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CONTRIBUTIONS TO THE MOSS (MUSCI) FLORA OF ÇANKIRI (YAPRAKLI)

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ABSTRACT

During field trips carried out in Yapraklı and its surroundings in 2004 May and 2005 June, 65 moss taxa were determined. In this study, 30 species are reported for the first time for the moss flora of Çankırı and further 3 taxa are new moss records for A2.The former and the recent studies done up to now show that there are 132 moss species in the boundaries of Çankırı province.

Key words: Bryophyta, Musci, Çankırı, Turkey.

ÇANKIRI (YAPRAKLI) KARAYOSUNU (MUSCI) FLORASINA KATKILAR

ÖZET

Yapraklı ve çevresinde 2004 Mayıs ve 2005 Haziran aylarında yapılan arazi çalışmaları esnasında, 65 karayosunu taksonu tespit edilmiştir. Sunulan bu çalışmada, Çankırı karayosunu florası için 30 tür ilk kez bildirilmektedir ve ayrıca 3 takson A2 karesi için yeni karayosunu kaydıdır. Şu ana kadar yapılmış olan önceki ve son çalışmalar Çankırı ili sınırları içerisinde 132 karayosunu türü olduğunu göstermiştir.

Anahtar Kelimeler: Bryophyta, Karayosunu, Çankırı, Türkiye.

1. INTRODUCTION

This paper is the fourth of the series informing the results of investigations on moss flora of Çankırı in Northern Central Anatolia of Turkey. The first paper on this subject of Keçeli and Çetin (2000) was related to Eldivan Mountain in Çankırı. There, the authors identified 54 taxa out of 145 specimens. Of these specimens, 15 taxa were new moss records for the A2 grid-square adopted by Henderson (1961). In the second paper about the moss flora of Ilgaz Mountain National Park, some parts belonging to Çankırı were published by Abay and Çetin (2003).109 moss species were recorded in this paper totally. However, 43 moss taxa in the boundaries of Çankırı were determined among them. After checking the paper, 15 taxa were seen as new records for the A2 grid square among total floristic list. The third publication of Abay (2005;2006) focused on the mosses of Eldivan-Karadere district. In this study, 18 genera belonging to 13 families and 48 taxa were identified. There were two new moss records for A2. Although Karadere is located close to Eldivan Mountain which was studied by Keçeli and Çetin (2000), different moss taxa were found in both areas. 27 mosses which were indicated in Eldivan-Karadere are different from the ones indicated in the study of Keçeli and Çetin (2000).

The moss flora of Çankırı was insufficiently known. There were only three investigated districts and the number of records was far from being completed. During the past years the author combined his efforts to improve aforementioned knowledge and make further explorations on the moss flora of Çankırı. Hence, in addition to the aforementioned researches, some districts of Çankırı which are located in Yapraklı town were studied. It is hoped that the present study will contribute important data to the knowledge of the moss flora of Çankırı and encourage further researches.

2. SITE DESCRIPTION

For this study Yapraklı district, city of Çankırı, was chosen as the research area. The south and west boundaries of the area are surrounded by the city centre of Çankırı (Anonymous, 2004). The study area, about 32 km NE of the city, is situated between 40^0 46' N and 33^0 48' E (Anonymous, 1995a). Yapraklı district is located in the A2 grid square according to the system adopted by Henderson (1961) (Figure 1).

For the description of climate, data of meteorological station of Yapraklı district was used, based on the period 1970-1995 (Anonymous, 1995a). Yapraklı has the highest precipitation amounts within Çankırı (Anonymous, 2004). The annual average precipitation is 530.8 mm and annual average temperature is 9,1 ºC. The highest average temperature is in July and August (26.2 C) and the lowest average temperature is in January (–5.4 °C) (Anonymous, 1995a). The climatic diagram (Figure 2) of Yapraklı district was drawn based on Walter's method (Özyuvacı, 1998).

Most of the study area is covered by particularly *Abies nordmanniana* (Steven) Spach. subsp. *bornmuelleriana* (Mattf.) Coode & Cullen, *Pinus sylvestris* L., *Juniperus communis* L. var. *saxatilis* Pall.

Main soil groups in Çankırı are alluvial and colluvial soils, chestnut colored and brown forest soils, deficient in lime brown forest and brown soils (Göl and Abay, 2003; Anonymous, 2004). The predominant rocks of the study area are sandstone, antigorite and partly schist with limestone from metamorphic rocks (Anonymous, 1995b).

3. MATERIAL AND METHODS

The materials of the study include 200 moss specimens. Field trips were done in May 2004 and June 2005. All main habitat types developed on various bedrocks were visited and mosses were collected from different substrates as seen in the floristic list.

The identification was based mainly on Frey et al. (1995), Cortini Pedrotti (2001, 2006), Heyn and Herrnstadt (2004), and Smith (2004); in case of difficult genera other references were used (Greven, 1995, 2003). The status of the species for the research area and for Turkey was determined by reviewing the related literature (Çetin, 1988; Frey and Kürschner, 1991; Uyar and Çetin, 2004; Kürschner and Erdağ, 2005). Information about new taxa for the A2 grid square was obtained from the literature (Henderson, 1961; Çetin and Yurdakulol, 1985, 1988; Keçeli and Çetin, 2000; Uyar and Çetin, 2001; Çetin et al., 2002; Abay and Çetin, 2003; Abay, [2005] 2006; Uyar and Çetin, 2006). New records for the moss flora of Çankırı are indicated with an asterisk (*). Nomenclature of the species follows Corley et al. (1981), and Corley and Crundwell (1991).

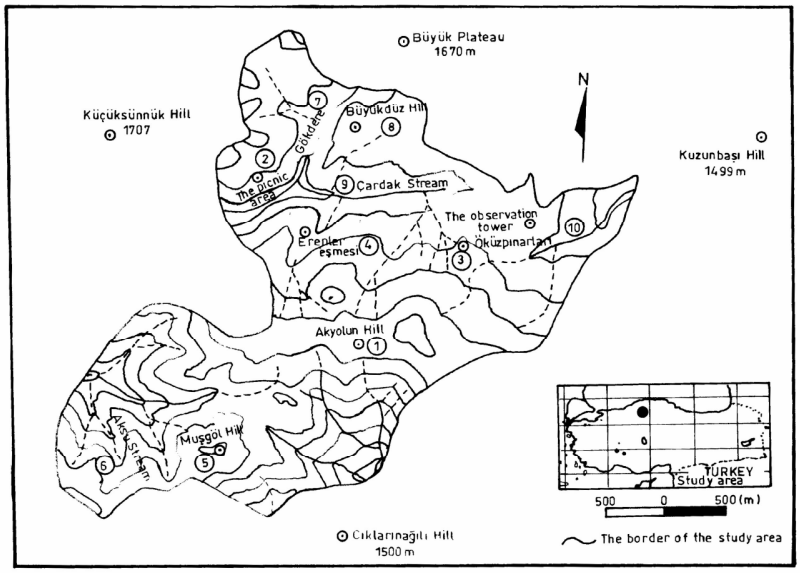

Figure 1. Map of the study area and the grid system adopted by Henderson (1961) for Turkey.

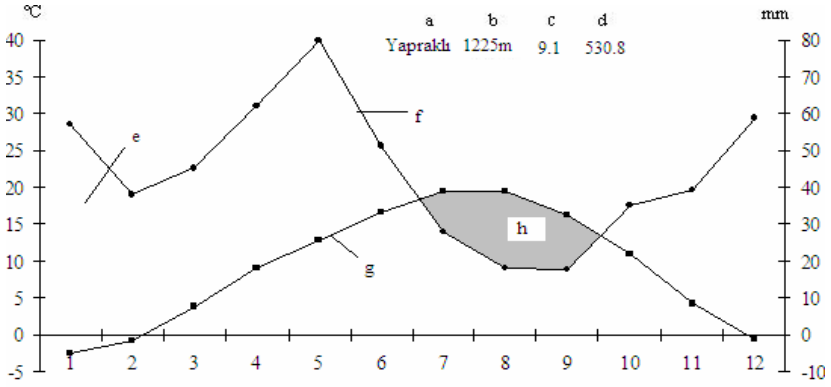

Figure 2. Climatic diagram of Yapraklı district. a: Locality; b: Altitude (m); c: Average annual temperature (ºC); d: Average annual precipitation (mm); e:Humid period, f: Precipitation (mm); g: Temperature (ºC); h: Water deficit

The complete record of the collections is as follow: After the species name the localities are given by numbers, continued by the substrate, date and the number of collector in the species list. Table 1 lists the sites sampled, all of which belong to the research area. Besides, the stations taking part in Table 1 were stated in Figure 1 showing the study area. The moss samples were placed in the private collection of ABAY, Forest Botany Laboratory, Forestry Faculty, Çankırı Karatekin University.

Table 1. Details of the study area

Site No	Altitude in metres above sea level (m)	Localities and geographic coordinates	The list of forest trees
1	1800	Akyol Hill, 40º 47' N-33º 45' E	*Abies nordmanniana* subsp. *bornmuelleriana*-*Pinus sylvestris*-*Juniperus communis* var. *saxatilis*
2	1700-1750	Upper side of the picnic area, 40º 48' N-33º 45' E	*Abies nordmanniana* subsp. *bornmuelleriana*
3	1600	Öküzpınarı, opposite to the observation tower, 40º 47' N-33º 46' E	*Juniperus communis* var. *saxatilis*- *Pinus sylvestris*
4	1730	Between Öküzpınarı and Erenler eşmesi, 40º 48' N-33º 45' E	*Abies nordmanniana* subsp. *bornmuelleriana*-*Juniperus communis* var. *saxatilis*-*Pinus sylvestris*
5	1730	Bottom side of Muşgöl Hill, 40º 47' N-33º 44' E	*Abies nordmanniana* subsp. *bornmuelleriana*-*Juniperus communis* var. *saxatilis*
6	1700	Aksu stream, 40º 47' N-33º 44' E	*Abies nordmanniana* subsp. *bornmuelleriana*-*Juniperus communis* var. *saxatilis* mixed forest
7	1650	Gökdere, 40º 48' N-33º 45' E	*Juniperus communis* var. *saxatilis*-*Pinus sylvestris*
8	1650	Büyükdüz Hill, 40º 48' N-33º 45' E	*Juniperus communis* var. *saxatilis*-*Pinus sylvestris*
9	1600	The union of Gökdere and Çandak streams, 45º 17' N-36º 56' E	*Abies nordmanniana* subsp. *bornmuelleriana*-*Juniperus communis* var. *saxatilis*-*Pinus sylvestris*
10	1700	The observation tower, 45º 17' N-36º 56' E	*Abies nordmanniana* subsp. *bornmuelleriana*-*Juniperus communis* var. *saxatilis*-*Pinus sylvestris*

4. SPECIES LIST

BRYOPSIDA

Polytrichaceae

1. Polytrichum juniperinum Hedw.- 1: on soil, 23 May 2004, ABAY 1159, ABAY 1158; 10: on soil, 26 June 2005, ABAY 1160.

Dicranaceae

2. Dicranum scoparium Hedw.- 1: on soil, 23 May 2004, ABAY 1154; 7: on soil, 25 May 2004, ABAY 979; 9: on fir root, 26 June 2005, ABAY 981, on soil, 26 June 2005, ABAY 1153; 10: on rock, 26 June 2005, ABAY 980.

***3. Dicranoweisia crispula** (Hedw.) Milde - 4: on Scotch pine logs, 23 May 2004, ABAY 983.

***4. Dicranella heteromalla** (Hedw.) Schimp.- 6: on soil, 25 May 2004, ABAY 984.

***5. Dichodontium pellucidum** (Hedw.) Schimp.- 5: on soil, 25 May 2004, ABAY 986; 6: on soil, 25 May 2004, ABAY 985.

Ditrichaceae

6. Ditrichum cylindricum (Hedw.) Grout. - 4: on soil, 23 May 2004, ABAY 1155, on rock, 23 May 2004, ABAY 1156; 6: on soil, 25 May 2004, ABAY 988; 10: on rock, 26 June 2005, ABAY 987.

***7. D. pusillum** (Hedw.) Hampe- 4: on rock, 23 May 2004, ABAY 1157.

***8. D. subulatum** Hampe- 10: on soil, on rock, 26 June 2005, ABAY 989, ABAY 990.

***9. Distichium capillaceum** (Hedw.) Bruch & Schimp.- 6: on rock, 25 May 2004, ABAY 991.

Encalyptaceae

10. Encalypta streptocarpa Hedw. – 9: on rock, 26 June 2005, ABAY 992.

Pottiaceae

***11. Syntrichia latifolia** (Bruch ex. Hartm.) Huebener- 10: on soil, 26 June 2005, ABAY 993.

12. S. norvegica F. Weber- 1: on soil, on rock, 23 May 2004, ABAY 1182, ABAY 1183.

13. S. ruralis (Hedw.) F.Weber & D.Mohr – 1: on soil, 23 May 2004, ABAY 1180; 4: on rock, 23 May 2004, ABAY 1181; 8: on soil, 25 May 2004, ABAY 998; 9: on rock, on soil, 26 June 2005, ABAY 994, ABAY 997; 10: on soil, 26 June 2005, ABAY 995.

14. Tortula muralis Hedw. var. **aestiva** Brid. ex. Hedw.- 4: on soil, 23 May 2004, ABAY 1187; 9: on rock, 26 June 2005, ABAY 999.

15. T. subulata Hedw. var. **graeffii** Warnst.- 10: on soil, 26 June 2005, ABAY 1010.

16. T. subulata Hedw. var. **subulata**- 1: on soil, 23 May 2004, ABAY 1188, on rock, 23 May 2004, ABAY 1189; 6: on rock, 25 May 2004, ABAY 1002; 7: on

soil, 25 May 2004, ABAY 1006, ABAY 1190; 8: on soil, 25 May 2004, ABAY 1007; 9: on roots, 26 June 2005, ABAY 1000; 10: on rock, 26 June 2005, ABAY 1003, on soil, 26 June 2005, ABAY 1008.

***17. T. vahliana** (Schultz) Mont.- 9: on rock, 26 June 2005, ABAY 1011.

18. Barbula unguiculata Hedw.- 6: on rock, 25 May 2004, ABAY 1012.

19. Didymodon fallax (Hedw.) R.H.Zander- 6: on soil, 25 May 2004, ABAY 1013.

***20. D. vinealis** (Brid.) R.H.Zander- 9: on soil, 26 June 2005, ABAY 1014.

***21. Bryoerythrophyllum recurvirostrum** (Hedw.) P.C.Chen.- 4: on soil, 23 May 2004, ABAY 1186.

***22. Weissia controversa** Hedw. var. **controversa**- 10: on rock, 26 June 2005, ABAY 1015.

***23. W. controversa** Hedw. var. **crispata** (Nees & Hornsch.) Nyholm- 5: on soil, 25 May 2004, ABAY 1016.

24. Tortella tortuosa (Hedw.) Limpr.- 1: on rock, 23 May 2004, ABAY 1184; 10: on soil, 26 June 2005, ABAY 1020, ABAY 1185, on rock, 26 June 2005, ABAY 1017.

Grimmiaceae

25. Schistidium apocarpum (Hedw.) Bruch & Schimp.- 1: on rock, 23 May 2004, ABAY 1167, ABAY 1168; 4: on rock, 23 May 2004, ABAY 1166; 5: on rock, 25 May 2004, ABAY 1023; 7: on rock, 25 May 2004, ABAY 1024; 9: on rock, 26 June 2005, ABAY 1025; 10: on rock, 26 June 2005, ABAY 1169, ABAY 1026.

26. S. confertum (Funck) Bruch & Schimp.- 9: on rock, 26 June 2005, ABAY 1027.

***27. Grimmia montana** Bruch & Schimp.- 4: on rock, 23 May 2004, ABAY 1170.

28. G. ovalis (Hedw.) Lindb.- 8: on rock, 25 May 2004, ABAY 1030; 10: on rock, 26 June 2005, ABAY 1031.

29. G. pulvinata (Hedw.) Sm.- 8: on rock, 25 May 2004, ABAY 1028; 9: on rock, 26 June 2005, ABAY 1029.

30. G. trichophylla Grev.- 1: on rock, 23 May 2004, ABAY 1171.

Bryaceae

31. Pohlia cruda (Hedw.) Lindb.- 4: on rock, 23 May 2004, ABAY 1147; 10: on rock, 26 June 2005, ABAY 1032.

32. Bryum caespiticium Hedw. – 1: on soil, 23 May 2004, ABAY 1033.

Mniaceae

***33. Mnium marginatum** (Dicks.) P.Beauv.- 6: on soil, 25 May 2004, ABAY 1034.

34. M. stellare Hedw. – 6: on soil, 25 May 2004, ABAY 1035; 10: on rock, 26 June 2005, ABAY 1037.

35. Plagiomnium affine (Blandow) T.J.Kop.- 10: on soil, 26 June 2005, ABAY 1039.

Bartramiaceae

36. Philonotis fontana (Hedw.) Brid.- 9: on soil near water, 26 June 2005, ABAY 1041.

Timmiaceae

***37. Timmia austriaca** Hedw. – 1: on soil, 23 May 2004, ABAY 1043.

Orthotrichaceae

38. Orthotrichum affine Brid.- 9: on tree, 26 June 2005, ABAY 1045; on rock, 26 June 2005, ABAY 1150.

***39. O. pulchellum** Brunt.- 1: on fir, 23 May 2004, ABAY 1152; 9: on tree, 26 June 2005, ABAY 1046.

***40. O. rupestre** Schleich. ex. Schwägr.- 4: on rock, 23 May 2004, ABAY 1151; 10: on rock, 26 June 2005, ABAY 1047.

Leskeaceae

***41. Pterigynandrum filiforme** Hedw.- 1: on rock, 23 May 2004, ABAY 1149; 4: on rock, 23 May 2004, ABAY 1148; 6: on tree, 25 May 2004, ABAY 1049; 9: on tree, 26 June 2005, ABAY 1048.

Thuidiaceae

***42. Thuidium recognitum** (Hedw.) Lindb.- 6: on soil near water, 25 May 2004, ABAY 1050.

Amblystegiaceae

43. Cratoneuron filicinum (Hedw.) Spruce – 6: on soil in water, 25 May 2004, ABAY 1051.

44. Palustriella commutata (Hedw.) Ochyra- 6: on wet soil, 25 May 2004, ABAY 1052; on wet soil, 25 May 2004, ABAY 1053.

***45. P. falcata** (Brid.) Ochyra- 6: on soil, 25 May 2004, ABAY 1054.

***46. Drepanocladus aduncus** (Hedw.) Warnst.- 7: on soil, 25 May 2004, ABAY 1057.

***47. D. revolvens** (Sw.) Warnst.- 6: on decayed log, 25 May 2004, ABAY 1058.

48. Sanionia uncinata (Hedw.) Loeske- 4: on rock, 23 May 2004, ABAY 1165; 6: on soil, 25 May 2004, ABAY 1059; 9: on soil, 26 June 2005, ABAY 1060; 10: on root, 26 June 2005, ABAY 1061.

***49. Calliergonella cuspidata** (Hedw.) Loeske- 5: on soil in water, 25 May 2004, ABAY 1062; 9: on soil in water, 26 June 2005, ABAY 1063.

Brachytheciaceae

50. Homalothecium lutescens (Hedw.) H.Rob.- 2: on rock, 23 May 2004, ABAY 1178; 6: on rock, 25 May 2004, ABAY 1065; 8: on rock, 25 May 2004, ABAY 1066; 9: on rock, 26 June 2005, ABAY 1067; 10: on rock, 26 June 2005, ABAY 1068, ABAY 1179, on soil, 26 June 2005, ABAY 1064.

51. H. sericeum (Hedw.) Schimp.- 2: on rock, 23 May 2004, ABAY 1172; 9: on soil, 26 June 2005, ABAY 1071.

52. Brachythecium erythrorrhizon Schimp.- 1: on soil, 23 May 2004, ABAY 1177; 3: on rock, 23 May 2004, ABAY 1176; 10: on soil, 26 June 2005, ABAY 1073.

53. B. glareosum (Spruce) Schimp.- 10: on soil, 26 June 2005, ABAY 1075.

54. B. plumosum (Hedw.) Schimp.- 1: on soil, 23 May 2004, ABAY 1173.

***55. B. salebrosum** (F.Weber & D.Mohr) Schimp.- 9: on decayed root, 26 June 2005, ABAY 1077.

56. B. velutinum (Hedw.) Schimp.- 1: on tree, 23 May 2004, ABAY 1174.

57. Rhynchostegium murale (Hedw.) Schimp.– 1: on rock in water, 23 May 2004, ABAY 1079.

***58. Eurhynchium hians** (Hedw.) Sande Lac.- 6: on soil near water, 25 May 2004, ABAY 1080.

***59. E. pulchellum** (Hedw.) Jenn.- 5: on soil, 25 May 2004, ABAY 1082.

***60. E. schleicher** (R.Hedw.) Jur.- 1: on soil, 23 May 2004, ABAY 1083.

Plagiotheciaceae

***61. Plagiothecium platyphyllum** Mönk.- 6: on decayed tree, 25 May 2004, ABAY 1084.

Hypnaceae

62. Hypnum cupressiforme Hedw.- 10: on rock, 26 June 2005, ABAY 1191.

***63. Rhytidiadelphus squarrosus** (Hedw.) Warnst.- 9: on soil, 26 June 2005, ABAY 1085.

***64. R. triquetrus** (Hedw.) Warnst.- 2: on rock, 23 May 2004, ABAY 1163; 4: on soil, 23 May 2004, ABAY 1162; 6: on soil, 25 May 2004, ABAY 1086, ABAY 1088.

65. Hylocomium splendens (Hedw.) Schimp.- 1: on soil, 23 May 2004, ABAY 1161; 8: on soil, 25 May 2004, ABAY 1089; 10: on soil, 26 June 2005, ABAY 1090.

5. RESULTS AND DISCUSSION

A total of 65 taxa belonging to 39 genera and 17 families were found among 200 moss specimens collected from Yapraklı district in 2004 and 2005. New moss records for the A2 grid square are *Syntrichia latifolia, Orthotrichum pulchellum,* and *Thuidium recognitum*. When compared with the previous studies of Abay (2003, [2005]2006) and Keçeli and Çetin (2000) in several parts of Çankırı, 30 taxa and their localities are mentioned for the first time in Çankırı. In these taxa, there are 17 acrocarp mosses and the most widespread ones are *Dichodontium pellucidum*, *Orthotrichum pulchellum* and *O. rupestre*. In the study area, *Pterigynandrum filiforme* and *Rhytidiadelphus triquetrus* species are the 2 most widespread pleurocarp species in the mentioned 30 taxa. The first time determined

acrocarp and pleurocarp mosses in Çankırı firstly cover the soil. Secondly the acrocarps grow up on rocks but the pleurocarps prefer tree or other substrata in more humid habitats in the study area.

When we look up to studies about the 30 firstly told taxa done outside Çankırı province and the neighbourhoods in the same grid square (A2), we can say that four of them, *Dicranella heteromalla, Orthotrichum rupestre, Pterigynandrum filiforme* and *Brachythecium salebrosum,* were informed from Kızılcahamam-Soğuksu National Park (Uyar and Çetin, 2001), Çamkoru and Çamlıdere districts (Çetin, Unç and Uyar, 2002) and Ilgaz Mountain National Park (Abay and Çetin, 2003). The following species were determined earlier from both Kızılcahamam-Soğuksu National Park (Uyar and Çetin, 2001) and Çamkoru-Çamlıdere districts (Çetin, Unç and Uyar, 2002): *Dicranoweisia crispula, Didymodon vinealis*, *Bryoerythrophyllum recurvirostrum, Weissia controversa* var. *crispata, Eurhynchium pulchellum*. Five of 30 taxa, *Weissia controversa* var. *controversa, Mnium marginatum, Calliergonella cuspidata, Rhytidiadelphus squarrosus* and *R. triquetrus,* were determined by Abay and Çetin (2003). *Grimmia montana* and *Drepanocladus revolvens* are reported from Kızılcahamam-Soğuksu National Park (Uyar and Çetin, 2001) and *Timmia austriaca, Drepanocladus aduncus* are also recorded by the following authors (Çetin, Unç and Uyar, 2002) and *Plagiothecium platyphyllum* was seen to be reported by Uyar and Çetin (2001) and Abay and Çetin (2003). As a result, comparing the taxa near Çankırı province and the neighborhoods with the firstly told 30 taxa, it can be said that 19 of them had been informed from the near surroundings and the rest 11 (*Dichodontium pellucidum, Ditrichum pusillum, D. subulatum, Distichium capillaceum, Syntrichia latifolia, Tortula vahliana, Orthotrichum pulchellum, Thuidium recognitum, Palustriella falcata, Eurhynchium hians, E. schleicher*) haven't been determined before.

If we compare this study with Keçeli and Çetin (2000), Abay and Çetin (2003) and Abay (2005;2006) studies, these results occur (Table 2): When looked at Table 2, in the moss studies in the boundaries of Çankırı province, Pottiaceae and Brachytheciaceae families are seen to have the biggest number of taxa such as in the present study. For the growth of Pottiaceae family members places like Çankırı, which have a semi-arid climate, are suitable areas. On the contrary, in Ilgaz Mountain National Park, some parts of the south slopes of which are in the boundaries of Çankırı province, Pottiaceae and Brachytheciaceae families have the same ratios sharing the first row.

In Table 3, the families Pottiaceae, Brachytheciaceae, Amblystegiaceae, and Grimmiaceae make up 58.45% of the total taxa in the study area, and the remaining families (13) constitute 41.55% of the total taxa. In consideration of the whole research area, 11 of the families belong to acrocarpous and 6 belong to pleurocarpous mosses. According to the total number of taxa, 40 of them belong to acrocarpous mosses, and 25 taxa belong to pleurocarpous mosses occurring in Yapraklı. It is an expected result because of the semi-arid study area.

Syntrichia ruralis, *Tortula subulata*, *Schistidium apocarpum*, and *Homalothecium lutescens* are common in all habitats because of their high tolerance to desiccation during the three months dry season (July, August and

September). Therefore, it is not surprising that Pottiaceae and Brachytheciaceae families have great moss species richness in the study area.

Table 2. The comparision of the taxa distribution according to the families.

	Contributions to the moss flora of Çankırı (Yapraklı		The moss flora of Çankırı-Eldivan mountain		Contributions to the moss flora of Çankırı province (Eldivan-Karadere)		Ilgaz mountain national park	
Families	Number of taxa	Rate (%)	Number of taxa	Rate (%)	Number of taxa	Rate (%)	Number of taxa	Rate (%)
Pottiaceae	14	21.53	14	26.00	14	29.20	15	13.76
Brachytheciaceae	11	16.92	11	20.50	6	12.50	15	13.76
Amblystegiaceae	7	10.77	4	7.40	4	8.30	5	4.60
Grimmiaceae	6	9.23	5	9.30	4	8.30	7	6.42
Dicranaceae	4	6.15	2	3.70	1	2.10	8	7.34
Ditrichaceae	4	6.15	1	1.80	1	2.10	2	1.83
Hypnaceae	4	6.15	4	7.40	3	6.20	9	8.26

Table 3. The distributions of the taxa according to the families

Families	Number of taxa	Percentage of taxa according to total number of taxa (%)	Families	Number of taxa	Percentage of taxa according to total number of taxa (%)
Pottiaceae	14	21.53	Bryaceae	2	3.08
Brachytheciaceae	11	16.92	Polytrichaceae	1	1.54
Amblystegiaceae	7	10.77	Encalyptaceae	1	1.54
Grimmiaceae	6	9.23	Bartramiaceae	1	1.54
Dicranaceae	4	6.15	Timmiaceae	1	1.54
Ditrichaceae	4	6.15	Leskeaceae	1	1.54
Hypnaceae	4	6.15	Thuidiaceae	1	1.54
Mniaceae	3	4.62	Plagiotheciaceae	1	1.54
Orthotrichaceae	3	4.62	**Total:** 17	65	100

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