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Additional Bryophyte Records from Dereli District (Giresun, Turkey)

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Abstract

In this study, the bryophyte flora of the Tamdere, Eğribel, Bektaş and Kulakkaya High Plateaus and their surroundings (Dereli district, Giresun province) were investigated. As a result of identification, a total of 208 bryophytes taxa were determined from 19 different localities. Of these, 33 taxa liverworts and 175 taxa mosses. Among them *Jungermannia eucordifolia* Schljakov was reported for the second time from Turkey, In addition, *Buxbaumia viridis* Moug. ex Lam. & DC.) Brid. ex Moug.& Nestl. and *Ceratodon conicus* (Hampe) Lindb. are new to the A4 grid-square. Furthermore, 10 taxa are new for Giresun province and 20 taxa are new for Dereli district. For every each taxon, the habitat pattern and distribution data are given.

Keywords: Biodiversity, Bryophyte, Dereli, Giresun, Türkiye

Dereli İlçesinden (Giresun, Türkiye) Ek Briyofit Kayıtları

Öz

Bu çalışmada, Tamdere, Eğribel, Bektaş ve Kulakkaya yaylaları ve çevresinin (Dereli ilçesi, Giresun) briyofit florası araştırılmıştır. Yapılan teşhisler sonucunda, 19 farklı lokaliteden toplam 208 briyofit taksonu tespit edilmiştir. Bunlardan 33 takson ciğerotlarına, 175 takson ise yapraklı karayosununa aittir. Bu taksonlar arasında, *Jungermannia eucordifolia* Schljakov Türkiye için ikinci kez kaydedilmiştir. Ek olarak, *Buxbaumia viridis* Moug. ex Lam. & DC.) Brid. ex Moug.& Nestl. ve *Ceratodon conicus* (Hampe) Lindb. A4 karesi için yenidir. Ayrıca, 10 takson Giresun ili için ve 20 takson Dereli ilçesi için yenidir. Her bir takson için habitat ve dağılım bilgileri verilmiştir.

Anahtar kelimeler: Biyoçeşitlilik, Briyofit, Dereli, Giresun, Türkiye

1. Introduction

The bryophyte checklist of Giresun Province was published by Özdemir and Batan (2017a) and it is mostly based on published data. This list includes 252 specific and infraspecific taxa. Later, Erata et

al. (2018), Erata et al., 2021a, 2021b and Erata, 2022 papers published. Up to now, 422 bryophyte taxa have known from Giresun Province. Tamdere, Eğribel, Bektaş and Kulakkaya High Plateaus are located in the northern part of the Giresun

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Mountains (Fig. 1). Black Sea climate prevails some of the research area (eg. Bektaş and Kulakkaya High Plateaus) and continental climate prevails in the higher parts of the its (eg. Tamdere and Eğribel High Plateaus). Thanks to the mild, damp oceanic climate with high and evenly

distributed rainfall makes bryodiversity very rich. Tamdere, Eğribel, Bektaş and Kulakkaya High Plateaus summers are warm and humid, and winters are cool, snowy, and damp (Anşın, 1981; Akman, 1999).

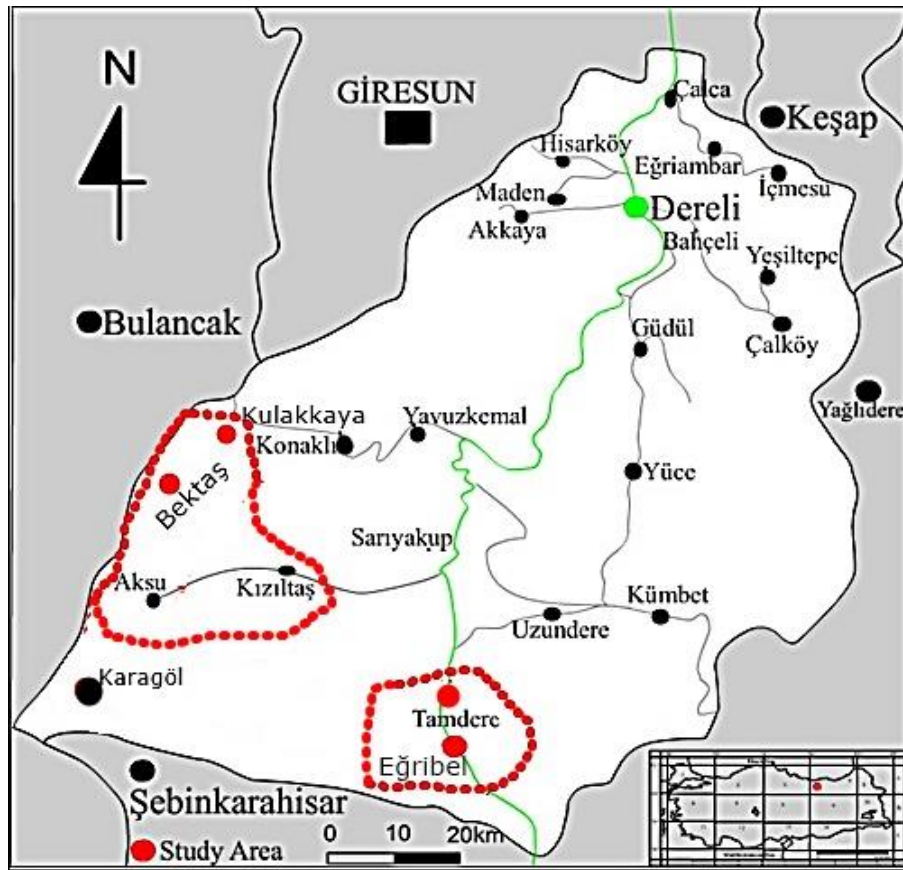


Figure 1. Map of the investigated area

There are two vegetation types in the research area; forest (up to 1900 m) and subalpine vegetation (from 1900 m to 2100 m). Forests are mixed deciduous (*Carpinus betulus* L., *C. orientalis* Mill., *Corylus avellana* Thunb., *Acer* sp., *Fagus orientalis* Lipsky) and coniferous (*Picea orientalis* (L.) Peterm.) forest.

2. Materials and Methods

Research materials were collected in 19 different localities (Table 1) between 13 September 2019 and 28 June 2020 from Tamdere, Eğribel, Bektaş, and Kulakkaya High Plateaus and their surroundings in Turkey (Fig. 1). Identifications were determined by consulting various floras and keys (Nyholm, 1986, 1989, 1993, 1998; Lewinsky, 1993; Blom, 1996; Smith, 1996, 2004; Paton, 1999; Pedrotti, 2001, 2006; Greven, 2003; Heyn and Herrnstadt, 2004; Frey et al., 2006; Guerra et al., 2006; 2010; 2014;

2018; Brugués et al., 2007; Kürschner and Frey, 2011).

Nomenclature of the species and synonym status were evaluated by reviewing Hodgetts et al. (2020). The status of bryophyte taxa for A4 grid-square and Giresun province was determined by reviewing the related literature (Abay et al., 2016; Özdemir and Batan, 2017a, 2017b; Erata et al., 2018, 2021a, 2021b; Erata, 2022). Bryophyte specimens are kept in the private herbarium of Nevzat BATAN, at the Karadeniz Technical University (Trabzon), Turkey.

For each taxon, their localities and substrate were given in the floristic list. Taxa for the second time from Turkey is indicated with (♦) and taxa for the new Giresun province is indicated with (+) and the Dereli district is indicated with (#) in the bryofloristic list. Also, new taxa for A4 square is indicated with (*) in the bryofloristic list.

Table 1. Locality information of bryophyte specimens collected from the study area

Locality Number	Date	Altitude (m)	Locality /GPS (Latitude, Longitude)
1	13.09.2019	1650	Giresun Province: Dereli, Enter the Tamdere (37T) 4485164 E, 4449130 N
2	13.09.2019	1827	Giresun Province: Dereli, Aksu village (37T) 4490065 E, 4433570 N
3	13.09.2019	1620	Giresun Province: Dereli, between Tamdere and Uzundere (37T) 4458330 N, 4487646 E
4	13.09.2019	2120	Giresun Province: Dereli, Eğribel pass-1 (37T) 4479616 E, 4489840 N
5	14.09.2019	1690	Giresun Province: Dereli, Tamdere, exit of Güzel plateau (37T) 4483388 E, 4460670 N
6	14.09.2019	2162	Giresun Province: Dereli, Aksu, Eğrikaya plateau (37T) 4488039 E, 4319440 N
7	14.09.2019	1480	Giresun Province: Dereli, between Tamdere and Uzundere -2, (37T) 4489075 E, 4470790 N
8	14.09.2019	2304	Giresun Province: Dereli, road to Eğribel, Işıklar plateau (37T) 4478547 E, 4494980 N
9	14.09.2019	1377	Giresun Province: Dereli, Kızıltaş village, (37T) 4491604 E, 4381290 N
10	27.06.2020	1611	Giresun Province: Dereli, Kulakkaya plateau, Alçakbel promenade, (37T) 0444816 E, 4505645 N
11	27.06.2020	1655	Giresun Province: Dereli, Kulakkaya plateau, Ağaçbaşı natural park, (37T) 0443347 E, 4504988 N
12	27.06.2020	2017	Giresun Province: Dereli, at the entrance to the Bektaş plateau, Kulakkaya plateau side (37T) 0436236 E, 4501688 N
13	27.06.2020	1641	Giresun Province: Dereli, Kulakkaya, Çağman plateau (37T) 0446371 E, 4504935 N
14	27.06.2020	1946	Giresun Province: Dereli, Gabalı plateau (37T) 0437107 E, 4502329 N
15	28.06.2020	2040	Giresun Province: Dereli, Tamdere, Teknecük plateau (37T) 0446575 E, 4483945 N
16	28.06.2020	2317	Giresun Province: Dereli, Eğribel pass-2, (37T) 0449598 E, 4478997 N
17	28.06.2020	2110	Giresun Province: Dereli, Eğribel pass-3, (37T) 0446745 E, 4477980 N
18	28.06.2020	1935	Giresun Province: Dereli, between Tamdere and Eğribel, near the tunnel entrance, (37T) 0447657 E, 4481077 N
19	28.06.2020	2075	Giresun Province: Dereli, exit of Bektaş plateau, Karagöl side, (37T) 0434114 E, 4499656 N

3. Results

As a result, 208 bryophyte taxa were determined, 33 taxa (belonging to 24 genera and 19 families) of liverworts and 175 taxa (belonging to 89 genera and 38 families) of mosses.

Bryofloristic list

Marchantiophyta

Cephaloziaceae Mig.

Cephalozia (Dumort.) Dumort.

Cephalozia bicuspidata (L.) Dumort. – Loc.: 12, 15; on soil, on wet soil.

Cephaloziellaceae Douin

Cephaloziella (Spruce) Schiffn.

Cephaloziella divaricata (Sm.) Schiffn. – Loc.: 11, 12, 14; on wet soil.

Lophoziopsis Konstant. & Vilnet

Lophoziopsis longidens (Lindb.) Konstant. & Vilnet (Syn: *Lophozia longidens* (Lindb.) Macoun) – Loc.: 14; on dead tree trunk.

Tritomaria Loeske

Tritomaria exsecta Schmidel ex. Schrad.) Loeske. – Loc.: 10, 13; on dead tree trunk.

Scapaniaceae Mig.

Diplophyllum (Dumort.) Dumort.

Diplophyllum taxifolium (Wahlenb) Dumort – Loc.: 14; on wet soil.

Scapania (Dumort.) Dumort.

Scapania irrigua (Ness) Ness – Loc.: 2, 4, 6, 15; on wet soil.

Calypogeiaceae Arnell

Calypogeia Raddi

Calypogeia fissa (L.) Raddi. – Loc.: 14; on wet soil.

C. muelleriana (Schiffn.) Müll. Frib. – Loc.: 6; on wet soil.

Jungermanniaceae Rchb.

Jungermannia L.

(♦)*Jungermannia eucordifolia* Schljakov – Loc.: 12, 14; on wet soil.

Solenostomataceae Stotler & Crand.-Stotl.

Solenostoma Mitt. emend. Zerov

Solenostoma gracillimum (Sm.) R.M.Schust. (Syn: *Jungermannia gracillima* Sm.) – Loc.: 5; on wet soil.

S. hyalinum (Lyell) Mitt. (Syn: *Jungermannia hyalina* Lyell) – Loc.: 4; on wet soil.

S. sphaerocarpum (Hook.) Steph. Sp. Hepat (Syn: *Jungermannia sphaerocarpa* Kanca.) – Loc.: 4, 14; on wet soil.

Blepharostomataceae W.Frey & M.Stech

Blepharostoma (Dumort. Emend. Lindb.) Dumort.

Blepharostoma trichophyllum (L.) Dumort. – Loc.: 10, 13; on calcareous rock, on dead tree trunk.

Lepidoziaceae Limpr.

Lepidozia (Dumort.) Dumort.

Lepidozia reptans (L.) Dumort. – Loc.: 10, 13; on dead tree trunk.

Lophocoleaceae Vanden Berghen

Chiloscyphus Corda

Chiloscyphus pallescens (Ehrh. ex Hoffm.) Dumort. – Loc.: 4, 6, 9, 15, 18; on wet soil.

C. polyanthos (L.) Corda – Loc.: 10, 13; on wet soil.

Lophocolea (Dumort.) Dumort.

Lophocolea heterophylla (Schrad.) Dumort. – Loc.: 11; on dead tree trunk.

L. minor Nees. – Loc.: 2, 10, 13; on soil, on dead tree trunk.

Plagiochilaceae Müll. Frib.

Pedinophyllum (Lindb.) Lindb.

Pedinophyllum interruptum (Nees) Kaal. – Loc.: 2, 4, 13; on wet soil, on wet rock.

Plagiochila (Dumort.) Dumort.

Plagiochila asplenioides (L. emend. Taylor) Dumort. – Loc.: 10, 12, 15, 16, 17; on soil, on rock, on dead tree trunk.

P. porelloides (Torrey ex Nees) Lindenb. – Loc.: 4, 6, 7, 9, 13; on soil, on rock.

Frullaniaceae Lorch

Frullania Raddi

Frullania dilatata (L.) Dumort. – Loc.: 10; on rock.

F. tamarisci (L.) Dumort. – Loc.: 10, 13; on tree bark.

Porellaceae Cavers

Porella L.

Porella cordaeana (Huebener) Moore – Loc.: 16, 17; on rock, on tree bark.

P. platyphylla (L.) Pfeiff. – Loc.: 9; on rock, on tree bark.

Radulaceae Müll. Frib.

Radula Dumort.

Radula complanata (L.) Dumort. – Loc.: 10; on tree bark.

R. lindenbergiana Gottsche ex C. Hartm. – Loc.: 1, 2, 3, 6, 10, 13, 18; on rock, on tree bark.

Ptilidiaceae H.Klinggr.

Ptilidium Nees

Ptilidium pulcherrimum (Weber) Vain. – Loc.: 11; on wet rock.

Aneuraceae H. Klinggr.

Riccardia Gray

Riccardia multifida (L.) Gray – Loc.: 10; on wet soil.

Metzgeriaceae H. Klinggr.

Metzgeria Raddi

Metzgeria conjugata Lindb. – Loc.: 9; on soil.

Pelliaceae H. Klinggr

Pellia Raddi

Apopellia endiviifolia (Dicks.) Nebel & D.Quandt. (Syn: *Pellia endiviifolia* (Dicks.) Dumort) – Loc.: 4, 5, 6, 12, 13; on wet soil.

Conocephaleaceae Müll. Frib. Ex Grolle

Conocephalum Hill

Conocephalum conicum (L.) Dumort. – Loc.: 18; on wet soil

Marchantiaceae Lindl.

Marchantia L.

Marchantia polymorpha L. – Loc.: 1, 2, 5, 6, 8, 9, 16, 17; on wet soil.

Bryophyta

Sphagnaceae Dumort.

Sphagnum L.

Sphagnum auriculatum Schimp. – Loc.: 12, 19; on wet soil in bog.

S. centrale C.E.O. Jensen – Loc.: 12, 19; on wet soil in bog.

(+) *S. contortum* Schultz – Loc.: 19; on wet soil in bog.

S. fallax (H. Klinggr.) H. Klinggr. – Loc.: 19; on wet soil in bog.

S. inundatum Russow – Loc.: 19; on wet soil in bog.

(+) *S. palustre* L. – Loc.: 12, 19; on wet soil in bog.

S. squarrosum Crome – Loc.: 19; on wet soil in bog.

S. subsecundum Nees – Loc.: 12, 19; on wet soil in bog.

S. teres (Schimp.) Ångstr. – Loc.: 12, 19; on wet soil in bog.

Polytrichaceae Schwagr.

Atrichum P.Beauv.

Atrichum undulatum (Hedw.) P. Beauv. – Loc.: 2; on soil.

Pogonatum P.Beauv.

(#)*Pogonatum nanum* (Hedw.) P.Beauv. – Loc.: 5, 10, 11, 13; on soil

P. urnigerum (Hedw.) P.Beauv. – Loc.: 10, 15; on soil, on rock.

Polytrichastrum Hedw.

Polytrichastrum alpinum (Hedw.) G.L.Sm. – Loc.: 17; on soil.

Polytrichum Hedw.

Polytrichum commune Hedw. – Loc.: 12; on soil.

P. formosum Hedw. – Loc.: 3, 5, 10, 11; on soil, on rock.

P. juniperinum Hedw. – Loc.: 1, 16, 17, 18; on soil, on rock.

P. piliferum Hedw. – Loc.: 2, 4, 5; on soil, on rock.

Buxbaumiaceae Schimp.**Buxbaumia** Hedw.

(*)*Buxbaumia viridis* (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl. – Loc.: 13; on dead tree trunk.

Encalyptaceae Schimp.**Encalypta** Dixon

Encalypta ciliata Hedw. – Loc.: 7, 11; on rock.

E. streptocarpa Hedw. – Loc.: 11; on rock.

Hymenolomataceae Ignatov & Fedosov**Hymenoloma** Dusén

Hymenoloma crispulum (Hedw.) Ochyra. – Loc.: 2, 4, 6, 14, 16; on soil, on rock.

Leucobryaceae Schimp.**Dicranodontium** Bruch & Schimp.

Dicranodontium denudatum (Brid.) E. Britton. – Loc.: 13; on dead tree trunk.

Aongstroemiaceae De Not.**Diobelonella** Ochyra.

Diobelonella palustris (Dicks.) Ochyra (Syn:

Dichodontium palustre (Dicks.) M. Stech.) – Loc.: 4; on soil.

Dicranellaceae M.Stech**Dicranella** (Müll. Hal.) Schimp.

Dicranella heteromalla (Hedw.) Schimp. – Loc.: 5; on soil.

Fissidentaceae Schimp.**Fissidens** Hedw.

Fissidens dubius P. Beauv. – Loc.: 12, 14; on rock crack.

Dicranaceae Schimp.**Dicranum** Hedw.

Dicranum polysetum Sw. ex anon. – Loc.: 11; on soil.

D. scoparium Hedw. – Loc.: 7, 10, 11, 13, 14, 15; on soil, on rock, on dead tree trunk

D. spadicum J.E.Zetterst. – Loc.: 6, 17; on soil.

Oncophorus (Brid.) Brid.

(+)*Oncophorus virens* (Hedw.) Brid. – Loc.: 16, 17; on soil.

Ditrichaceae Limpr.**Ceratodon** Brid.

(*)*Ceratodon conicus* (Hampe) Lindb. – Loc.: 18; on soil.

C. purpureus (Hedw.) Brid. – Loc.: 2, 4, 8, 10, 14, 16, 17, 18; on soil; on rock.

Ditrichum Timm ex Hampe

(+)*Ditrichum pusillum* (Hedw.) Hampe – Loc.: 16, 17; on soil.

Pottiaceae Schimp.**Anoetangium** Schwägr.

Anoetangium aestivum (Hedw.) Mitt. – Loc.: 1, 3, 8; on rock.

Barbula Hedw.

(#)*Barbula unguiculata* Hedw. – Loc.: 14; on soil

Bryoerythrophyllum P.C.Chen.

Bryoerythrophyllum recurvirostrum (Hedw.) P.C. Chen. – Loc.: 7, 11; on rock.

Chionoloma Dixon

Chionoloma tenuirostre (Hook. & Taylor) M.Alonso, M J Cano & J A Jiménez (Syn: *Oxystegus tenuirostris* (Hook. & Taylor) A.J.E.Sm.) – Loc.: 10, 11; on rock.

Didymodon Hedw.

Didymodon fallax (Hedw.) R.H.Zander – Loc.: 11; on soil,

(+)*D. insulanus* (De Not.) M.O.Hill – Loc.: 9; on rock.

D. rigidulus Hedw. – Loc.: 11; on rock.

Streblotrichum P.Beauv.

(#)*Streblotrichum convolutum* (Hedw.) P.Beauv. (Syn: *Barbula convoluta* Hedw.) – Loc.: 11; on soil.

Syntrichia Brid.

Syntrichia norvegica F.Weber – Loc.: 2, 6, 10; on rock.

S. papillosissima (Copp.) Loeske – Loc.: 8; on rock.

S. ruraliformis (Besch.) Mans. (Syn: *S. ruralis* (Hedw.) F.Weber & D.Mohr var. *ruraliformis*

(Besch.) Delogne) – Loc.: 8, 18; on soil, on rock.

S. ruralis (Hedw.) F.Weber & D.Mohr var. *ruralis* – Loc.: 1, 2, 4, 6, 7, 8, 11, 15, 16, 17, 18; on soil, on rock.

Tortella (Müll.Hal.) Limpr.

Tortella tortuosa (Hedw.) Limpr. – Loc.: 1, 2, 3, 7, 11, 12, 18; on soil, on rock.

Tortula Hedw.

Tortula hoppeana (Schultz) Ochyra – Loc.: 2, 18; on rock.

T. marginata (Bruch & Schimp.) Spruce. – Loc.: 12; on soil, on rock.

T. subulata Hedw. – Loc.: 4, 10, 11, 12, 13, 15, 16, 18; on soil, on rock.

Grimmiaceae Arn.**Grimmia** Hedw.

(+)*Grimmia anodon* Bruch & Schimp. – Loc.: 2, 8; on rock.

G. anomala Hampe ex Schimp – Loc.: 15; on rock.

G. alpestris (Weber & Mohr) Schleicher. – Loc.: 2, 4, 6, 12, 15, 16, 17, 18; on rock.

- G. elatior* Bruch ex Bals.-Criv. & De Not. – Loc.: 2, 6, 7; on rock.
G. hartmannii Schimp. – Loc.: 2, 6, 14, 15; on rock.
 (+)*G. lisae* De Not. – Loc.: 4; on rock.
G. montana Bruch & Schimp. – Loc.: 5; on rock.
G. ovalis (Hedw.) Lindb. – Loc.: 4, 6, 8; on rock.
G. pulvinata (Hedw.) Sm. – Loc.: 1; on rock.
Racomitrium Brid.
Racomitrium aquaticum (Brid. ex Schrad.) Brid. – Loc.: 5; on rock.
R. canescens (Hedw.) Brid. – Loc.: 6; on rock.
R. ericoides Brid. – Loc.: 11, 12, 14, 17, 18; on rock.
R. sudeticum (Funck) Bruch & Schimp. – Loc.: 3; on rock.
Schistidium Bruch & Schimp.
Schistidium apocarpum (Hedw.) Bruch & Schimp. – Loc.: 14; on rock.
 (+)*S. brunnescens* Limpr – Loc.: 14; on rock.
S. confertum (Funck) Bruch & Schimp. – Loc.: 1, 2, 4, 6, 8, 12, 14, 18; on rock.
S. dupretii (Thér.) W.A.Weber. – Loc.: 2, 5, 8, 14, 18; on rock.
S. flaccidum H.H.Blom – Loc.: 14; on rock.
S. helveticum (Schkuhr) Deguchi – Loc.: 8; on rock.
S. papillosum Culm. – Loc.: 1, 3, 4, 7, 8, 11, 14, 18; on rock.
S. platyphyllum (Mitt.) H.Perss. – Loc.: 16; on rock.
S. rivulare (Brid.) Podp. – Loc.: 16, 17, 18; on rock.
Hedwigiaceae Schimp.
Hedwigia P.Beauv.
Hedwigia ciliata (Hedw.) P.Beauv. – Loc.: 1, 3; on rock.
H. emodica Hampe ex Müll.Hal. (Syn: *H. ciliata* var. *leucophaea* Bruch & Schimp.) – Loc.: 7; on rock.
Bartramiaceae Schwagr.
Bartramia Hedw.
Bartramia halleriana Hedw. – Loc.: 3, 7; on wet rock, on rock crack.
B. ithyphylla Brid. – Loc.: 1, 5, 15, 18; on rock, on rock crack.
Philonotis Brid.
Philonotis caespitosa Jur. – Loc.: 16; near stream, on wet soil.
P. calcarea (Bruch & Schimp.) Schimp. – Loc.: 4, 8, 14; near stream, on wet soil, on wet rock.
P. fontana (Hedw.) Brid. – Loc.: 2, 6, 14, 15, 16, 17; near stream, on wet soil, on wet rock.
 (#)*P. marchica* (Hedw.) Brid. – Loc.: 15; near stream, on wet soil.
P. seriata Mitt. – Loc.: 4, 5, 6, 12, 14; near stream, on wet soil.
Bryaceae Schwagr.
Bryum Hedw.
Bryum argenteum Hedw. – Loc.: 2, 6, 8, 11, 12; on soil.
B. dichotomum Hedw. – Loc.: 10, 14, 16, 17; on soil.
 (#)*B. radiculosum* Brid. – Loc.: 14; on soil.
Imbriobryum N.Pedersen
Imbriobryum alpinum (Huds. ex With.) N. Pedersen – Loc.: 5, 8, 15; on wet soil.
 (#)*I. mildeanum* (Jur.) J.R.Spence (Syn: *Bryum mildeanum* Jur.) – Loc.: 10; on wet soil.
Ptychostomum Hornsch.
Ptychostomum creberrimum (Taylor) J.R. Spence & H.P. Ramsay – Loc.: 10; on soil.
P. elegans (Nees) D.Bell & Holyoak – Loc.: 2; on soil.
P. imbricatulum (Müll. Hal.) Holyoak & N. Pedersen. – Loc.: 3, 5, 6, 10, 15; on soil.
P. moravicum (Podp.) Ros & Mazimpaka. – Loc.: 5, 10, 11, 14; on soil, on tree brak.
P. pallens (Sw.) J.R. Spence – Loc.: 17; on soil.
P. pseudotriquetrum var. *bimum* (Schreb.) Holyoak & N. Pedersen – Loc.: 12, 16, 17; near stream, on wet soil.
P. pseudotriquetrum (Hedw.) J.R. Spence & H.P. Ramsay var. *pseudotriquetrum*. – Loc.: 4, 6, 10, 12, 14, 16, 17; near stream, on wet soil.
P. schleicheri (DC.) J.R.Spence ex D.Bell & Holyoak (Syn: *Bryum schleicheri* DC.) – Loc.: 4, 5, 6, 8, 11, 14, 15, 18; near stream, on wet soil.
Rhodobryum (Schimp.) Limpr.
Rhodobryum ontariense (Kindb.) Kindb. – Loc.: 13; on soil.
Mniaceae Schwagr.
Mnium Hedw.
Mnium hornum Hedw. – Loc.: 2; on wet soil.
M. spinosum (Voit) Schwägr. – Loc.: 2, 6, 7, 10, 11; on wet soil, on dead tree trunk.
M. spinulosum Bruch & Schimp. – Loc.: 10, 11, 13; on wet soil.
Plagiomnium T.J.Kop.
Plagiomnium affine (Blandow ex Funck) T.J.Kop. – Loc.: 10, 13; on soil, on wet soil.
P. elatum (Bruch & Schimp.) T.J. Kop. – Loc.: 10, 13, 18; on soil.
P. ellipticum (Brid.) T.J.Kop. – Loc.: 4, 8, 9, 10; on wet soil.
P. medium (Bruch & Schimp.) T.J.Kop. – Loc.: 1; on soil.
P. undulatum (Hedw.) T.J.Kop. – Loc.: 9; on soil, on rock.
Pohlia Hedw.
 (+)*Pohlia annotina* (Hedw.) Lindb. – Loc.: 15; on soil.
 (#)*P. camptotrachela* (Renauld & Cardot) Broth – Loc.: 6, 16; on soil.
P. cruda (Hedw.) Lindb. – Loc.: 18; on soil.
P. nutans (Hedw.) Lindb. – Loc.: 11; on wet soil.
P. wahlenbergii (F.Weber & D.Mohr) A.L.Andrews. – Loc.: 6; on wet soil.
Rhizomnium (Broth.) T.J.Kop.
Rhizomnium magnifolium (Horik.) T.J.Kop. – Loc.: 6, 12, 14, 15; on wet soil.

R. punctatum (Bruch & Schimp.) T.J.Kop. – Loc.: 1, 2, 4, 6, 9, 14; on wet soil, on dead tree trunk.

Orthotrichaceae Arn.

Lewinskya F.Lara, Garilleti & Goffinet

Lewinskya affinis (Schrad. ex Brid.) F.Lara, Garilleti & Goffinet – Loc.: 6, 7; on tree bark.

L. rupestris (Schleich. Ex Schwägr.) F.Lara, Garilleti & Goffinet. – Loc.: 4, 8; on rock, on tree bark.

L. speciosa (Nees) F.Lara, Garilleti & Goffinet. – Loc.: 1, 7; on tree bark.

L. striata (Hedw.) F.Lara, Garilleti & Goffinet – Loc.: 9, 10; on tree bark.

Orthotrichum Hedw.

Orthotrichum anomalum Hedw. – Loc.: 10; on rock.

(#)*O. pulchellum* Brunt. – Loc.: 9; on rock.

Uloa D.Mohr

Uloa crispula Bruch. – Loc.: 10; on tree bark.

Fontinalaceae Schimp.

Fontinalis Hedw.

Fontinalis antipyretica Hedw. – Loc.: 1, 5; submerged.

Plagiotheciaceae (Broth.) M.Fleisch.

Herzogiella Broth.

Herzogiella seligeri (Brid.) Z.Iwats. – Loc.: 13; on dead tree trunk.

Plagiothecium Schimp.

Plagiothecium denticulatum (Hedw.) Schimp. – Loc.: 10, 13; on soil, on dead tree trunk.

P. laetum Schimp. – Loc.: 13; on soil.

Pterigynandraceae Schimp.

Pterigynandrum Hedw.

Pterigynandrum filiforme Hedw. – Loc.: 2, 6, 7, 8, 11, 13; on rock, on tree bark.

Climaciaceae Kindb.

Climacium F. Weber & D. Mohr.

Climacium dendroides (Hedw.) F. Weber & D. Mohr. – Loc.: 2, 5, 12, 14, 15; on wet soil.

Amblystegiaceae Kindb.

Campylium (Sull.) Mitt.

Campylium protensum (Brid.) Kindb. – Loc.: 4, 11, 15; on wet soil, on wet rock.

(#)*C. stellatum* (Hedw.) Lange & C.E.O.Jensen – Loc.: 4; on wet soil

Cratoneuron (Sull.) Spruce

Cratoneuron filicinum (Hedw.) Spruce. – Loc.: 4, 6, 9, 11, 16, 17; on wet soil, on wet rock.

Campylophyllopsis W.R.Buck

Campylophyllopsis calcarea (Crundw. & Nyholm) Ochyra (Syn: *Campylidium calcareum* (Crundw. & Nyholm) Ochyra, *Campylophyllum calcareum* (Crundw. & Nyholm) Hedenäs) – Loc.: 16, 17; on wet soil.

Drepanium (Schimp.) C.E.O.Jensen

Drepanium fastigiatum (Hampe) C.E.O.Jensen (Syn: *Hypnum recurvatum* (Lindb. & Arnell) Kindb. – Loc.: 7, 8, 10; on rock.

Palustriella Ochyra

Palustriella decipiens (De Not.) Ochyra – Loc.: 18; on wet soil.

P. falcata (Brid.) Hedenäs. – Loc.: 4, 16, 17; on wet soil.

Platyhypnum Loeske

Platyhypnum duriusculum (De Not.) Ochyra (Syn: *Hygrohypnum duriusculum* (De Not.) D.W.Jamieson) – Loc.: 2, 6, 7; near stream, on wet soil.

Scorpidiaceae Ignatov & Ignatova

Hygrohypnella Ignatov & Ignatova

Hygrohypnella ochracea (Turner ex Wilson) Ignatov & Ignatova (Syn: *Hygrohypnum ochraceum* (Turner ex Wilson) Loeske) – Loc.: 6, 11; on wet soil.

Sanionia Loeske

Sanionia uncinata (Hedw.) Loeske. – Loc.: 10, 11, 13, 14, 15; on soil, on dead tree trunk.

Pseudoleskeaceae Schimp.

Lescurea Schimp.

Lescurea incurvata (Hedw.) E. Lawton. – Loc.: 4, 14, 15, 18; on rock.

L. mutabilis (Brid.) Lindb. ex I. Hagen. – Loc.: 16; on tree bark.

(#)*L. radicata* (Mitt.) Mönk. (Syn: *Pseudoleskea radicata* (Mitt.) Macoun & Kindb.) – Loc.: 15; on soil.

Pseudoleskeellaceae Ignatov & Ignatova

Pseudoleskeella Kindb.

Pseudoleskeella nervosa (Brid.) Nyholm. – Loc.: 2, 7, 8, 9, 10, 13; on tree bark.

Thuidiaceae Schimp.

Abietinella Müll.Hal.

Abietinella abietina (Hedw.) M.Fleisch. var. *abietina* – Loc.: 7, 8, 10; on soil, on rock.

A. abietina (Hedw.) M.Fleisch. var. *hystricosa* (Mitt.) Sakurai. – Loc.: 8, 11, 18; on soil, on rock.

Thuidium Schimp.

Thuidium assimile (Mitt.) A.Jaeger. – Loc.: 2, 9, 14; on soil, on rock, on dead tree trunk.

T. tamariscinum (Hedw.) Schimp. – Loc.: 12, 13; on soil, on rock, on dead tree trunk.

Brachytheciaceae Schimp.

Brachytheciastrum Ignatov & Huttunen

Brachytheciastrum velutinum (Hedw.) Ignatov & Huttunen. – Loc.: 10; on soil, on dead tree trunk.

Brachythecium Schimp.

Brachythecium albicans (Hedw.) Schimp. – Loc.: 2, 10, 11, 15; on soil.

B. glareosum (Bruch ex Spruce) Schimp. – Loc.: 2, 18; on soil.

B. rivulare Schimp. – Loc.: 1, 2, 4, 5, 6, 7, 8, 12, 13, 15, 16, 17, 18; near stream, on wet soil.

B. rutabulum (Hedw.) Schimp. – Loc.: 9; near stream, on wet soil.

B. salebrosum (Hoffm. ex F. Weber & D. Mohr) Schimp. – Loc.: 10, 14; on soil.

Eurhynchium Schimp.

Eurhynchium angustirete (Broth.) T.J.Kop. – Loc.: 7, 13; on soil.

Homalothecium Schimp.

Homalothecium philippeanum (Spruce) Schimp. – Loc.: 1, 2, 3, 8, 18; on soil, on rock.

H. sericeum (Hedw.) Schimp. – Loc.: 3; on soil, on rock.

Kindbergia Ochyra

Kindbergia praelonga (Hedw.) Ochyra – Loc.: 5, 7, 9; on soil.

Oxyrrhynchium (Schimp.) Warnst.

Oxyrrhynchium hians (Hedw.) Loeske. – Loc.: 1; on soil, on rock.

Pseudoscleropodium (Limpr.) M.Fleisch.

Pseudoscleropodium purum (Hedw.) M.Fleisch. – Loc.: 14; on soil.

Rhynchostegium Schimp.

Rhynchostegium riparioides (Hedw.) Cardot – Loc.: 3, 7, 9; on wet rock.

Sciuro-hypnum Hampe

Sciuro-hypnum populeum (Hedw.) Ignatov & Huttunen – Loc.: 10; on rock.

Hypnaceae Schimp.**Hypnum** Hedw.

Hypnum andoi A.J.E.Sm. – Loc.: 7, 8; on rock, on tree bark.

H. cupressiforme var. *cupressiforme* Hedw. – Loc.: 1, 3, 5, 7, 10, 11, 13; on soil, on rock, on tree bark, on dead tree trunk.

H. cupressiforme var. *filiforme* Brid. – Loc.: 7, 10, 11, 13; on soil, on tree bark.

H. cupressiforme var. *lacunosum* Brid. – Loc.: 2, 7, 11, 14; on soil, on rock.

H. jutlandicum Holmen & E.Warncke. – Loc.: 10, 11; on soil, on dead tree trunk.

H. resupinatum Taylor (Syn: *Hypnum cupressiforme* var. *resupinatum* (Taylor) Schimp. – Loc.: 1; on soil, on tree bark.

Pylaisiadelphaceae Goffinet & W.R.Buck**Platygyrium** Schimp.

Platygyrium repens (Brid.) Schimp. – Loc.: 10; on rock.

Calliergonella Loeske

Calliergonella cuspidata (Hedw.) Loeske. – Loc.: 2, 4, 6, 12, 14, 15, 18; near stream, on wet soil.

Homomallium (Schimp.) Loeske

Homomallium incurvatum (Schrad. ex Brid.) Loeske – Loc.: 10, 13; on rock.

Pseudohygrohypnum Kanda

(+) *Pseudohygrohypnum eugyrium* (Schimp.) Kanda (Syn: *Hygrohypnum eugyrium* (Schimp.) Broth.) – Loc.: 12, 14; on wet soil.

Roaldia P.E.A.S.Câmara & Carv.-Silva

Roaldia revoluta (Mitt.) P.E.A.S.Câmara & M.Carvalho-Silva (Syn: *Hypnum revolutum* (Mitt.) Lindb. – Loc.: 8; on rock

Hylocomiaceae M. Fleisch.**Hylocomiadelphus** Ochyra & Stebel

Hylocomiadelphus triquetrus (Hedw.) Ochyra & Stebel (Syn: *Rhytidiadelphus triquetrus* (Hedw.) Warnst.) – Loc.: 7, 12, 13, 18; on soil.

Hylocomium Schimp.

Hylocomium splendens (Hedw.) Schimp. – Loc.: 3, 10, 12, 13; on soil, on rock.

Pleurozium Mitt.

Pleurozium schreberi (Brid.) Mitt. – Loc.: 10, 13; on soil.

Rhytidiadelphus (Limpr.) Warnst.

Rhytidiadelphus squarrosus (Hedw.) Warnst. – Loc.: 10; on soil.

Rhytidiaceae Broth.**Rhytidium** (Sull.) Kindb.

Rhytidium rugosum (Ehrh. ex Hedw.) Kindb. – Loc.: 3; on soil, on rock.

Entodontaceae Kindb.**Entodon** Müll. Hal.

Entodon concinnus (De Not.) Paris. – Loc.: 7; on soil.

Leucodontaceae Schimp.**Leucodon** Schwägr.

Leucodon sciuroides (Hedw.) Schwägr. – Loc.: 1, 8, 9, 11, 13; on rock, on tree bark.

Neckeraceae Schimp.**Alleniella** S.Olsson, Enroth & D.Quandt

Alleniella complanata (Hedw.) S.Olsson, Enroth & D.Quandt. – Loc.: 10; on tree bark.

Neckera Hedw.

Neckera pennata Hedw. – Loc.: 10, 13; on tree bark.

Thamnobryum Nieuwl.

Thamnobryum alopecurum (Hedw.) Gangulee. – Loc.: 9; on wet rock.

Pseudanomodon (Limpr.) Ignatov & Fedosov

Pseudanomodon attenuatus (Hedw.) Ignatov & Fedosov (Syn: *Anomodon attenuatus* (Hedw.) Huebener) – Loc.: 9; on soil.

Lembophyllaceae Broth.**Isothecium** Brid.

Isothecium alopecuroides (Lam. ex Dubois) Isov. – Loc.: 7, 10, 11, 13; on soil, on rock.

Myuriaceae M.Fleisch**Ctenidium** (Schimp.) Mitt.

Ctenidium molluscum (Hedw.) Mitt. – Loc.: 12, 14; on soil, on rock.

Anomodontaceae Kindb.**Anomodon** Hook. & Taylor

Anomodon viticulosus (Hedw.) Hook. & Taylor – Loc.: 9; on soil, on rock.

4. Discussion

From the determined taxa, *Jungermannia eucordifolia* was reported for the second time from Turkey (it was the first time reported of Anzer (Rize) by Abay et al., 2022) and *Buxbaumia viridis* and *Ceratodon conicus* are new to the A4 grid-square. With the present study, the number of

bryophyte taxa reported from Giresun Province has reached 432.

Sphagnum contortum, *S. palustre*, *Oncophorus virens*, *Ditrichum pusillum*, *Didymodon insulanus*, *Grimmia anodon*, *G. lisae*, *Schistidium brunnescens*, *Pohlia annotina* and *Pseudohygrohypnum eugyrium* are new for Giresun Province.

In addition, *Pogonatum nanum*, *Barbula unguiculata*, *Streblotrichum convolutum*, *Philonotis marchica*, *Bryum radiculosum*, *Imbribryum mildeanum*, *Pohlia camptotrachela*, *Orthotrichum pulchellum*, *Campylium stellatum*, *Lescuraea radicata*, *Sphagnum contortum*, *S. palustre*, *Oncophorus virens*, *Ditrichum pusillum*, *Didymodon insulanus*, *Grimmia anodon*, *G. lisae*, *Schistidium brunnescens*, *Pohlia annotina* and *Pseudohygrohypnum eugyrium* new for Dereli district.

The dominant moss families are Grimmiaceae (22 taxa), Pottiaceae (16 taxa), Brachytheciaceae, (14 taxa), Bryaceae (14 taxa), Mniaceae (13 taxa), Sphagnaceae (9 taxa), Polytrichaceae (8 taxa), Amblystegiaceae (7 taxa), Orthotrichaceae (7 taxa), Bartramiaceae (7 taxa), Hypnaceae (6 taxa), and Pylaisiadelphaceae (5 taxa). These 12 families give 73.14 % of the total moss taxa in this study and the other families constitute 26.86%. The most common moss genera are *Sphagnum* (9 taxa), *Grimmia* (9 taxa), *Schistidium* (9 taxa), *Ptychostomum* (8 taxa), *Hypnum* (6 taxa), *Brachythecium* (5 taxa), *Plagiomnium* (5 taxa), *Pohlia* (5 taxa), *Philonotis* (5 taxa), *Lewinskya* (4 taxa), *Syntrichia* (4 taxa), *Racomitrium* (4 taxa), *Polytrichum* (4 taxa). Other genera are represented by 3 or fewer taxa in the study area.

The dominant liverwort families are Lophocoleaceae (4 taxa), Cephaloziellaceae (3 taxa), Solenostomataceae (3 taxa), Plagiochilaceae (3 taxa), Scapaniaceae (2 taxa), Calypogeiaceae (2 taxa), Frullaniaceae (2 taxa), Porellaceae (2 taxa), and Radulaceae (2 taxa). These 8 families give 51.52 % of the total liverwort taxa in this study and the other families constitute 48.48%. The most common liverwort genera are *Solenostoma* (3 taxa), *Calypogeia* (2 taxa), *Chiloscyphus* (2 taxa), *Lophocolea* (2 taxa), *Plagiochila* (2 taxa), *Frullania* (2 taxa), *Porella* (2 taxa), and *Radula* (2 taxa). Other genera are represented by one taxon in the study area.

The most common moss taxa are *Hymenoloma crispulum*, *Dicranum scoparium*, *Ceratodon purpureus*, *Syntrichia ruralis* var. *ruralis*, *Tortella tortuosa*, *Tortula subulata*, *Grimmia alpestris*,

Racomitrium ericoides, *Schistidium confertum*, *S. papillosum*, *Philonotis fontana*, *Bryum argenteum*, *Ptychostomum pseudotriquetrum* var. *pseudotriquetrum*, *P. imbricatulum*, *Mnium spinosum*, *Rhizomnium punctatum*, *Pterigynandrum filiforme*, *Climacium dendroides*, *Cratoneuron filicinum*, *Sanionia uncinata*, *Pseudoleskeella nervosa*, *Barchythecium rivulare*, *Hypnum cupressiforme* var. *cupressiforme*, *Calliergonella cuspidata* and *Leucodon sciuroides* in the study area.

The most common liverworts taxa are *Scapania irriqua*, *Chiloscyphus pallescens*, *Plagiochila asplenioides*, *P. porelloides*, *Radula lindenbergiana*, *Apopellia endiviifolia*, and *Marchantia polymorpha* in the study area.

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