriella decipens* (De Not.) Ochyra., *Desmatodon latifolius* (Hedw.) Brid., *Didymodon spadiceus* (Mitt.) Limpr., *Phascum curvicolle* Hedw., *Syntrichia princeps* (De Not.) Mitt. recorded from the research area for A4 square.

Thirty six taxa (*Amblystegium serpens* var *serpens* (Hedw.) Schimp., *Amblystegium riparium* (Hedw.) Br. Eur., *Crataneuron filicinum* (Hedw.) Spruce, *Hygroamblystegium irriguum* Hedw., *Philonotis*

calcareo (Bruch and Schimp.) Schimp., *Philonotis tomentella* Molendo. *Homalothecium philippeanum* (Spruce) B.S.G., *Rhynchostegium confertum* (Dicks.) B.S. G., *Bryum alpinum* Huds. ex With., *Bryum caespiticum* Hedw., *Bryum creberrinum* Tayl., *Bryum dichotomum* Hedw., *Bryum imbricatum* (Schwaegr.) B. S. G., *Bryum laevifilum* Syed, *Bryum torquescens* Bruch ex De Not., *Drepanocladus aduncus* (Hedw.) Warnst., *Drepanocladus uncinatus* (Hedw.) Warnst., *Hygrohypnum smithii* (Sw.) Broth., *Encalypta streptocarpa* Hedw., *Grimmia decipiens* (Schultz) Lindb., *Grimmia elongata* Kaulf. *Grimmia laevigata* (Brid.) Brid., *Grimmia ovalis* Auct., *Grimmia pulvinata* (Hedw.) Sm., *Grimmia tergestina* Tomm. Ex Bruch and Schimp., *Schistidium flaccidum* (De Not.) Ochyra., *Schistidium platyphyllum* (Mitt.) Kindb., *Schistidium trichodon* (Brid.) Poelt., *Palustriella decipens* (De Not.) Ochyra., *Hypnum revolutum* (Mitt.) Lindb., *Orthotrichum affine* Schrad ex Brid., *Ulota crispa* (Hedw.) Brid., *Anoetangium aestivum* (Hedw.) Mitt., *Desmatodon latifolius* (Hedw.) Brid., *Phascum curvicolle* Hedw., *Syntrichia princeps* (De Not.) Mitt., *Syntrichia ruraliformis* (Besch.) Cardot, *Syntrichia ruralis* (Hedw.) F. Weber and D.Morh, *Tortula intermedia* (Brid.) De Not., *Tortula muralis* var. *muralis* Hedw., *Crataneuron filicinum* (Hedw.) Spruce) are new for Giresun province (Özdemir, 2001 a, b; Koz and Özdemir, 2005; Özdemir and Koz, 2006; Özdemir and Koz, 2008).

In the following records the taxa name is followed by the number of locations and substrate. The plant list is given according to the system proposed by Smith 2004. The asterisks mark the species that have been first recorded from the A4 grid square (Table 3).

Forty nine taxa were found growing on the rocks. Members of the mosses preferred to grow predominantly on stones and rocks depending on data obtained from the study area. The samples growing on the rocks are 57.65% of all samples These are; *Amblystegium riparium* (Hedw.) Br.Eur., *A. varium* (Hedw.) Lindb., *Crataneuron filicinum* (Hedw.) Spruce, *Drepanocladus uncinatus* (Hedw.) Warnst., *Hygroamblystegium tenax* (Hedw.) Jenn., *Pallustriella decipiens* (De Not.) Ochyra. *Brachythecium albicans* (Hedw.) Schimp., *Eurhynchium striatulum* (Spruce) Schimp., *E. striatum* (Schreb. ex Hedw.) Schimp., *Homalothecium lutescens* (Hedw.) H. Rob., *H. nitens* (Hedw.) H. Rob., *H. philippeanum* (Spruce) B.S.G., *H. sericeum* (Hedw.) Schimp., *Bryum capillare* Hedw., *B. imbricatum* (Schwaegr.) B. S. G., *Philonotis calcarea* (Bruch and Schimp.) Schimp., *P. fontana* (Hedw.) Brid., *P. tomentella* Molendo., *Dicranum polysetum* Sw., *Grimmia tricophylla* Grev., *G. decipiens* (Schultz) Lindb., *G. donniana* Sm., *G. elongata* Kaulf., *G. hartmanii* Schimp., *G. laevigata* (Brid.) Brid., *G. ovalis* auct., *G. pulvinata* (Hedw.) Sm., *G. terpestina* Tomm. Ex Bruch and Schimp., *Schistidium apocarpum* (Hedw.) Bruch and

Table 2: Distribution and percentages of taxa on the plant families

NF	Families	NT	(%)
1	Pottiaceae	15	17.65
2	Brachytheciaceae	15	17.65
3	Grimmiaceae	14	16.47
4	Bryaceae	10	11.76
5	Amblystegiaceae	5	5.88
6	Campylaceae	5	5.88
7	Thuidiaceae	4	4.71
8	Bartramiaceae	3	3.53
9	Hypneaceae	3	3.53
10	Dicranaceae	2	2.35
11	Hylacomiaceae	2	2.35
12	Orthotrichaceae	2	2.35
13	Mniaceae	1	1.18
16	Encalptraceae	1	1.18
17	Helodiaceae	1	1.18
14	Leucodontaceae	1	1.18
15	Anomodontaceae	1	1.18
	Total	85	100.00

NF: No. of family, NT: No. of taxa, (%): Percentage of taxa according to the total No. of taxa

Schimp., *S. trichodon* (Brid.) Poelt., *Hypnum cupressiforme* Hedw., *Hypnum revolutum* var. *revolutum* (Mitt.) Lindb., *Rhytidiadelphus triquetrus* (Hedw.) Warnst., *Leucodon sciuroides* (Hedw.) Schwagr., *Anoetangium aestivum* (Hedw.) Mitt., *Desmatodon latifolius* (Hedw.) Brid., *Didymodon spadiceus* (Mitt.) Limpr., *D. tophaceus* (Brid.) Lisa., *Syntrichia ruralis* (Hedw.) F. Weber and D. Morh., *S. ruraliformis* (Besch.) Cardot, *Tortula intermedia* (Brid.) De Not., *Anomodon attenuatus* (Hedw.) Huebener, *Crataneuron filicinum* (Hedw.) Spruce, *Thuidium delicatulum* (Hedw.) Schimp., *T. tamariscinum* (Spruce) Schimp (Table 4).

Five taxa were found growing on wet rock. These taxa are 5.88% all samples (Table 4). These are;

Brachythecium populeum (Hedw.) Schimp., *Bryum caespiticum* Hedw., *B. imbricatum* (Schwaegr.) B. S. G., *Schistidium flaccidum* (DeNot.) Ochyra., *S. platyphyllum* (Mitt.) Kindb (Table 4).

Thirteen taxa were found growing on soil. The samples growing on soil are 15.29% all samples. These are; *Calliergon cuspidatum* (Hedw.) Kindb., *Drepanocladus aduncus* (Hedw.) warnst., *Hygrohypnum smithii* (Sw.) Broth., *Sanionia uncinata* (Hedw.) Loeske., *Eurhynchium hians* (Hedw.) Sande Lac., *Rhynchostegium murale* (Hedw.) Schimp., *Dicranum scoparium* Hedw., *Racomitrium heterostichum* (Hedw.)Brid., *Ctenidium molluscum* (Hedw.) Mitt., *Pleurozium schreberi* (Willd. Ex Brid.) Mitt., *Mnium*

Table 3: The characteristics and list of taxa

Family No.	Families	Cins No.	Genera	Takson No.	Taxa	Station No.	Habitats						Herbarium No.																								
							WR	R	S	WS	T	DT																									
1	Amblystegiaceae	1	Amblystegium	1	<i>A. serpens</i> var <i>serpens</i> (Hedw.) Schimp.	1,2								•	Öz and Bat 1																						
					2	<i>A. riparium</i> (Hedw.) Br. Eur.	10,11									•	Öz and Bat 2																				
					3	<i>A. varium</i> (Hedw.) Lindb.	2,23,26,20												•	Öz and Bat 3																	
					4	<i>C. filicinum</i> (Hedw.) Spruce	8,17													•	Öz and Bat 4																
					5	<i>H. irriguum</i> Hedw.*	8													•	Öz and Bat 5																
					2	Anomodontaceae	4	Anomodon	6	<i>A. attenuatus</i> (Hedw.) Huebener	19										•	Öz and Bat 6															
										7	<i>P. calcarea</i> (Bruch and Schimp.) Schimp.	4,14,23											•	Öz and Bat 7													
					4	Brachytheciaceae	6	Brachythecium	10	<i>P. fontana</i> (Hedw.) Brid.	3,4,17,23, 24,25											•	Öz and Bat 8														
										9	<i>P. tomentella</i> Molendo.	22													•	Öz and Bat 9											
										11	<i>B. albicans</i> (Hedw.) Schimp.	11,21														•	Öz and Bat 10										
										11	<i>B. glareosum</i> (Spruce) Schimp.	11															•	Öz and Bat 11									
										12	<i>B. mildeanum</i> (Schimp.) Schimp.	2															•	Öz and Bat 12									
										13	<i>B. populeum</i> (Hedw.) Schimp.	2,1,16,															•	Öz and Bat 13									
										14	<i>B. plumosum</i> (Hedw.) B.S.G.	1,16																•	Öz and Bat 14								
										15	<i>B. rivulare</i> (Schimp.) B.S.G.	1																	•	Öz and Bat 15							
										16	<i>E. hians</i> (Hedw.) Sande Lac.	2,25																	•	Öz and Bat 16							
										17	<i>E. striatulum</i> (Spruce) Schimp.	11																		•	Öz and Bat 17						
					5	Brachytheciaceae	7	Brachythecium	18	<i>E. striatum</i> (Schreb.ex Hedw.) Schimp.	11,20,23															•	Öz and Bat 18										
										19	<i>H. Intescens</i> (Hedw.) H. Rob.	3,9																		•	Öz and Bat 19						
										20	<i>H. nitens</i> (Hedw.) H. Rob.	19																				•	Öz and Bat 20				
										21	<i>H. philippeanum</i> (Spruce) B.S.G.	3																					•	Öz and Bat 21			
										22	<i>H. sericeum</i> (Hedw.) Schimp.	3,4,11,9, 16,19,24																						•	Öz and Bat 22		
23	<i>R. confertum</i> (Dicks.) B.S.G.*	16																													•	Öz and Bat 23					
24	<i>R. murale</i> (Hedw.) Schimp.	6																														•	Öz and Bat 24				
25	<i>B. alpinum</i> Huds. ex With.*	2,12																															•	Öz and Bat 25			
26	<i>B. caespiticum</i> Hedw.	3,16																															•	Öz and Bat 26			
27	<i>B. capillare</i> Hedw.	23																															•	Öz and Bat 27			
6	Campylaceae	9	Bryum	31	<i>B. creberrimum</i> Tayl.	16																								•	Öz and Bat 28						
					32	<i>B. dichotomum</i> Hedw.*	16																										•	Öz and Bat 29			
					33	<i>B. imbricatum</i> (Schwaegr.) B. S. G.	16																											•	Öz and Bat 30		
					34	<i>B. laevifilum</i> Syed.*	12																												•	Öz and Bat 31	
					35	<i>B. mildeanum</i> Jur.	2,23																												•	Öz and Bat 32	
					36	<i>B. pallescens</i> Schwaegr.	16																												•	Öz and Bat 33	
					37	<i>B. torquescens</i> Bruch ex De Not.	12																												•	Öz and Bat 34	
					38	<i>C. cuspidatum</i> (Hedw.) Kindb.	20																												•	Öz and Bat 35	
					39	<i>D. aduncus</i> (Hedw.) warnst.	20																													•	Öz and Bat 36
					40	<i>D. uncinatus</i> (Hedw.) Warnst.	20,21																													•	Öz and Bat 37
7	Dicranaceae	14	Dicranum	40	<i>H. smithii</i> (Sw.) Broth.*	20																										•	Öz and Bat 38				
					41	<i>S. uncinata</i> (Hedw.) Loeske.	20																												•	Öz and Bat 39	
					42	<i>D. polysetum</i> Sw.	25																													•	Öz and Bat 40
					43	<i>D. scoparium</i> Hedw.	25																													•	Öz and Bat 41
					44	<i>E. streptocarpa</i> Hedw.,	12																													•	Öz and Bat 42

Table 3: Continued

Family No.	Families	Cins		Takson No.	Taxa	Station No.	Habitats						Herbarium No.				
		No.	Genera				WR	R	S	WS	T	DT					
9	Grimmiaceae	16	Grimmia	43	<i>G. tricophylla</i> Grev.	3		•						Öz and Bat 43			
				44	<i>G. decipiens</i> (Schultz) Lindb.*	3		•							Öz and Bat 44		
				45	<i>G. domiana</i> Sm.	13,23		•								Öz and Bat 45	
				46	<i>G. elongata</i> Kaulf.	4,13,23,24		•									Öz and Bat 46
				47	<i>G. hartmanii</i> Schimp.	4,9,5,25,16,13,24,21		•									Öz and Bat 47
				48	<i>G. laevigata</i> (Brid.) Brid.	5,18		•									Öz and Bat 48
				49	<i>G. ovalis</i> auct.	9,10,11		•									Öz and Bat 49
				50	<i>G. pulvinata</i> (Hedw.) Sm.	5		•									Öz and Bat 50
				51	<i>G. tergestina</i> Tomm. Ex* Bruch and Schimp.	15		•									Öz and Bat 51
				10	Helodiaceae	19	Palustriella	52	<i>R. heterostichum</i> (Hedw.) Brid.	4,2			•				
53	<i>S. apocarpum</i> (Hedw.) Bruch and Schimp.	5							•						Öz and Bat 53		
54	<i>S. flaccidum</i> (DeNot.) Ochyra.*	16						•								Öz and Bat 54	
55	<i>S. platyphyllum</i> (Mitt.) Kindb.*	2						•								Öz and Bat 55	
56	<i>S. trichodon</i> (Brid.) Poelt.	23							•							Öz and Bat 56	
11	Hypnaceae	20	Ctenidium	57	<i>P. decipiens</i> (De Not.) Ochyra.	2			•					Öz and Bat 57			
				58	<i>C. molluscum</i> (Hedw.) Mitt.	2				•					Öz and Bat 58		
12	Hypnaceae	21	Hypnum	59	<i>H. cupressiforme</i> Hedw.	2,3,22,24			•					Öz and Bat 59			
				60	<i>H. revolutum</i> (Mitt.) Lindb	3				•					Öz and Bat 60		
				61	<i>P. schreberi</i> (Willd. Ex Brid.) Mitt.	20,25					•					Öz and Bat 61	
13	Leucodontaceae	23	Rhytidiadelphus	62	<i>R. triquetrus</i> (Hedw.) Warnst.	5			•					Öz and Bat 62			
				63	<i>L. sciuroides</i> (Hedw.) Schwagr.	3				•					Öz and Bat 63		
14	Mniaceae	25	Mnium	64	<i>M. spinosum</i> (Voit.) Schwagr.	20				•				Öz and Bat 64			
15	Orthotrichaceae	26	Orthotrichum	65	<i>O. affine</i> Schrad ex Brid.	2				•				Öz and Bat 65			
				66	<i>U. crispa</i> (Hedw.) Brid.	2,16						•			Öz and Bat 66		
16	Pottiaceae	28	Anoetangium	67	<i>A. aestivum</i> (Hedw.) Mitt.	26				•				Öz and Bat 67			
				68	<i>B. unguiculata</i> Hedw.,	2						•			Öz and Bat 68		
				69	<i>D. latifolius</i> (Hedw.) Brid.*	14						•			Öz and Bat 69		
				70	<i>D. acutus</i> (Bridel) K. Saito	16							•			Öz and Bat 70	
				71	<i>D. asperifolius</i> (Mitt.) Crum <i>et al.</i>	12,16								•		Öz and Bat 71	
				72	<i>D. spadiceus</i> (Mitt.) Limpr.	3							•			Öz and Bat 72	
				73	<i>D. tophaceus</i> (Brid.) Lisa.	21,24								•		Öz and Bat 73	
				74	<i>D. vinealis</i> (Brid.) R.H. Zander.	11								•		Öz and Bat 74	
				75	<i>P. curvicolle</i> Hedw.*	16,1									•	Öz and Bat 75	
				76	<i>S. intermedia</i> Brid.	1,2									•	Özdemir 76	
17	Thuidiaceae	32	Phascum	77	<i>S. princeps</i> (De Not.) Mitt.*	2,12,								Özdemir 77			
				78	<i>S. ruraliformis</i> (Besch.) Cardot	9,23										Özdemir 78	
				79	<i>S. ruralis</i> (Hedw.) F. Weber and D.Morh	5										Özdemir 79	
				80	<i>T. intermedia</i> (Brid.) De Not.	23										Özdemir 80	
				81	<i>T. muralis</i> var. <i>muralis</i> Hedw.	7										Özdemir 81	
				82	<i>A. attenuatus</i> (Hedw.) Huebener	19											Özdemir 82
				83	<i>C. filicinum</i> (Hedw.) Spruce	8,17											Özdemir 83
				84	<i>T. delicatulum</i> (Hedw.) Schimp.	8											Özdemir 84
				85	<i>T. tamariscinum</i> (Spruce) Schimp.	11											Özdemir 85

*DT: Died Tree body, T: Tree body, R: Rock, S: Soil, WR: Wet Rock, WS: Wet Soil

Table 4: The distribution of taxa in habitats

NH	Habitats	NT	(%)
1	Wet rock	5	5.88
2	Rock	49	57.65
3	Soil	13	15.29
4	Wet soil	6	7.06
5	Tree body	8	9.41
6	Died tree body	4	4.71
	Total	85	100.00

(NH: No. of habitats, NT: No. of taxa, (%): percentage of taxa according to the total No. of taxa)

spinosum (Voit.) Schwagr., *Didymodon vinealis* (Brid.) R.H. Zander., *Tortula muralis* var. *muralis* Hedw (Table 4).

Six taxa were found growing on wet soil. The samples growing on wet soil 7.06% all samples

(Table 4). These are; *Brachythecium rivulare* (Schimp.) B.S.G., *Bryum alpinum* Huds. ex With., *B. creberrinum* Tayl., *B. dichotomum* Hedw., *B. pallescens* Schwaegr., *Didymodon acutus* (Bridel) K. Saito (Table 4).

Eight taxa were found growing on tree body (on *Abies nordmanniana* (Stev) Spac, *Quercus robur* L., *Quercus petraea* (Mattuschka) Liebl., *Junglans regia* L., forest). These are 9.41% all Samples (Table 4). (*Brachythecium glareosum* (Spruce) Schimp., *B. mildeanum* (Schimp.) Schimp., *Rhynchostegium confertum* (Dicks.) B.S.G., *Barbula unguiculata* Hedw., *Ecalyptia streptokarpa* Hedw., *Phascum curvicolle*

Hedw., *Syntrichia princeps* (De Not.) Mitt., *Orthotrichum affine* Schrad ex Brid (Table 4).

Six taxa were found growing on died tree body. These are 4.71% all samples (Table 4). These are; *Amblystegium serpens* var *serpens* (Hedw.) Schimp., *Brachythecium plumosum* (Hedw.) B.S.G., *Didymodon asperifolius* (Mitt.) Crum et al., *Syntrichia intermedia* Brid., *Ulota crispa* (Hedw.) Brid., *Orthotrichum affine* Schrad ex Brid (Table 4).

Dominated families of the regions are Pottiaceae (15), Brachytheciaceae (15), Grimmiaceae (14), Bryaceae (10). These families make up 63.52% of the total taxa in this study and the other 11 families constitute 36.48% (Table 3).

In Table 5 and 6 a comparison between studies carried out in the Black Sea region and the Mediterranean show that the proportion of acrocarpous mosses in the

Mediterranean is higher than that in the Black Sea region, especially, the No. of taxa of Pottiaceae family members is higher than the number of taxa of Brachytheciaceae family members in this study areas. Since acrocarpous species have quilledged leaves and grow in cushion form, they can endure long periods of heat and dryness better than pleurocarpous species in the Black Sea region.

The study area is in the northeast of Anatolia. Pottiaceae family that displayed acrocarpous growth and have the largest number of taxa and rich group determined the study area. In terms of number of taxa was Brachytheciaceae family and this family displayed acrocarpous growth. Because in the study area, which has a semiarid and very cold Mediterranean bioclimatic in contrast with the studies corresponding to coastal of the Black Sea region.

Table 5: A comparison between the studies carried out in the Black Sea region

Families	Some other studies in Turkey											
	Şebinkarahisar and Alucra (Giresun)		Trabzon its environs		Giresun near vicinity		İlgaz mountain (Kastamonu)		Bolu and Gerede Aktaş		Sinop and its environs	
	NT	(%)	NT	(%)	NT	(%)	NT	(%)	NT	(%)	NT	(%)
Pottiaceae	15	17.65	13	10.66	16	12.0	10	16.39	15	13.76	12	10.7
Brachytheciaceae	15	17.65	22	18.03	19	15.0	18	29.67	15	13.76	23	20.5
Grimmiaceae	14	16.47	8	6.56	2	2.0	4	6.55	7	6.42	3	2.6
Bryaceae	10	11.76	6	4.92	8	6.0	3	4.91	5	4.6	9	8.0
Amblystegiaceae	5	5.88	6	4.92	11	8.0	5	8.19	8	7.34	6	5.4
Campylaceae	5	5.88	11	9.02	11	8.0	3	4.91	9	8.26	10	8.9
Thuidiaceae	4	4.71	9	7.38	10	7.4	2	3.27	8	7.34	6	5.4
Bartramiaceae	3	3.53	6	4.92	5	3.7	-	-	2	1.83	6	5.4
Hypneaceae	3	3.53	-	-	4	3.0	-	-	4	3.67	3	2.6
Other families	11	12.94	41	33.61	27	40.3	5	16.3	12	69.9	10	70.0
Total taxa No.	85	100.00	122	100.0	73	100.0	109	100.0	133	100.0	112	100.0

NT: No. of taxa; (%): Percentage of taxa according to the total No. of taxa

Table 6: A comparison between the studies carried out in the Mediterranean and in the Northwest of Central Anatolia

Families	Some other studies in Turkey											
	Şebinkarahisar and Alucra (Giresun)		Çankiri Eldivan mountain		Uludağ National Park		Antalya and environs (Antalya)		Yedigöller and environs		Moss flora of Ankara	
	NT	(%)	NT	(%)	NT	(%)	NT	(%)	NT	(%)	NT	(%)
Pottiaceae	15	17.65	14	26.0	12	13.64	10	11.9	32	34.41	19	16.4
Brachytheciaceae	15	17.65	11	20.5	15	17.05	10	11.9	14	15.05	20	17.2
Grimmiaceae	14	16.47	5	9.3	3	3.41	11	13.1	6	6.45	13	11.2
Bryaceae	10	11.76	4	7.4	8	9.09	4	4.76	3	3.23	7	6.0
Amblystegiaceae	5	5.88	5	9.3	2	2.27	8	9.52	4	4.3	14	12.1
Campylaceae	5	5.88	4	7.4	8	9.09	2	2.38	3	3.23	3	2.6
Thuidiaceae	4	4.71	2	3.7	3	3.41	4	4.76	4	4.3	6	5.2
Bartramiaceae	3	3.53	2	3.7	4	4.55	0	0.0	0	0.0	1	0.9
Hypneaceae	3	3.53	-	-	0	0.0	0	0.0	0	0.0	1	0.9
Other families	11	12.94	6	10.0	33	37.5	35	41.67	27	29.03	34	72.5
Total taxa No.	85	100.0	54	100.0	84	88.0	100	100.0	93	100.0	116	100.0

NT: No. of taxa; (%): Percentage of taxa according to the total number of taxa

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