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# The Moss Flora (Musci) of Ilgaz Mountain National Park

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**Abstract:** A list of mosses from the Ilgaz Mountain National Park which is an important area because of its location and floristic richness, is presented. A total of 109 taxa belonging to 56 genera and 21 families were found from 650 moss specimens collected between 1997 and 2000. Among them, 15 taxa are new records for the A2 grid square according to the system of Henderson & Prentice (1969).

**Key Words:** Bryophytes, Moss, Flora, National Park, Ilgaz Mountain

## Ilgaz Dağı Milli Parkı Karayosunu (Musci) Florası

**Özet:** Bu çalışmada konumu ve floristik zenginliği açısından önem taşıyan Ilgaz Dağı Milli Parkı'nın karayosunu florası sunulmaktadır. 1997-2000 yılları arasında toplanan 650 karayosunu örneklerinden 21 familyaya ait 56 cins ve bunlara ait 109 takson tanımlanmıştır. Bunlardan 15 tanesi Henderson ve Prentice'in kareleme sistemine göre A2 karesi için yeni kayıttır.

**Anahtar Sözcükler:** Bryophyta, Karayosunu, Flora, Milli Park, Ilgaz Dağı

## Introduction

The study area, Ilgaz Mountain National Park, is located in the A2 grid square according to the system adopted by Henderson & Prentice (1969). No detailed study has yet been conducted on the moss flora in the area, which is located in a transitional zone between Inner Anatolia and the north-west Black Sea regions.

The master plan of the national park has not been reviewed since 1976 when it was declared. This has resulted in uncontrolled building and recreational use. As a result of the controversial use of the park, many species of flowering plants and mosses may become endangered. To conserve biological diversity, the construction of buildings must be prevented. The national park should be used in an ecologically balanced manner, and a master plan urgently be needs to prepared.

The national park has 1089 hectares; 751 hectares of the park are situated within the province of Kastamonu, and 338 hectares are within the boundaries of Çankırı province.

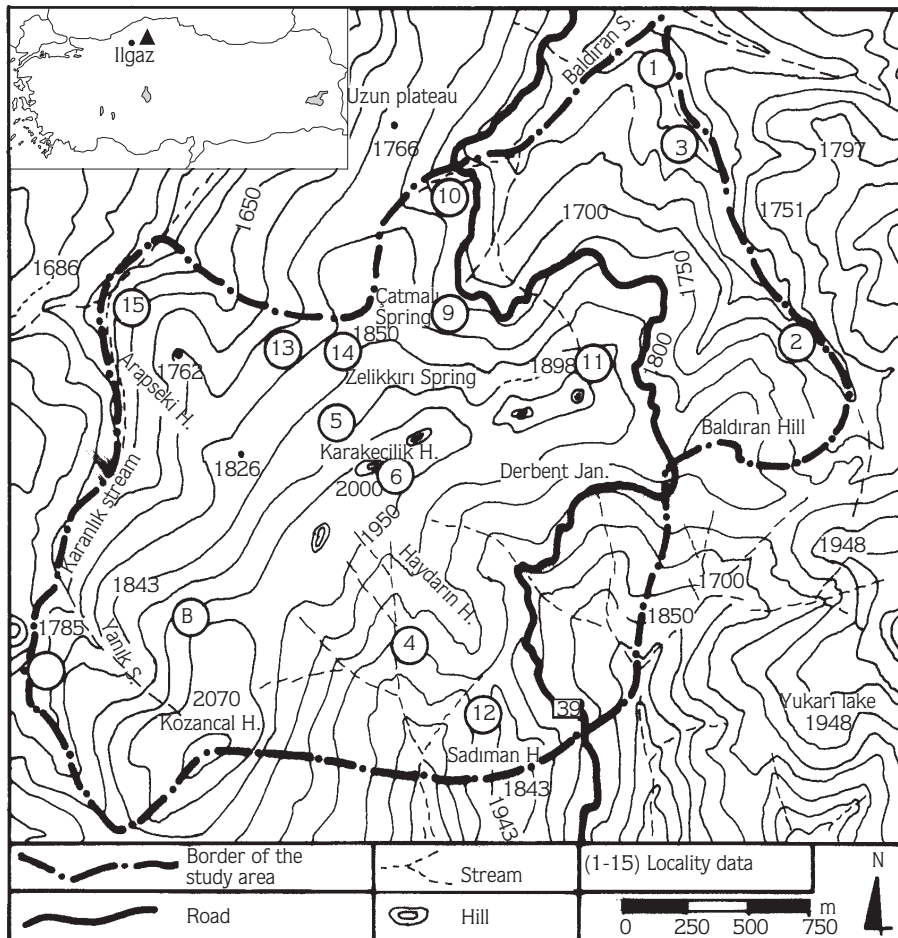
The national park is surrounded by the Baldıran River to the north, and the Karanlık River to the west, Baldıran hill to the east, and Kazançal and Şadımının hills to the south. Karakeçilik hill is the second highest point in the study area. From there it is possible to see both north and south facing slopes (Figure 1).

It is hoped that this study will contribute to knowledge of moss flora in Turkey and be useful as a guide for future research.

## Materials and Methods

The materials of the study include 650 specimens which were collected during periodic field trips to Ilgaz Mountain National Park between 1997 and 2000 in different seasons. The identified samples are kept in the Forest Botany Laboratory, Çankırı Faculty of Forestry, Ankara University.

The samples were identified with various moss floras (Smith, 1980; Kramer, 1980; Watson, 1981; Nyholm,



▲ Study area

Figure 1. Topographical Map of Ilgaz Mountain National Park ▲ Study Area 1-15. Collecting sites.

1981; Frey et al, 1995; Greven, 1995). The list of species is arranged according to the system described by Smith (1980). In addition, collection dates, collector number, altitude and habitat are mentioned. Taxa new for the A2 grid square were determined by reviewing the related literature (Henderson & Prentice, 1969; Çetin & Yurdakulol, 1985, 1988; Keçeli & Çetin, 2000; Uyar & Çetin, 2001). New records for the A2 grid square are marked with an asterisk.

Information about taxon distribution was obtained from the literature (Henderson & Prentice, 1969; Çetin, 1988a, 1988b; Çetin & Yurdakulol, 1988, Çetin, 1989; Frey & Kürschner, 1991; Baydar & Özdemir, 1996; Çetin & Uyar, 1997; Çetin, 1999; Özdemir & Çetin, 1999; Keçeli & Çetin, 2000; Özdemir, 2001; Uyar & Çetin, 2001).

#### Floristic list

##### Tetraphidaceae Schimp.

###### \*1. *Tetraphis pellucida* Hedw.

A2 Kastamonu: Ilgaz Mountain National Park, on decayed fir log, 1400 m, 24 vii 1998, ABAY 119.

Turkey (A4), Europe, Caucasus, Central Asia, China, Taiwan, Japan, Korea, N. America.

##### Polytrichaceae Schwägr.

###### 2. *Pogonatum urnigerum* (Hedw.) P.Beauv

A2 Kastamonu: Ilgaz Mountain National Park, Haydarin hill, on soil, 1715 m, 3 vii 1998, ABAY 72.

Turkey (A1, A2, A3, A4), Europe, W., C. and E. Asia, N. America, Greenland, Caribbean.

**3. Polytrichum juniperinum Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on rock, 1400 m, 3 vii 1998, ABAY 61.

Cosmopolitan.

**4. Atrichum undulatum (Hedw.) P.Beauv.**

A2 Kastamonu: Ilgaz Mountain National Park, Doruk, on soil, 1800 m, 14 vii 1998, ABAY 308.

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

**Buxbaumiaceae Schwägr.**

**5. Buxbaumia viridis (Mong.) Brid.**

A2 Kastamonu: Ilgaz Mountain National Park, Şadimanın hill, on decayed fir log, 1740 m, 20 v 1999, ABAY 193.

Turkey (A2), Europe, Caucasus, China, N. America.

**Fissidentaceae Schimp.**

**6. Fissidens taxifolius Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, near water, 24 vii 1998, 1400 m, ABAY 123.

Turkey (A1, A2, A4, B6, B11), Europe, Asia, Japan, N. America.

**Dicranaceae Schimp.**

**\*7. Dicranum fuscescens Turner**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on fir trunk, 1430 m, 3 vii 1998, ABAY 36.

Turkey (A4), Europe, Caucasus, N. and C. Asia, N. America, Greenland.

**8. D. polysetum Sw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on fir trunk, 1430 m, 3 vii 1998, ABAY 48.

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

**9. D. scoparium Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, near water, 1450m, 19 xii 1997, ABAY 1.

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

**10. D. tauricum Sap.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on fir trunk, 1430 m, 19 xii 1997, ABAY 6.

Turkey (A2, A3, B6), Europe, N. America, Greenland.

**\*11. Dicranoweisia cirrata (Hedw.) Lindb. ex Milde**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, *Abies nordmanniana* subsp. *bornmuelleriana* forest, on rock, 1715 m, 3 vii 1998, ABAY 68.

Turkey (A1, A3, B6, C11, C12), Europe, Caucasus, Himalayas, Mongolia, Algeria, Canary Islands, Hawaii, N. America, Tasmania.

**12. Dicranella heteromalla (Hedw.) Schimp.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on fir roots, 1500 m, 19 xii 1997, ABAY 12.

Turkey (A3, A4, 5), Europe, Asia, N. America.

**13. D. varia (Hedw.) Schimp.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, near water, 1400 m, 24 vii 1998, ABAY 147.

Turkey (A1, A2, A3, B6, C11, C12), Europe, Middle East, China, Siberia, N. Africa, N. America, Guatemala, Cuba, Jamaica, Haiti.

**\*14. Cynodontium jenneri (Schimp.) Stint.**

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on soil, 1400 m, 24 vii 1998, ABAY 154.

N. Wales, Durham, Scandinavia.

**Ditrichaceae B., S. & G.**

**15. Ceratodon purpureus (Hedw.) Brid.**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, near water, 1715 m, 3 vii 1998, ABAY 75.

Cosmopolitan.

**\*16. Ditrichum cylindricum (Hedw.) Grout.**

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m, 24 vii 1998, ABAY 145.

Turkey (B8), Europe, Siberia, Japan, N. America, New Zealand.

**Encalyptaceae Schimp.**

**17. Encalypta ciliata Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on rock, 1400 m, 4 vii 1998, ABAY 86.

Turkey (A1, A2, A4, B8, B9), Europe, C. Africa, Australia.

**18. *E. rhyptocarpa* Schwägr.**

A2 Kastamonu: Ilgaz Mountain National Park, Kazançal hill, on fir log, 1900 m, 1 vii 1999, ABAY 231.

Turkey (A1, A2), Europe, Caucasus, Asia, N. America, N. Africa, Greenland, Hawaii.

**19. *E. streptocarpa* Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Karanlık streams, on rock, 1650 m, 28 viii 2000, ABAY 312.

Turkey (A1, A2, A3, B6, B7, C12), Europe, Caucasus, N. America.

**Pottiaceae** Schimp.

**20. *Tortula muralis* Hedw. var. *muralis***

A2 Kastamonu: Ilgaz Mountain National Park, Kazançal hill, on rock, 1900 m, 1 vii 1998, ABAY 222.

Cosmopolitan.

**21. *T. muralis* Hedw. var. *aestiva* Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Zelikır spring, on rock, 1800 m, 14 vii 2000, ABAY 301.

Turkey (A2, C14), Europe, Asia, N. America.

**22. *T. norvegica* (Web.f.) Wahlenb. ex Lindb.**

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on soil, 2000 m, 24 vii 1998, ABAY 116.

Turkey (A1, A2, A3, A8, B9), W. Europe, N. Asia, N. America.

**23. *T. princeps* De Not.**

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on soil, 1900 m, 24 vii 1998, ABAY 112.

Turkey (A1, A2, B6, B7, C11, C12, C13, C14), Europe, Asia, N. and S. America, New Zealand.

**24. *T. ruralis* (Hedw.) P.Gaertn. Meyer & Scherb.**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, on soil, 1715 m, 19 xii 1997, ABAY 52.

Cosmopolitan.

**25. *T. subulata* Hedw. var. *subulata***

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1400 m, 19 xii 1997, ABAY 19.

Cosmopolitan.

**26. *T. subulata* Hedw. var. *angustata* (Schimp.) Limpr.**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, on soil, 1715 m, 3 vii 1998, ABAY 91.

Turkey (A1, A2, B6, B8), Europe, Asia, N. America, N. Africa.

**27. *T. subulata* Hedw. var. *graeffii* Warnst.**

A2 Kastamonu: Ilgaz Mountain National Park, Çatmalı spring, on rock, 1800 m, 1 vii 2000, ABAY 239.

Turkey (A2), W. and N. Britain.

**\*28. *Pottia mutica* Vent.**

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m, 24 vii 1998, ABAY 111.

C., W., and S. Europe, N. Africa, Palestine, Arabia.

**29. *Barbula convoluta* Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1600 m, 3 vii 1998, ABAY 27.

Turkey (A1, A2, A4, B6, C11, C12, C13), Europe, Asia, N. Africa, N. America, Mexico, Australia.

**30. *B. cylindrica* (Taylor) Schimp.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1420 m, 10 ix 1998, ABAY 172.

Turkey (A1, A3, A4, B6, C11), Europe, Asia, N. Africa, N. and C. America.

**31. *B. tophacea* (Brid.) Mitt.**

A2 Kastamonu: Ilgaz Mountain National Park, Çatmalı spring, near water, 1800 m, 24 vii 1998, ABAY 148.

Turkey (A1, A2, A4, B6, C11, C13), Europe, Asia, N. Africa, N., C. and S. America

**32. *Trichostomum crispulum* Bruch.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1400 m, 4 vii 1998, ABAY 85.

Turkey (A1, A2, A3, A4, B6, C11, C12, C13), Europe, Caucasus, Asia, N. Africa, N. America.

**33. *Weissia controversa* Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1450 m, 4 vii 1998, ABAY 87.

Turkey (A2, A4, B6, B7, C11), Europe, Asia, N. and C. America, West Indies, Tasmania, New Zealand.

- 34. *Tortella tortuosa*** (Hedw.) Limpr.  
A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1500 m, on soil, 19 xii 1997, ABAY 5.  
Cosmopolitan.  
Grimmiaceae Arnott.
- 35. *Schistidium apocarpum*** (Hedw.) B. & S.  
A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m, 1 vii 1998, ABAY 129.  
Cosmopolitan.
- \*36. *S. apocarpum*** (Hedw.) B. & S. var. *atrofuscum* (Schimp.) C.O.Jensen ex Weim.  
A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m. 24 vii 1998, ABAY 152.  
Turkey (B8, C11).
- 37. *S. confertum*** (Funck.) B., S. & G.  
A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m, 24 vii 1998, ABAY 105.  
Turkey (A1, A2, A4, B6, B8, B9, C13, C14), Europe, Caucasus, N. and C. Asia, Japan, Ethiopia, N. America.
- 38. *Grimmia alpestris*** (Web. & Mohr.) DC.  
A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m, 24 vii 1998, ABAY 130.  
Turkey (A1, A4, B8, B10), Europe, Caucasus, N. America.
- 39. *G. pulvinata*** (Hedw.) Sm.  
A2 Kastamonu: Ilgaz Mountain National Park, Çatmalı spring, on rock, 1500 m, 1 vii 2000, ABAY 281, 288.  
Cosmopolitan.
- 40. *Racomitrium canescens*** (Hedw.) Brid.  
A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, on soil, 1740 m, 3 vii 1998, ABAY 43.  
Turkey (A1, A2, A4), Europe, Caucasus, Asia, N. America.
- \*41. *R. heterostichum*** (Hedw.) Brid.  
A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1450 m, 3 vii 1998, ABAY 31.  
Turkey (A4), Europe, Asia, N. America, Greenland, S. Africa, Tasmania, New Zealand.
- Bryaceae Schwägr.**
- 42. *Pohlia cruda*** (Hedw.) Lindb.  
A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m, 24 vii 1998, ABAY 158.  
Turkey (A1, A2, A3, A4, B6, B7, B8, C11), Europe, Asia, Africa.
- 43. *Bryum alpinum*** With. var. *viride* Husn.  
A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on fir bark, 2000 m, 24 vii 1998, ABAY 156.  
Turkey (A1, A2), Europe, Asia, C. and S. Africa, Canary Island, America.
- 44. *B. capillare*** Hedw.  
A2 Kastamonu: Ilgaz Mountain National Park, Baldıran 1450 m, on soil, 1450 m, 24 vii 1998, ABAY 160.  
Cosmopolitan.
- 45. *B. elegans*** Nees  
Karakeçilik hill, on rock, 2000 m, 24 vii 1998, ABAY 149.  
Turkey (A1, A2, A3, A4, B6), Europe.
- \*46. *B. pallens*** (Brid.) Sw. ex Roehl.  
A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on wet soil, 1500 m, 3/4 vii 1998, ABAY 34, 92.  
Turkey (A3, A4), Europe, W. and N. Asia, China, N. and C. Africa, N. and S. America, Greenland.
- 47. *B. torquescens*** Bruch ex De Not.  
A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, on soil, 1750 m, 3 vii 1998, ABAY 65.  
Turkey (A1, A2, A4, B6, B8, B9, C11, C12, C13), Europe, Asia, N. Africa, N. America.
- 48. *B. turbinatum*** (Hedw.) Turn.  
A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on soil, 2000 m, 24 vii 1998, ABAY 110.  
Turkey (A1, A2, A4, B6, B7, B8, C11, C13, C15), Europe, Caucasus, C. and W. Asia, N. and C. Africa, N. and S. America.
- 49. *Rhodobryum roseum*** (Hedw.) Limpr.  
A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1450 m, 24 vii 1998, ABAY 122.  
Turkey (A2, A4), Europe, Asia, N. America.

**Mniaceae Schwägr.**

**\*50. Mnium hornum Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1450 m, 24 vii 1998, ABAY 157.

Turkey (A4), Europe, Japan, Algeria, N. America.

**\*51. M. marginatum (With.) Brid. ex P.Beauv.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1400 m, 24 vii 1998, ABAY 140.

Turkey (A4), Europe, Caucasus, Siberia, N. America.

**52. M. spinosum (Voit.) Schwägr.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1450 m, 19 xii 1997, ABAY 4.

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

**53. M. stellare Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, near water, 1620 m, 10 ix 1998, ABAY 181.

Turkey (A1, A2, A4), Europe, Turkey, Asia, N. America.

**54. Rhizomnium punctatum (Hedw.) T.Kop.**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, near water, 1750 m, 3 vii 1998, ABAY 44.

Turkey (A1, A2, A3, A4, B8), Europe, Asia, N. America, Greenland.

**55. Plagiomnium affine (Bland. ex Funck.) T.Kop**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, on soil, 1750 m, 3 vii 1998, ABAY 45.

Turkey (A1, A2, A3, A4, B6, B8), Europe, Asia.

**56. P. cuspidatum (Hedw.) T.Kop.**

A2 Kastamonu: Ilgaz Mountain National Park, Zelikkırı spring, on soil, 1800 m, 11 ix 1999, ABAY 266.

Turkey (A4, B6), Europe, Asia, N. America.

**57. P. elatum (B., S. & G.) T.Kop.**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, on soil, 1750 m, 3 vii 1998, ABAY 39.

Turkey (A2, A3, A4), Europe.

**58. P. undulatum (Hedw.) T.Kop.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, near water, 1430 m, 19 xii 1997, ABAY 2.

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

**Bartramiaceae Schwägr.**

**59. Bartramia halleriana Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on moist soil, 1420 m, 10 ix 1998, ABAY 178.

Turkey (A2, A4), Europe, Asia, N. and S. America, Australia, New Zealand, Hawaii.

**60. B. ithyphylla Brid.**

A2 Kastamonu: Ilgaz Mountain National Park, Karanlık Streams, on rock, 1650 m, 28 viii 2000, ABAY 309.

Turkey (A1, A2, A4), Europe, Asia, E. Africa, America.

**61. Philonotis fontana (Hedw.) Brid.**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, near water, 1750 m, 3 vii 1998, ABAY 70.

Turkey (A1, A2, A3, A4, B6, B7, B8, B9, B10), Europe, Asia, N. and E. Africa, N. America, Mexico, Greenland.

**62. P. tomentella Mol.**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, near water, 1750 m, 3 vii 1998, ABAY 69, 70.

Turkey (A1, A2, A4, B9), Europe, N. W. and C. Asia, N. America, Greenland.

**Orthotrichaceae Arnott.**

**63. Orthotrichum affine Brid.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on fir roots, 1500 m, 3 vii 1998, ABAY 77.

Turkey (A1, A2, A3, A4, B6), Europe, Asia, N. Africa, N. America.

**\*64. O. diaphanum Brid.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on fir bark, 1450 m, 4 vii 1998, ABAY 100.

Turkey (A1, A3, A4, B6, B7), Europe, Asia, N. Africa, Canary Islands, N., C. and S. America.

**65. O. rupestre Schleich. ex Schwägr.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1500 m, 4 vii 1998, ABAY 99.

Turkey (A1, A2, B5, B6, B7, B8, C13), Europe, Asia, N. America.

**66. *O. speciosum* Nees**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on fir bark, 1520 m, 4 vii 1998, ABAY 98.

Turkey (A1, A2), Europe, N. Africa, N. and C. Asia, N. America, Greenland.

**Leucodontaceae** Schimp.

**67. *Leucodon immersus* Lindb.**

A2 Kastamonu: Ilgaz Mountain National Park, Çatmalı spring, on branches, 1350 m, 10 ix 1998, ABAY 177.

Turkey (A2, A3), Europe, Asia.

**68. *L. sciuroides* (Hedw.) Schwägr.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on fir, 1450 m, 4 vii 1998, ABAY 91.

Cosmopolitan.

**69. *Antitrichia curtispindula* (Hedw.) Brid.**

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on soil, 2000 m, 24 vii 1998, ABAY 128.

Turkey (A2, A3, A4, B6), Europe, C. and S. Africa, Caucasus, America.

**Neckeraceae** Schimp.

**70. *Neckera crispa* Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Karanlık stream, on rock, 1650 m, 28 viii 2000, ABAY 310.

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

**71. *Metaneckera menziesii* (Hook.) Steere**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1420 m, 10 ix 1998, ABAY 179.

Turkey (A2, B6, C11, C12, C13), Europe, Asia, S. America, N. Africa.

**Leskeaceae** Schimp.

**\*72. *Habrodon perpusillus* (De Not.) Lindb.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on fir bark, 1420 m, 4 vii 1998, ABAY 101.

Turkey (A1, A3, A4, B6, C12), Europe, N. Africa.

**73. *Pseudoleskeella catenulata* (Brid. ex Schrad.)**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1450 m, 4 vii 1998, ABAY 104.

Turkey (A2, A3), Europe, Asia.

**74. *Lescureaea incurvata* (Hedw.) Lawt.**

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on soil, 2000 m, 24 vii 1998, ABAY 127.

Turkey (A1, A4, B10, C13), Europe, Asia, N. America.

**75. *Pterigynandrum filiforme* Hedw.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1450 m, 19 xii 1997, ABAY 23.

Turkey (A1, A2, A3, B6, C11), Europe, N. America, Asia.

**Thuidiaceae** Schimp.

**76. *Abietinella abietina* (Hedw.) Fleisch. subsp. *abietina***

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1500 m, 19 xii 1997, ABAY 11.

Turkey (A1, A2, A3, A4, B9), Europe, Asia, N. America, Greenland.

**77. *A. abietina* (Hedw.) Fleisch subsp. *hystricosum* (Mitt) Loeske**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1580 m, 19 xii 1997, ABAY 8.

Turkey (A2, A3, A4, B9), Europe, Asia.

**Amblystegiaceae** (Broth.) Fleisch.

**78. *Crataneuron commutatum* (Hedw.) Roth**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, near water, 1430 m, 4 vii 1998, ABAY 89.

Turkey (A1, A2, A3, B7, B8, B9, B10, C11, C13, C15), Europe, Asia, N. America, N. Africa.

**79. *C. filicinum* (Hedw.) Spruce var. *filicinum***

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, near water, 1430 m, 3 vii 1998, ABAY 79.

Cosmopolitan.

**80. *C. filicinum* (Hedw.) Spruce var. *fallax* (Brid) Roth.**

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on moist soil, 1430 m, 3 vii 1998, ABAY 33.

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

**81. *Sanionia uncinata* (Hedw.) Loeske.**

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, on soil, 1750 m, 3 vii 1998, ABAY 38.



Turkey (A1, A2, A3, A4, A5), Europe, Asia, N., C. and S. America, Greenland, Australia, New Zealand.

**82. Calliergonella cuspidata** (Hedw.) Loeske

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, near water, 1430 m, 19 xii 1997, ABAY 7.

Turkey (A1, A2, A3, A4, A5, B6, C13, C15), Europe, Asia, N. Africa, N., C. and S. America, Australia, New Zealand.

**Brachytheciaceae** Schimp.

**83. Isothecium myosuroides** Brid.

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on rock, 1430 m, 10 ix 1998, ABAY 182.

Turkey (A2, A3, A4, B6), Europe, N. Africa.

**84. Homalothecium lutescens** (Hedw.) Robins.

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m, 24 vii 1998, ABAY 247.

Turkey (A1, A2, A3, A4, B6, B7, C11, C12, C13), Europe.

**85. H. sericeum** (Hedw.) B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on rock, 2000 m, 24 vii 1998, ABAY 132.

Cosmopolitan.

**86. Brachythecium albicans** (Hedw.) B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1420 m, 10 ix 1998, ABAY 167.

Turkey (A1, A2, A4), cosmopolitan.

**87. B. curtum** (Lindb.) J.Lange & C.Jens

A2 Kastamonu: Ilgaz Mountain National Park, Zelikırnı spring, near water, 1400 m, 11 ix 1999, ABAY 267.

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

**88. B. erythrorrhizon** B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, on fir bark, 1800 m, 3 vii 1998, ABAY 37.

Turkey (A1, A2, A4), Europe, Asia, N. America.

**89. B. glaerosum** (Spruce) B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1420 m, 24 vii 1998, ABAY 40.

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

**90. B. plumosum** (Hedw.) B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Karakeçilik hill, on soil, 2000 m, 24 vii 1998, ABAY 133. Cosmopolitan.

**91. B. populeum** (Hedw.) B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on fir bark, 1520 m, 19 xii 1997, ABAY 17.

Turkey (A1, A2, A4, B6), cosmopolitan.

**92. B. rivulare** B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Haydarın hill, near water, 1420 m, 3 vii 1998, ABAY 71.

Turkey (A1, A2, A3, A4, A5, B6, B8, B9, C11, C12), Europe, Asia, N. America.

**93. B. salebrosum** (Web.& Mohr.) B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1400 m, 3 vii 1998, ABAY 54.

Turkey (A1, A2, A3, A4, B4, B6, C12, C13), Europe, N. and C. Asia, N. America.

**94. Scleropodium purum** (Hedw.) Limpr.

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on moist soil, 1420 m, 10 ix 1998, ABAY 168.

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

**\*95. Cirriphyllum piliferum** (Hedw.) Grout.

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, on soil, 1450 m, 9 ix 1999, ABAY 238.

Turkey (A3, A4), Europe, Asia, N. Africa, N. America, Greenland.

**96. Rhynchostegium riparioides** (Hedw.) C.O.Jensen

Baldıran, near water, 1420 m, 10 ix 1998, ABAY 170.

Turkey (A1, A2, A3, A4, A5, B6, B8, B9, C11, C12), Europe, Asia, N. Africa, N. and C. America.

**97. Eurhynchium striatum** (Hedw.) Schimp.

A2 Kastamonu: Ilgaz Mountain National Park, Baldıran, near streams, 1400 m, 9 ix 1999, ABAY 254.

Turkey (A1, A2, A3, A4, B6, C12), Europe, Asia, N. Africa.

Plagiotheciaceae (Broth.) Fleisch.

98. *Plagiothecium denticulatum* (Hedw.) B., S. & G

A2 Kastamonu: Ilgaz Mountain National Park, KazaŇal hill, on rock, 1900 m, 1 vii 1999, ABAY 218, 219.

Turkey (A1, A2, A3, A4), Europe, Asia, N. and S. America, Greenland, Australia.

99. *P. platyphyllum* Moenk.

A2 Kastamonu: Ilgaz Mountain National Park, Çatmalı spring, near water, 1500 m, 10 ix 1998, ABAY 175.

Turkey (A1, A2, A3, A4), Europe.

100. *Herzogiella seligeri* (Brid.) Iwats.

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on fir roots, 1500 m, 24 vii 1998, ABAY 146.

Turkey (A2, A3), Europe, Asia, N. America.

Hypnaceae Schimp.

101. *Hypnum cupressiforme* Hedw. var. *cupressiforme* Hedw.

A2 Kastamonu: Ilgaz Mountain National Park, KazaŇal hill, on rock, 1980 m, 1 vii 1999, ABAY 226.

Turkey (A1, A2, A3, A4, A5, B6, B7, C11, C13), cosmopolitan.

102. *H. cupressiforme* Hedw. var. *lacunosum* Brid.

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on soil, 1420 m, 24 vii 1998, ABAY 121.

Turkey (A1, A2, A3, A4, B6, C12), Europe, C. America.

103. *H. cupressiforme* Hedw. var. *resupinatum* (Taylor ex Spruce) Hartm.

A2 Kastamonu: Ilgaz Mountain National Park, Çatmalı spring, on rock, 1750 m, 1 vii 2000, ABAY 285.

Turkey (A1, A2, A4), Europe

104. *H. imponens* Hedw.

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on soil, 1450 m, 4 vii 1998, ABAY 29, 95.

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

\*105. *H. revolutum* (Mitt.) Lindb.

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on rock, 1500 m, 4 vii 1998, ABAY 88.

Turkey (A4, B10, C13), N. Europe, Asia, N. America, Greenland, Antarctica.

106. *Ptilium crista-castrensis* (Hedw.) De Not.

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on soil, 1550 m, 24 vii 1998, ABAY 134.

Turkey (A2, A3), Europe, Asia, N. America, Greenland.

107. *Rhytidiadelphus squarrosus* (Hedw.) Warnst.

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on soil, 1470 m, 3 vii 1998, ABAY 35.

Turkey (A2, A3, A4), Europe, Asia, Azores, N. America.

108. *R. triquetrus* (Hedw.) Warnst.

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on soil, 1450 m, 19 xii 1997, ABAY 3.

Turkey (A2, A3, A4, A5, B6), Europe, N. and C. Asia, N. America.

109. *Hylocomium splendens* (Hedw.) B., S. & G.

A2 Kastamonu: Ilgaz Mountain National Park, Baldiran, on soil, 1450 m, 15 iv 1998, ABAY 26.

Turkey (A2, A3, A4, A5), cosmopolitan.

## Results and Discussion

In this study, 109 taxa belonging to 56 genera and 21 families were identified from 650 moss specimens collected from Ilgaz Mountain National Park between 1997 and 2000.

In Table 1, the families *Brachytheciaceae*, *Pottiaceae*, *Mniaceae*, *Hypnaceae*, *Dicranaceae*, *Bryaceae* and *Grimmiaceae* make up 65.14% of the total taxa in the study area, and the other 14 families constitute 34.86%.

The number of new records from the research area in the A2 grid square according to Henderson's system is 15.

In KazaŇal hill, located in the south-west of the study area, the region between the altitudes of 1900 and 1980 m is covered with *Abies nordmanniana* (Steven) Spach subsp. *bornmuelleriana* (Mattf.) Coode & Cullen forest. On soil *Polytrichum juniperinum*, *Dicranum scoparium*, *Tortula subulata* var. *subulata*, *T. subulata* var. *angustata*, and *Brachythecium salebrosum*; on rock *Tortula muralis*, *Tortella tortuosa*, *Schistidium apocarpum*, *Sanionia*

Table 1. The Distributions of the Taxa According to the Families.

Family	Number of taxa	Percentage of taxa according to the total number of taxa
Pottiaceae	15	13.76
Brachytheciaceae	15	13.76
Mniaceae	9	8.26
Hypnaceae	9	8.26
Dicranaceae	8	7.34
Bryaceae	8	7.34
Grimmiaceae	7	6.42
Amblystegiaceae	5	4.60
Bartramiaceae	4	3.67
Orthotrichaceae	4	3.67
Leskeaceae	4	3.67
Polytrichaceae	3	2.75
Encalyptaceae	3	2.75
Leucodontaceae	3	2.75
Plagiotheciaceae	3	2.75
Ditrichaceae	2	1.83
Neckeraceae	2	1.83
Thuidiaceae	2	1.83
Tetraphidaceae	1	0.92
Buxbaumiaceae	1	0.92
Fissidentaceae	1	0.92

*uncinata*, *Plagiothecium denticulatum*, and *Hypnum cupressiforme* var. *cupressiforme* occur, whereas on trees *Ceratodon purpureus*, *Encalypta rhytocarpha*, *Mnium marginatum*, *M. spinosum*, *Lescurea incurvata*, and *Brachythecium glaerosum* can be found. Near water *Rhizomnium punctatum*, *Crataneuron filicinum* var. *filicinum* and *Calliergonella cuspidata* were found.

Şadımanın hill is located to the east of the southern boundary of the area at an elevation of 1740-1800 m. It is covered with *Abies nordmanniana* subsp. *bornmuelleriana* forest. The following taxa were collected from this area: on soil *Tortula ruralis*, *Mnium spinosum*, *M. stellare*, *Rhizomnium punctatum*, *Crataneuron commutatum*, *Brachythecium rivulare* and *Hylocomium splendens* are frequently; found on rocks *Polytrichum juniperinum*, *Tortella tortuosa* and *Schistidium apocarpum*; on trees *Buxbaumia viridis*, *Dicranum scoparium*, *Tortella tortuosa*, *Lescurea incurvata* and *Brachythecium glaerosum*; and near water *Fissidens taxifolius*, *Rhizomnium punctatum*, *Plagiomnium undulatum* and *Ptilium crista-castrensis*.

In the west, the Karanlık stream region at 1650 m, *Abies nordmanniana* subsp. *bornmuelleriana* forests occur

once/more. The species found in on soil and rock are as follows: on soil *Atrichum undulatum* and *Hypnum cupressiforme* var. *lacunosum* and on rock *Encalypta streptocarpa*, *Bartramia ithyphylla* and *Neckera crispa*.

At Doruk, located in the north of the region between 1800 and 1950 m, the area is covered with *Abies nordmanniana* subsp. *bornmuelleriana* forest. There the following species were found: on soil *Atrichum undulatum* and *Mnium spinosum*; and on trees *Orthotrichum speciosum*, *Sanionia uncinata* and *Brachythecium erythrorrhizon*.

Pure Uludağ fir (*Abies nordmanniana* subsp. *bornmuelleriana*) forest is found between 1715 and 1800 m at Haydarın hill. There the moss flora on soil include *Polytrichum juniperinum*, *Pogonatum urnigerum*, *Dicranoweisia cirrata*, *Tortula ruralis*, *T. subulata* var. *angustata*, *Tortella tortuosa*, *Racomitrium canescens*, *Bryum torquescens*, *Mnium spinosum*, *Rhizomnium punctatum*, *Plagiomnium affine*, *P. elatum*, *Abietinella abietina* subsp. *abietina*, *Sanionia uncinata*, *Brachythecium erythrorrhizon*, *B. glaerosum*, *Rhytidiadelphus triquetrus* and *Hylocomium splendens*. On trees *Dicranum fuscescens*, *D. polysetum*, *D. scoparium*, *D. tauricum*, *Pterigynandrum filiforme* and *Brachythecium salebrosum* were found and near water *Ceratodon purpureus*, *Rhizomnium punctatum*, *Philonotis fontana*, *P. tomentella*, *Brachythecium rivulare* and *Rhytidiadelphus squarrosus* were noted.

The species abundant below the *Abies nordmanniana* subsp. *bornmuelleriana* layer, which grows at an elevation of 1340-1800 m at Çatmalı spring in the north, include the following: on soil *Dicranum scoparium*, *Tortula subulata* var. *subulata*, *Philonotis fontana*, *Lescurea incurvata*, *Pterigynandrum filiforme*, *Homalothecium lutescens*, *Rhytidiadelphus squarrosus* and *Hylocomium splendens*; on rock *Tortula ruralis*, *T. subulata* var. *graeffii*, *Tortella tortuosa*, *Schistidium apocarpum* var. *atrofusum*, *Grimmia pulvinata*, *Leucodon sciuroides*, *Pseudoleskeella catenulata*, *Brachythecium plumosum* and *Hypnum cupressiforme* var. *resupinatum*; on trees *Orthotrichum speciosum* and *Leucodon immersus*; and near water *Barbula tophacea*, *Brachythecium rivulare* and *Plagiothecium platyphyllum*.

Uludağ fir (*Abies nordmanniana* subsp. *bornmuelleriana*) forest sometimes mixed with Scots pine (*Pinus sylvestris* L.) is found between 1730 and 1830 m at Zelikkırı spring. The following mosses were found in

this formation: on soil *Tortula ruralis*, *T. subulata* var. *subulata*, *Plagiomnium cuspidatum* *Rhytidiadelphus squarrosus* and *Hylocomium splendens*, on tree *Dicranum scoparium*, *D. tauricum*, *Plagiothecium platyphyllum*, *Herzogiella seligeri*; on rocks *Tortula muralis* var. *aestiva*, *T. ruralis* and *Schistidium apocarpum*; and near water *Brachythecium curtum*.

*Abies nordmanniana* subsp. *bornmuelleriana* and *Juniperus communis* L. var. *saxatilis* Pall. Forests are found between 1900 and 2000 m at the centre of the national park. There are both north and south slopes. The mosses collected from the Karakeçilik hill are as follows: on soil *Cynodontium jenneri*, *Dicranum scoparium*, *Tortula norvegica*, *T. princeps*, *Tortella tortuosa*, *Bryum turbinatum*, *Mnium marginatum*, *Plagiomnium affine*, *Antitrichia curtispindula*, *Crataneuron filicinum* var. *filicinum*, *Brachythecium glaucosum*, *B. plumosum*, *Ptilium crista-castrensis*; and *Rhytidiadelphus triquetrus*; on rock *Ditrichum cylindricum*, *Dicranella heteromalla*, *Tortula ruralis*, *Pottia mutica*, *Tortella tortuosa*, *Schistidium apocarpum*, *S. apocarpum* var. *atrofusum*, *S. confertum*, *Grimmia alpestris*, *Racomitrium canescens*, *Pohlia cruda*, *Bryum elegans*, *Homalothecium lutescens*; and *H. sericeum*; and on trees *Bryum alpinum* var. *viride*, *Orthotrichum affine*, *Lescuraea incurvata*, *Pterigynandrum filiforme* and *Brachythecium erythrorrhizon*.

The following taxa are abundant below the layer of *Abies nordmanniana* subsp. *bornmuelleriana* (sometimes mixed with *Pinus sylvestris* forest) at an elevation of 1400-1580 m at Baldiran in the east: on soil *Polytrichum juniperinum*, *Dicranum scoparium*, *Tortula subulata* var. *subulata*, *Tortella tortuosa*, *Bryum capillare*, *B. pallens*, *Rhodobryum roseum*, *Mnium hornum*, *M. marginatum*,

*M. spinosum*, *Plagiomnium undulatum*, *Bartramia halleriana*, *Abietinella abietina* subsp. *hystricosum*, *A. abietina* subsp. *abietina*, *Calliergonella cuspidata*, *Brachythecium albicans*, *Cirriphyllum piliferum*, *Hypnum cupressiforme* var. *lacunosum*, *H. imponens*, *Rhytidiadelphus squarrosus*, *R. triquetrus* and *Hylocomium splendens*; on rock *Polytrichum juniperinum*, *Encalypta ciliata*, *Tortula ruralis*, *Barbula convulata*, *B. cylindrica*, *Weissia controversa*, *Trichostomum crispulum*, *Tortella tortuosa*, *Racomitrium heterostichum*, *Orthotrichum rupestre*, *Metaneckera menziesii*, *Pseudoleskeella catenulata*, *Abietinella abietina* subsp. *abietina*, *Isothecium myosuroides*, *Brachythecium glaucosum*, *Hypnum revolutum*, and *Hylocomium splendens*; on trees *Tetraphis pellucida*, *Dicranella heteromalla*, *Dicranum fuscescens*, *D. polysetum*, *D. tauricum*, *Tortula subulata* var. *subulata*, *Tortella tortuosa*, *Plagiomnium undulatum*, *Orthotrichum affine*, *O. diaphanum*, *O. speciosum*, *Leucodon sciuroides*, *Habrodon perpusillus*, *Pterigynandrum filiforme*, *Brachythecium populeum*, *Herzogiella seligeri* and *Hypnum cupressiforme* var. *lacunosum*; and also near water *Fissidens taxifolius*, *Dicranella varia*, *Dicranum scoparium*, *Mnium stellare*, *Plagiomnium undulatum*, *Crataneuron commutatum*, *C. filicinum* var. *filicinum*, *C. filicinum* var. *fallax*, *Calliergonella cuspidata*, *Brachythecium salebrosum*, *Scleropodium purum*, *Rhynchostegium riparioides*, *Eurhynchium striatum* and *Ptilium crista-castrensis*.

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## References

- Baydar S & Özdemir T (1996). Altındere Vadisi Milli Parkı Karayosunları (Musci). *Tr J of Botany* 20: 53-57.
- Çetin B (1988a). Checklist of the Mosses of Turkey. *Lindbergia* 14: 15-23.
- Çetin B (1988b). Dilek Yarımadası Milli Parkı Karayosunları (I). *DOĞA TU Botanik D* 12(3): 207-214.
- Çetin B (1989). Antalya Çevresi (Köprülü Kanyon ve Güllükdagi (Termessos) Milli Parkları ve Kurşunlu Şelalesi) Karayosunları (Musci). *DOĞA TU Botanik D* 13(3): 456-469.
- Çetin B (1999). The Moss Flora of the Uludağ National Park (Bursa/Turkey). *Tr J of Botany* 23: 187-193.
- Çetin B & Uyar G (1997). The Moss Flora of Sinop and Its Environs (Ayancık, Boyabat and Gerze). *Turk J of Botany* 21: 231-244.
- Çetin B & Yurdakulol E (1985). Gerede-Aktaş (Bolu) Ormanlarının Karayosunları (Musci) Florası. *DOĞA Bilim Dergisi* 9(1): 29-39.
- Çetin B & Yurdakulol E (1988). Yedigöller (Bolu) Milli Parkının Karayosunları Florası. *DOĞA TU Botanik D* 12(2): 128-146.

- Frey W & Kürschner H (1991). *Conspectus Bryophytorum Orientalum et Arabicum. An Annotated Catalogue of the Bryophytes of Southwest Asia. Bryop Bibl* 39: 1-181.
- Frey W, Frahm J-P, Fischer E & Lobin W (1995). *Die Moos-und Farnpflanzen Europas*, ed 6. *Kleine Kryptogamenflora*. 4:1-XI, 1-426. Stuttgart: Gustav Fischer Verlag.
- Greven HC (1995). *Grimmia Hedw. (Grimmiaceae, Musci) in Europe*. Leiden: Backhuys Publishers.
- Henderson DM & Prentice HT (1969). Contributions to the Bryophyte Flora of Turkey VIII. *Notes from Roy Bot Gard Edimb* 29: 235-262.
- Keçeli T & Çetin B (2000). The Moss Flora of Çankırı-Eldivan Mountain. *Turk J Bot* 24: 249-258.
- Kramer W (1980). *Tortula Hedw. Sect. Rurales DE NOT. (Pottiaceae, Musci) in der östlichen Holarktis. Bryop Bibl* 21: 1-165.
- Nyholm E (1981). *Illustrated Moss Flora of Fennoscandia*. Swedish Natural Science-Research Council. Fasc. 1-6, 799 pp., Kungälv.
- Özdemir T (2001). The Bryophyta Flora of Giresun Province Centre and Near Vicinity. *Turk J Bot* 25: 275-283.
- Özdemir T & Çetin B (1999). The Moss Flora of Trabzon and Environs. *Turk J of Botany* 23: 391-404.
- Smith A.JE (1980). *The Moss Flora of Britain and Ireland*. pp. 706. London: Cambridge University Press.
- Uyar G & Çetin B (2001). The Moss Flora of Ankara-Kızılcahamam Soğuksu National Park. *Turk J Bot* 25: 261-273.
- Watson E (1981). *British Mosses and Liverworts*. pp. 519. London: Cambridge University Press.