

BRYOPHYTE CHECKLIST OF RIZE, NORTH-EAST TURKEY

ЧЕКЛИСТ МОХООБРАЗНЫХ ПРОВИНЦИИ РИЗЕ, СЕВЕРО-ВОСТОЧНАЯ ТУРЦИЯ

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Abstract

Bryophytes of Rize Province are listed, basing on data published between 1955 and 2014. This is the first list of Anthocerotophyta, Marchantiophyta, and Bryophyta from Rize. The checklist includes 45% of the total hornwort and liverwort flora of Turkey (31 families, 46 genera, 81 species and 2 subspecies), and 42 % of its moss flora (44 families, 126 genera, 309 species, 4 subspecies and 14 varieties). The largest number of species have *Orthotrichum*, *Sphagnum*, *Grimmia*, *Racomitrium*, *Brachythecium*, *Dicranum*, *Ptychostomum*, and *Tortula*. In liverworts, *Scapania*, *Jungermannia*, and *Lophozia* are the richest in species number, and in hornworts *Anthoceros* is the only genus represented in the list. Pottiaceae, Brachytheciaceae, Grimmiaceae, Jungermanniaceae, and Scapaniaceae are largely represented in Rize. In the light of the presented checklist, Rize is one of the most diverse areas for bryophytes in Turkey. The level and number of knowledge on bryophytes occurring in Rize is expected to increase with further investigations in less studied areas of the province.

Резюме

Приводится список мохообразных (мхов, печеночников и антоцеротовых) провинции Ризе, суммирующий данные, опубликованные с 1955 по 2014 гг. На данной сравнительно небольшой территории, 3922 км², отмечено 45% видов печеночников и антоцеротовых, известных в Турции, (31 семейства, 46 родов, 81 видов, 2 подвида) и 42% видового разнообразия мхов (44 семейства, 126 родов, 309 видов, 4 подвида, 14 разновидностей). Наибольшее число видов мхов в родах *Orthotrichum*, *Sphagnum*, *Grimmia*, *Racomitrium*, *Brachythecium*, *Dicranum*, *Ptychostomum* и *Tortula*, а печеночников – в родах *Scapania*, *Jungermannia* и *Lophozia*. Антоцеротовые представлены одним видом *Anthoceros*. Из семейств наиболее представлены Pottiaceae, Brachytheciaceae, Grimmiaceae, Jungermanniaceae и Scapaniaceae. Таким образом, провинция Ризе имеет наибольшее разнообразие мохообразных среди прочих районов Турции. Вместе с тем, есть основания полагать, что находки новых для провинции видов продолжатся.

KEYWORDS: Bryophyte, checklist, hornworts, liverworts, mosses

INTRODUCTION

Bryofloristic studies in Turkey by local bryologists started in 1980s, they continue at present and bring a lot of new data on bryophyte diversity. These studies resulted in several checklists of some provinces and a whole country. The first checklist of liverworts of Turkey was prepared by Gökler *et al.* (1985–1986). The second detailed checklist of liverworts and hornworts was published by Çetin (1988a). A few years later, Gökler & Öztürk (1991) listed liverworts and hornworts of Turkey according to grid-square system adopted by Henderson (1961a, 1961b). The first checklist of Turkish mosses was published by Çetin (1988b). The time between 1988 and 2004 was one of the greatest periods of intensive bryological studies in the history of Turkish bryology. A major version of the moss checklist for Turkey was published by Uyar & Çetin (2004). Right after, the second

major checklist for mosses, liverworts, and hornworts in Turkey was presented by Kürschner & Erdağ (2005). However, the number of bryophytes in the country kept increasing due to discovery of several new species and many new records of bryophytes. Therefore, Özenoğlu Kiremit & Keçeli (2009) listed the liverworts and hornworts of Turkey, also taking into consideration the study of Ros *et al.* (2007). The latest information about Turkish mosses was cited within the study of Ros *et al.* (2013). A year later, Abay (2014) presented the current knowledge about the bryophyte species in Turkey based on mainly the past and recent checklists and surveys. There are some local checklists based on the grid-squares adopted by Henderson on Turkey's map (Abay *et al.*, 2009, 2010; Şahin *et al.*, 2009a, 2009b; Ursavaş & Abay, 2009; Özdemir, 2009; Ursavaş *et al.*, 2010; Keçeli *et al.*, 2011; Ursavaş & Abay, 2012a, 2012b), but the number of spe-

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cies lists for individual provinces is limited (Abay, 2014). However, data of regional level are the most important for biodiversity studies and conservation. Thus, in this paper we compile all data on bryophyte species occurring in Rize Province, aiming to fill one of the gaps in our knowledge of hornworts, liverworts, and mosses.

Rize Province is located on the coast of Eastern Black Sea Region between the east meridians of 40°22' and 41°28' and northern latitudes of 40°20' and 41°20'. It is surrounded by Trabzon in the west, Erzurum in the south, Bayburt in the southwest, Artvin in the east and the Black Sea in the north. Rize has an area of 3922 km², excluding lakes. The climate of Rize is subtropical, with warm summers, cool winters and rains during all seasons caused by mountains parallel to the sea. Mean annual temperature of Rize is 14 °C, mean average rainfall is 2300 mm; it makes Rize the wettest province in Turkey. The humidity is always above 75% (Çevre Durum Raporu, 2014).

MATERIALS AND METHODS

In this review, we survey all available bryofloristic researches published in European countries and Turkey that include data on bryophytes of Rize Province: Henderson & Muirhead, 1955; Henderson 1961a, 1961b, 1964; Papp, 2004; Abay, 2004; Townsend, 2005; Abay *et al.*, 2006a, 2006b, 2007, 2009a, 2009b; Kürschner & Parolly, 2006a, 2006b; Keçeli & Abay, 2007a, 2007b, 2012, 2014; Keçeli *et al.*, 2008; Uyar *et al.*, 2008; Lara *et al.*, 2010; Kırmacı *et al.*, 2012; Kürschner *et al.*, 2012; Kırmacı & Kürschner, 2013; Kürschner, 2013; Abay & Keçeli, 2014. All records were obtained from published literature concerning the province between the years 1955 and 2014.

Names of hornwort and liverwort taxa follow publications of Ros *et al.* (2007) and Özenoğlu Kiremit & Keçeli (2009). For mosses, the checklist of Ros *et al.* (2013) served as a reference. The synonyms of the bryophyte taxa are given in Supplement 1 (http://arctoa.ru/ru/Archive-ru/25_2/Abay_et_al_S1.pdf). They are based on publications of Söderström *et al.* (2016) for hornworts and liverworts; of Ros *et al.* (2013) and partly of Hill *et al.* (2006) for mosses. Author abbreviations follow Brummit & Powel (1992).

RESULTS

Composition of bryophyte families and genera

The checklist reports data on 410 bryophytes recorded from different localities within the Rize Province. The list includes 45.11 % of the total hornwort and liverwort flora of Turkey that equals 31 families, 46 genera and 83 taxa (81 species and 2 subspecies). Of these, *Anthoceros caucasicus* Stephani belonging to Anthocerotophyta is a hornwort, and 82 are liverworts belonging to Marchantiophyta. The largest number of liverwort species was found in the families Jungermanniaceae (11), Scapaniaceae (10), Lepidoziaceae (5), and Lophocoleaceae (5). With 8 taxa, *Scapania* is the richest genus of liverworts. It is followed by *Jungermannia* and *Lophozia*, each having four taxa.

Mosses are represented in the present checklist by 44 families, 126 genera, and 327 taxa of infrageneric level (309 species, 14 varieties, and 4 subspecies), that equals 42.00 % of the total moss flora of Turkey. The list of mosses includes one species of Andreaeopsida (*Andreaea rupestris* Hedw.), 15 taxa Sphagnopsida (*Sphagnum* spp.), and 311 taxa of Bryopsida. Pottiaceae is the richest family comprising 36 taxa. Some other rich families are Brachytheciaceae (31), Grimmiaceae (30), Orthotrichaceae (22) and Mniaceae (18). The richest genera include *Orthotrichum* (17 species), *Sphagnum* (15), *Grimmia* (13), and *Racomitrium* (10). The genera *Brachythecium*, *Dicranum*, *Ptychostomum*, and *Tortula* shared the fifth position with eight taxa each.

New records

A hornwort and two liverworts not included in the checklist of Özenoğlu Kiremit & Keçeli (2009) were published later: *Anthoceros caucasicus* Stephani (Kırmacı *et al.*, 2012), *Trichocolea tomentella* (Ehrh.) Dumort. (Keçeli & Abay, 2012), and *Jubula hutchinsiae* (Hook.) Dumort. subsp. *caucasica* Konstant. & Vilnet (Kürschner, 2013).

Five species of mosses were reported as new records after checklist by Ros *et al.* (2013): *Pohlia obtusifolia* (Vill. ex Brid.) L.F.Koch (Kırmacı *et al.*, 2012), *Sphagnum contortum* Schultz, *S. fallax* (H.Klinggr.) H.Klinggr., *S. magellanicum* Brid. (Kırmacı & Kürschner, 2013), and *Sphagnum molle* Sull. (Abay & Keçeli, 2014).

ALPHABETICAL LIST OF BRYOPHYTES OF RIZE

ANTHOCEROTOPHYTA (Hornworts)

Anthoceros caucasicus Stephani

MARCHANTIOPHYTA (Liverworts)

Aneura pinguis (L.) Dumort.

Anthelia julacea (L.) Dumort.

Apometzgeria pubescens (Schrank) Kuwah.

Barbilophozia barbata (Schmidel ex Schreb.) Loeske

B. hatcheri (A. Evans) Loeske

Bazzania flaccida (Dumort.) Grolle

B. tricrenata (Wahlenb.) Trevis.

B. trilobata (L.) Gray

Blasia pusilla L.

Blepharostoma trichophyllum (L.) Dumort.

Calypogeia arguta Nees et Mont.

C. azurea Stotler & Crotz

C. fissa (L.) Raddi

Cephalozia bicuspidata (L.) Dumort.

C. catenulata (Huebener) Lindb.

C. pleniceps (Austin) Lindb.

Cephaloziella divaricata (Sm.) Schiffn.

C. hampeana (Nees) Schiffn.

Chiloscyphus pallescens (Ehrh. ex Hoffm.) Dumort.

C. polyanthos (L.) Corda

Cololejeunea rossettiana (C. Massal.) Schiffn.

Conocephalum conicum (L.) Dumort.

Diplasiolejeunea cavifolia Steph.

Diplophyllum albicans (L.) Dumort.

D. taxifolium (Wahlenb.) Dumort.

- Eremonotus myriocarpus* (Carrington) Lindb. & Kaal ex Pearson
Fossombronia angulosa (Dicks.) Raddi
Frullania dilatata (L.) Dumort.
F. jackii Gottsche
F. tamarisci (L.) Dumort.
Gymnomitrium concinnatum (Lightf.) Corda
Harpanthus scutatus (F. Weber & D.Mohr) Spruce
Jamesoniella autumnalis (DC.) Steph.
Jubula hutchinsiae (Hook.) Dumort. subsp. *caucasica* Konstant. & Vilnet
J. hutchinsiae (Hook.) Dumort. subsp. *javanica* (Steph.) Verd.
Jungermannia atrovirens Dumort.
Leiocolea bantriensis (Hook.) Jörg.
Lepidozia reptans (L.) Dumort.
Lophocolea bidentata (L.) Dumort.
L. heterophylla (Schrad.) Dumort.
L. minor Nees
Lophozia bicrenata (Schmidel ex Hoffm.) Dumort.
L. incisa (Schrad.) Dumort.
L. sudetica (Nees ex Huebener) Grolle
L. ventricosa (Dicks.) Dumort.
Lunularia cruciata (L.) Lindb.
Marchantia paleacea Bertol.
M. polymorpha L.
Marsupella emarginata (Ehrh.) Dumort.
M. funckii (F. Weber & D. Mohr) Dumort.
Metzgeria conjugata Lindb.
M. furcata (L.) Dumort.
Nardia scalaris Gray
Nowellia curvifolia (Dicks.) Mitt.
Pallavicinia lyellii (Hook.) Carruth.
Pedinophyllum interruptum (Nees) Kaal.
Pellia endiviifolia (Dicks.) Dumort.
P. epiphylla (L.) Corda
Plagiochila asplenioides (L. emend. Taylor) Dumort.
P. porelloides (Torrey ex Nees) Lindenb.
Porella arboris-vitae (With.) Grolle
P. platyphylla (L.) Pfeiff.
Radula complanata (L.) Dumort.
R. lindenbergiana Gottsche ex C. Hartm.
Reboulia hemisphaerica (L.) Raddi
Riccardia chamedryfolia (With.) Grolle
R. palmata (Hedw.) Carruth.
Scapania aspera Bernet & M. Bernet
S. compacta (A.Roth) Dumort.
S. irrigua (Nees) Nees
S. nemorea (L.) Grolle
S. paludosa (Müll.Frib.) Müll. Frib.
S. subalpina (Nees ex Lindenb.) Dumort.
S. undulata (L.) Dumort.
S. verrucosa Heeg
Solenostoma hyalinum (Lyell) Mitt.
Solenostoma obovatum (Nees) C.Massal.
Solenostoma sphaerocarpum (Hook.) Steph.
Telaranea europaea J.J. Engel & G.L.S. Merrill
Trichocolea tomentella (Ehrh.) Dumort.
Tritomaria exsecta (Schmidel ex Schrad.) Loeske
T. quinquedentata (Huds.) H. Buch
- BRYOPHYTA (Mosses)
- Abietinella abietina* (Hedw.) M.Fleisch.
Alleniella complanata (Hedw.) S. Olsson, Enroth & D. Quandt
Amblystegium serpens (Hedw.) Schimp.
Amphidium mougeotii (Schimp.) Schimp.
Andreaea rupestris Hedw.
Anomodon attenuatus (Hedw.) Huebener
A. rugelii (Müll. Hal.) Keissl.
A. viticulosus (Hedw.) Hook. & Taylor
Antitrichia curtispindula (Hedw.) Brid.
Archidium alternifolium (Hedw.) Mitt.
Atrichum angustatum (Brid.) Bruch & Schimp.
A. tenellum (Röhl.) Bruch & Schimp.
A. undulatum (Hedw.) P. Beauv.
Aulacomnium palustre (Hedw.) Schwägr
Barbula convoluta Hedw. var. *convoluta*
B. convoluta var. *sardoa* Schimp.
B. unguiculata Hedw.
Bartramia halleriana Hedw.
B. ithyphylla Brid.
B. pomiformis Hedw.
Blindia acuta (Hedw.) Bruch & Schimp.
B. caespiticia (F. Weber & D. Mohr) Müll.Hal.
Brachytheciastrum collinum (Schleich. ex Müll. Hal.) Ignatov & Huttunen
B. velutinum (Hedw.) Ignatov & Huttunen
Brachythecium albicans (Hedw.) Schimp.
B. erythrorrhizon Schimp.
B. geheebii Milde
B. glareosum (Bruch ex Spruce) Schimp.
B. mildeanum (Schimp.) Schimp.
B. rivulare Schimp.
B. rutabulum (Hedw.) Schimp.
B. salebrosum (Hoffm. ex F. Weber & D. Mohr) Schimp.
Bryoerythrophyllum recurvirostrum (Hedw.) P.C. Chen
Bryum argenteum Hedw.
B. canariense Brid.
B. elegans Nees
B. schleicheri DC.
Calliergonella lindbergii (Mitt.) Hedenäs
Campylium protensum (Brid.) Kindb.
C. stellatum (Hedw.) Lange & C.E.O. Jensen
Campylopus atrovirens De Not.
C. pyriformis (Schultz) Brid.
C. subulatus Schimp. ex Milde
Ceratodon purpureus (Hedw.) Brid.
Climacium dendroides (Hedw.) F. Weber & D. Mohr.
Coscinodon cribrosus (Hedw.) Spruce
Cratoneuron filicinum (Hedw.) Spruce
Ctenidium molluscum (Hedw.) Mitt.
Dichodontium flavescens (Dicks.) Lindb.
D. palustre (Dicks.) M. Stech
D. pellucidum (Hedw.) Schimp.
Dicranella heteromalla (Hedw.) Schimp.
Dicranodontium denudatum (Brid.) E.Britton
Dicranoweisia cirrata (Hedw.) Lindb.
Dicranum bonjeanii De Not.
D. flexicaule Brid.
D. fulvum Hook.
D. fuscescens Sm.
D. majus Sm.
D. polysetum Sw. ex anon
D. scoparium Hedw.
D. tauricum Sappjegin
Didymodon fallax (Hedw.) R.H. Zander
D. ferrugineus (Schimp. ex Besch.) M.O. Hill
D. insulanus (De Not.) M.O. Hill
D. luridus Hornsch.

- D. rigidulus* Hedw
D. tophaceus (Brid.) Lisa
D. vinealis (Brid.) R.H. Zander
Diphyscium foliosum (Hedw.) D. Mohr
Distichium capillaceum (Hedw.) Bruch & Schimp.
D. inclinatum (Hedw.) Bruch & Schimp.
Ditrichum flexicaule (Schwägr.) Hampe
D. heteromallum (Hedw.) E. Britton
D. pallidum (Hedw.) Hampe
D. pusillum (Hedw.) Hampe
D. subulatum Hampe
Drepanocladus aduncus (Hedw.) Warnst.
Encalypta streptocarpa Hedw.
E. vulgaris Hedw.
Eucladium verticillatum (With.) Bruch & Schimp.
Eurhynchiastrum pulchellum (Hedw.) Ignatov & Huttunen var. *pulchellum*
E. pulchellum var. *praecox* (Hedw.) Ochyra & Żarnowiec
Eurhynchium angustirete (Broth.) T.J. Kop.
E. striatum (Hedw.) Schimp.
Exsertotheca crispa (Hedw.) S. Olsson, Enroth & D. Quandt
Fissidens adianthoides Hedw.
F. crispus Mont.
F. dubius P. Beauv.
F. exilis Hedw.
F. taxifolius Hedw.
Fontinalis antipyretica Hedw
Funaria hygrometrica Hedw.
Grimmia alpestris (F. Weber & D. Mohr) Schleich.
G. decipiens (Schultz) Lindb.
G. elatior Bruch ex Bals.-Criv. & De Not
G. elongata Kaulf.
G. funalis (Schwägr.) Bruch & Schimp.
G. hartmanii Schimp.
G. laevigata (Brid.) Brid.
G. longirostris Hook.
G. montana Bruch & Schimp
G. ovalis (Hedw.) Lindb.
G. pulvinata (Hedw.) Sm.
G. ramondii (Lam. & DC.) Margad.
G. trichophylla Grev.
Gymnostomum aeruginosum Sm.
G. calcareum Nees & Hornsch.
Gyroweisia tenuis (Hedw.) Schimp.
Habrodon perpusillus (De Not.) Lindb.
Hamatocaulis vernicosus (Mitt.) Hedenäs
Hedwigia ciliata (Hedw.) P.Beauv. var. *ciliata*
H. ciliata var. *leucophaea* Bruch & Schimp.
Helodium blandowii (F. Weber & D. Mohr) Warnst
Heterocladium dimorphum (Brid.) Schimp.
H. heteropterum (Brid.) Schimp.
Homalia trichomanoides (Hedw.) Brid.
Homalothecium lutescens (Hedw.) H. Rob. var. *lutescens*
H. lutescens var. *fallax* (H. Philib.) Hedenäs & L. Söderstr.
H. sericeum (Hedw.) Schimp
Hookeria lucens (Hedw.) Sm.
Hygroamblystegium fluviatile (Hedw.) Loeske
H. varium (Hedw.) Mönk.
Hygrohypnum eugyrium (Schimp.) Brothe
H. luridum (Hedw.) Jenn.
Hylocomium splendens (Hedw.) Schimp.
Hymenoloma crispulum (Hedw.) Ochyra
Hypnum andoi A.J.E. Sm.
H. callichroum Brid.
H. cupressiforme Hedw. var. *cupressiforme*
H. cupressiforme var. *filiforme* Brid.
H. cupressiforme var. *lacunosum* Brid.
H. cupressiforme var. *resupinatum* (Taylor) Schimp.
H. imponens Hedw.
Imbriobryum mildeanum (Jur.) J.R. Spence
Isopterygiopsis muelleriana (Schimp.) Z. Iwats.
I. pulchella (Hedw.) Z. Iwats.
Isothecium alopecuroides (Lam. ex Dubois) Isov.
I. holtii Kindb.
I. myosuroides Brid. subsp. *myosuroides*
I. myosuroides subsp. *brachythecioides* (Dixon) Braithw.
Kindbergia praelonga (Hedw.) Ochyra
Leptobryum pyriforme (Hedw.) Wilson
Leptodictyum riparium (Hedw.) Warnst.
Lescurea incurvata (Hedw.) E. Lawton
L. mutabilis (Brid.) Lindb ex I. Hagen
L. patens Lindb
L. plicata (Schleich. ex F. Weber & D. Mohr) Broth.
L. radicata (Mitt.) Mönk.
L. saviana (De Not.) E. Lawton
L. saxicola (Schimp.) Molendo
Leskea polycarpa Hedw.
Leucobryum glaucum (Hedw.) Ångstr.
L. juniperoideum (Brid.) Müll. Hal.
Leucodon immersus Lindb.
L. sciuroides (Hedw.) Schwägr.
Loeskeobryum brevirostre (Brid.) M. Fleisch.
Mnium hornum Hedw.
M. lycopodioides Schwägr.
M. marginatum (Dicks.) P.Beauv.
M. stellare Hedw.
Myurella julacea (Schwägr.) Schimp.
M. tenerrima (Brid.) Lindb.
Nogopterium gracile (Hedw.) Crosby & W.R. Buck
Oligotrichum hercynicum (Hedw.) Lam. & DC.
Oncophorus virens (Hedw.) Brid.
Orthotrichum affine Schrad. ex Brid.
O. alpestre Bruch & Schimp.
O. anomalum Hedw.
O. consobrinum Cardot
O. cupulatum Hoffm. ex Brid.
O. diaphanum Schrad. ex Brid.
O. microcarpum De Not.
O. pallens Bruch ex Brid.
O. pumilum Sw. ex anon.
O. rogeri Brid.
O. rupestre Schleich. ex Schwägr.
O. scanicum Gronvall
O. speciosum Nees
O. stramineum Hornsch. ex Brid.
O. striatum Hedw.)
O. urnigerum Myrin
Oxyrrhynchium hians (Hedw.) Loeske
O. schleicheri (R. Hedw.) Röhl
O. speciosum (Brid.) Warnst.
Oxystegus tenuirostris (Hook. & Taylor) A.J.E. Sm.
Palamocladium euchloron (Müll. Hal.) Wijk & Margad.
Palustriella commutata (Hedw.) Ochyra
P. decipiens (De Not.) Ochyra
P. falcata (Brid.) Hedenäs
Paraleucobryum enerve (Thed.) Loeske

- P. longifolium* (Hedw.) Loeske
Philonotis caespitosa Jur.
P. calcarea (Bruch & Schimp.) Schimp.
P. capillaris Lindb.
P. fontana (Hedw.) Brid.
P. marchica (Hedw.) Brid.
P. seriata Mitt.
P. tomentella Molendo
Physcomitrella patens (Hedw.) Bruch & Schimp.
Plagiomnium affine (Blandow ex Funck) T.J. Kop.
P. cuspidatum (Hedw.) T.J. Kop.
P. elatum (Bruch & Schimp.) T.J. Kop.
P. ellipticum (Brid.) T.J. Kop.
P. medium (Bruch & Schimp.) T.J. Kop.
P. rostratum (Schrad.) T.J. Kop.
P. undulatum (Hedw.) T.J. Kop.
Plagiopus oederianus (Sw.) H.A. Crum & L.E. Anderson
Plagiothecium cavifolium (Brid.) Z. Iwats.
P. curvifolium Schlieph. ex Limpr.
P. denticulatum (Hedw.) Schimp.
P. laetum Schimp.
P. nemorale (Mitt.) A.Jaeger
P. platyphyllum Mönk.
P. succulentum (Wilson) Lindb.
Plasteurhynchium meridionale (Schimp.) M. Fleisch.
P. striatulum (Spruce) M. Fleisch.
Platygyrium repens (Brid.) Schimp.
Pleuridium subulatum (Hedw.) Rabenh.
Pleurozium schreberi (Willd. ex Brid.) Mitt.
Pogonatum aloides (Hedw.) P. Beauv.
P. urnigerum (Hedw.) P. Beauv.
Pohlia cruda (Hedw.) Lindb.
P. elongata Hedw.
P. ludwigii (Spreng. ex Schwaegr.) Broth.
P. nutans (Hedw.) Lindb.
P. obtusifolia (Vill. ex Brid.) L.F. Koch
P. wahlenbergii (F. Weber & D. Mohr) A.L. Andrews
Polytrichastrum alpinum (Hedw.) G.L. Sm.
P. sexangulare (Brid.) G.L. Sm.
Polytrichum commune Hedw.
P. formosum Hedw.
P. juniperinum Hedw.
P. piliferum Hedw.
Pseudoamblystegium subtile (Hedw.) Vanderp. & Hedenäs
Pseudoleskeella catenulata (Brid. ex Schrad.) Kindb.
P. nervosa (Brid.) Nyholm
Pseudoscleropodium purum (Hedw.) M. Fleisch.
Pterigynandrum filiforme Hedw.
Ptilium crista-castrensis (Hedw.) De Not.
Ptychostomum boreale (F. Weber & D. Mohr) Ochyra & Bednarek-Ochyra
P. capillare (Hedw.) Holyoak & N. Pedersen
P. imbricatulum (Müll. Hal.) Holyoak & N. Pedersen
P. moravicum (Podp.) Ros & Mazimpaka
P. pallens (Sw.) J.R. Spence
P. pseudotriquetrum (Hedw.) J.R. Spence & H.P. Ramsay
P. torquescens (Bruch & Schimp.) Ros & Mazimpaka
P. zieri (Hedw.) Holyoak & N. Pedersen
Racomitrium aciculare (Hedw.) Brid.
R. affine (F. Weber & D. Mohr) Lindb.
R. aquaticum (Brid. ex Schrad.) Brid.
R. canescens (Hedw.) Brid.
R. elongatum Ehrh. ex Frisvoll.
R. ericoides (Brid.) Brid.
R. heterostichum (Hedw.) Brid.
R. macounii subsp. *macounii* Kindb.
R. macounii subsp. *alpinum* (E.Lawton) Frisvoll
R. microcarpon (Hedw.) Brid.
Rhizomnium punctatum (Hedw.) T.J. Kop.
Rhodobryum ontariense (Kindb.) Kindb.
R. roseum (Hedw.) Limpr.
Rhynchostegiella tenella (Dicks.) Limpr.
Rhynchostegium murale (Hedw.) Schimp.
R. riparioides (Hedw.) Cardot
Rhytidiadelphus squarrosus (Hedw.) Warnst.
R. triquetrus (Hedw.) Warnst.
Rhytidium rugosum (Hedw.) Kindb.
Sanionia uncinata (Hedw.) Loeske
Sarmentypnum exannulatum (Schimp.) Hedenäs
S. sarmentosum (Wahlenb.) Tuom. & T.J. Kop.
Schistidium apocarpum (Hedw.) Bruch & Schimp.
S. atrofusum (Schimp.) Limpr.
S. confertum (Funck) Bruch & Schimp.
S. crassipilum H.H. Blom
S. flaccidum (De Not.) Ochyra
S. trichodon (Brid.) Poelt
Sciuro-hypnum plumosum (Hedw.) Ignatov & Huttunen
S. populeum (Hedw.) Ignatov & Huttunen
S. reflexum (Starke) Ignatov & Huttunen
Sphagnum capillifolium (Ehrh.) Hedw.
S. centrale C.E.O. Jensen
S. compactum Lam. & DC.
S. contortum Schultz
S. fallax (H. Klinggr.) H. Klinggr.
S. girgensohnii Russow
S. inundatum Russow
S. magellanicum Brid.
S. molle Sull.
S. palustre L.
S. platyphyllum (Lindb. ex Braithw.) Warnst.
S. squarrosum Crome
S. subsecundum Nees
S. teres (Schimp.) Ångstr.
S. warnstorffii Russow
Straminergon stramineum (Dicks. ex Brid.) Hedenäs
Syntrichia laevipila Brid.
S. norvegica F.Weber
S. papillosa (Wilson) Jur.
S. ruralis (Hedw.) F. Weber & D. Mohr
Taxiphyllum densifolium (Lindb. ex Broth.) Reimers
Tetraphis pellucida Hedw.
Thamnobryum alopecurum (Hedw.) Gangulee
Thuidium delicatulum (Hedw.) Schimp.
Timmia austriaca Hedw.
Tortella inclinata (R.Hedw.) Limpr. var. *densa* (Lorentz & Molendo) Limpr.
T. inflexa (Bruch) Broth.
T. nitida (Lindb.) Broth.
T. tortuosa (Hedw.) Limpr.
Tortula caucasica Broth.
T. hoppeana (Schultz) Ochyra
T. lindbergii Broth
T. marginata (Bruch & Schimp.) Spruce
T. muralis Hedw.
T. muralis var. *aestiva* Brid. ex Hedw.
T. schimperii M.J. Cano, O.Werner & J. Guerra

T. subulata Hedw.
Trichodon cylindricus (Hedw.) Schimp.
Trichostomum brachydontium Bruch
T. crispulum Bruch
Ulota coarctata (P. Beauv.) Hammar
U. crispa (Hedw.) Brid.
U. rehmannii Jur.
W. condensata (Voit) Lindb.
W. controversa Hedw.
Zygodon rupestris Schimp. ex Lorentz
Z. viridissimus (Dicks.) Brid.

CONCLUSIONS

Bryophyte diversity of Rize Province is the richest among provinces of Turkey. This checklist is one of the essential steps towards the evaluation of the number and conservation status of species. A number of publications on bryophyte flora of the province in regional, national and international journals are currently unavailable to access online; the present checklist summarizes these data for Rize Province. Finally, a cooperation between bryologists from different provinces of Turkey is necessary for better understanding of bryoflora at a regional and province level.

LITERATURE CITED

- ABAY, G. & T. KEÇELİ. 2014. *Sphagnum molle* (Sphagnaceae, Bryophyta) in Turkey and SW Asia. – *Cryptogamie Bryologie* **35** (1): 105–112.
- ABAY, G. 2004. The moss flora of Kiyıcık village. – *Ot Sistematik Botanik Dergisi* **1**(1):149–162.
- ABAY, G. 2014. Bryodiversity of Turkey. – *Scientific And Technological Cooperation in the Field of Plant Diversity And Biotechnology Between Turkey And Germany, Artvin, Türkiye, 25–27 IX. 2014*: 15.
- ABAY, G., S. URSAVAŞ & A. ŞAHİN. 2009. Türkiye'nin A3 karesinin karayosunları (Musci) kontrol listesi. – *I. Ulusal Batı Karadeniz Ormancılık Kongresi, Bartın, Türkiye, 5–7 XI. 2009*: 613–619.
- ABAY, G., S. URSAVAŞ & T. KEÇELİ. 2010. Türkiye'nin B7 karesinin bryophyta kontrol listesi. – *20. Ulusal Biyoloji Kongresi, Denizli, Türkiye, 21–25 VI. 2010*: 394–395.
- ABAY, G., G. UYAR, B. ÇETİN & T. KEÇELİ. 2006a. Fırtına vadisi (Çamlıhemşin, Rize) *Buxus sempervirens* L. topluluklarının yayılış gösterdiği alanların karayosunu (Musci) florası. – *Süleyman Demirel Üniversitesi Orman Fakültesi Dergisi* **2**: 37–49.
- ABAY, G., G. UYAR, B. ÇETİN & T. KEÇELİ. 2006b. New bryofloristic records for the square A4 (Rize, Turkey). – *Proceedings of IV BBC, Sofia, 20–26 VI. 2006*: 134–139 (publ. 2009).
- ABAY, G., G. UYAR, B. ÇETİN & T. KEÇELİ. 2007. *Bucklandiella microcarpa* (Hedw.) Bednareck-Ochyra & Ochyra (Grimmiaceae, Bryopsida), new to the moss flora of Turkey and South-West Asia. – *Cryptogamie Bryologie* **28**: 145–148.
- ABAY, G., G. UYAR, T. KEÇELİ & B. ÇETİN. 2009a. *Sphagnum centrale* and other remarkable bryophyte records from the Kaçkar Mountains (Northern Turkey). – *Cryptogamie Bryologie* **30**(3): 399–407.
- ABAY, G., G. UYAR, T. KEÇELİ & B. ÇETİN. 2009b. Contributions to the bryoflora of the Kaçkar Mts (NE Anatolia, Turkey). – *Phytologia Balcanica* **15**: 317–329.
- BRUMMITT, R.K. & C.E. POWELL. 1992. Authors of plant names. A list of authors of scientific names of plants, with recommended standard form of their names including abbreviations. *Royal Botanic Gardens, Kew*, 732 pp.
- ÇETİN, B. 1988a. Checklist of the liverworts and hornworts of Turkey. – *Lindbergia* **14**: 12–14.
- ÇETİN, B. 1988b. Checklist of the Mosses of Turkey. – *Lindbergia* **14**: 15–23.
- ÇEVRE DURUM RAPORU. 2014. İl Çevre Durum Raporu. – *Rize Çevre ve Şehircilik İl Müdürlüğü*, 126 pp.
- GÖKLER, İ. & M. ÖZTÜRK. 1991. Liverworts of Turkey and their position in South-west Asia. – *Candollea* **46**: 359–366.
- GÖKLER, İ., M. ÖZTÜRK & T. KESERCİOĞLU. 1985–1986. Checklist of liverworts (Hepaticae) recorded from Turkey. – *Ege University Journal of Science Faculty Series B* **3**: 1–10.
- HENDERSON, D.M. & C.W. MUIRHEAD. 1955. Contribution to the bryophyte flora of Turkey. – *Notes from the Royal Botanic Garden, Edinburgh*, **22**: 29–43.
- HENDERSON, D.M. 1961a. Contributions to the bryophyte flora of Turkey: IV. – *Notes from the Royal Botanic Garden, Edinburgh*, **23**: 263–278.
- HENDERSON, D.M. 1961b. Contributions to the bryophyte flora of Turkey: V. Summary of present knowledge. – *Notes from the Royal Botanic Garden, Edinburgh*, **23**: 279–301.
- HENDERSON, D.M. 1964. Contributions to the bryophyte flora of Turkey: VI. – *Notes from the Royal Botanic Garden, Edinburgh*, **25**: 279–291.
- HILL, M. O., N. BELL, M.A. BRUGGEMAN-NANNENGA, M. BRUGÜES, M.J. CANO, J. ENROTH, K.I. FLATBERG, J. P. FRAHM, M. T. GALLEGRO, R. GARILLETI, J. GUERRA, L. HEDENÄS, D. T. HOLYOAK, J. HYVÖNEN, M. S. IGNATOV, F. LARA, V. MAZIMPAKA, J. MUÑOZ & L. SÖDERSTRÖM. 2006. An annotated checklist of the mosses of Europe and Macaronesia. – *Journal of Bryology* **28**: 198–267.
- KEÇELİ, T., S. URSAVAŞ & G. ABAY. 2011. Türkiye'nin B6 karesinin bryophyta kontrol listesi. – *Bartın Orman Fakültesi Dergisi* **13**: 14–24.
- KEÇELİ, T. & G. ABAY. 2007a. *Pallavicinia lyellii* (Hook.) Carruth in Turkey, new to Southwestern Asia. – *Cryptogamie Bryologie* **28**: 249–252.
- KEÇELİ, T. & G. ABAY. 2007b. *Telaranea europaea* (Lepidoziaceae, Hepaticae), new for Turkey. – *Cryptogamie Bryologie* **28**: 79–81.
- KEÇELİ, T. & G. ABAY. 2012. *Trichocolea tomentella* (Trichocoleaceae), Türkiye Çiğeroğulları (Marchantiophyta) Florası için yeni kayıt – *21. Ulusal Biyoloji Kongresi, Bildiri Kitabı, 3–7 IX. 2012, İzmir*: 577–578.
- KEÇELİ, T. & G. ABAY. 2014. Fındıklı (Rize) Çiğeroğu Florasına Katkıları. – *22. Ulusal Biyoloji Kongresi, Bildiri Özet Kitabı, 23–27 VI. 2014, Eskişehir, Türkiye*: 48.
- KEÇELİ, T., G. ABAY, G. UYAR & B. ÇETİN. 2008. New national and regional bryophyte records, 19. *Scapania paludosa* (Müll. Frib.) Müll. Frib. – *Journal of Bryology* **15**: 234.
- KİRMACI, M. & H. KÜRSCHNER. 2013. The genus *Sphagnum* L. in Turkey with *S. contortum*, *S. fallax*, *S. magellanicum* and *S. rubellum*, new to Turkey and Southwest Asia. – *Nova Hedwigia* **96** (3–4): 383–397.
- KİRMACI, M., H. KÜRSCHNER & A. ERDAĞ. 2012. New and noteworthy records to the bryophyte flora of Turkey and Southwest Asia. – *Cryptogamie Bryologie* **33** (3): 267–270.
- KÜRSCHNER, H. & A. ERDAĞ. 2005. Bryophytes of Turkey: An annotated reference list of the species with synonyms from the recent literature and an annotated list of Turkish bryological literature. – *Turkish Journal of Botany* **29**: 95–154.
- KÜRSCHNER, H. & G. PAROLLY. 2006a. New national and regional bryophyte records, 13. 11. *Warnstorfia sarmentosa* (Wahlenb.) Hedenäs. – *Journal of Bryology* **28**: 154.
- KÜRSCHNER, H. & G. PAROLLY. 2006b. New national and regional bryophyte records, 12. 9. *Eremonotus myriocarpus* (Carrington) Lindb. & Kall. ex Pearson. – *Journal of Bryology* **28**: 69.
- KÜRSCHNER, H. 2013. *Jubula huchinsiae* subsp. *caucasica* Konstant. & Vilnet (Marchantiophyta: Jubulaceae) – new for the bryophyte flora of İnan and Turkey. – *Polish Botanical Journal* **58** (1): 211–216.

- KÜRSCHNER, H., M. KİRMACI, A. ERDAĞ, K. BATSATSASHVILI & G. PAROLLY. 2012. Ecology and life strategies of epiphytic bryophyte communities from the Arcto-Tertiary relict forests of the Black and Caspian Sea areas. – *Nova Hedwigia* **94** (1–2): 31–65.
- LARA, F., V. MAZIMPAKA, R. MEDINA, R. CAPARRÓS & R. GARILLETI. 2010. Northeastern Turkey, an unnoticed but very important area for the Orthotrichaceae (Bryophyta). – *Nova Hedwigia*, Beiheft **138**: 165–180.
- SÖDERSTRÖM, L., A. HAGBORG, M. KONRAT, S. BARTHOLOMEW-BEGAN, D. BELL, L. BRISCOE, E. BROWN, D. CHRISTINE CARGILL, D. P. COSTA, B. J. CRANDALL-STOTLER, E. D. COOPER, G. DAUPHIN, J. J. ENGEL, K. FELDBERG, D. GLENNY, S. R. GRADSTEIN, X. HE, J. HEINRICH, J. HENTSCHEL, A. L. ILKIU-BORGES, T. KATAGIRI, N. A. KONSTANTINOVA, J. LARRAÍN, D. G. LONG, M. NEBEL, T. PÓCS, F. PUCHE, E. REINER-DREHWALD, M. A. M. RENNER, A. SASS-GYARMATI, A. SCHÄFER-VERWIMP, J. G. S. MORAGUES, R. E. STOTLER, P. SUKKHARAK, B. M. THIERS, J. URIBE, J. VÁÖA, J. C. VILLARREAL, M. WIGGINTON, L. ZHANG & R.-L. ZHU. 2016. World checklist of hornworts and liverworts. – *PhytoKeys* **59**: 1–828.
- ÖZDEMİR, T. 2009. A Revised Check-List of the Bryophytes of A4 Square of Turkey. – *International Journal of Botany* **5**: 1–35.
- ÖZENOĞLU KIREMIT, H & T. KEÇELI. 2009. An annotated check-list of the Hepaticae and Anthocerotae of Turkey. – *Cryptogamie Bryologie* **30**: 343–356.
- PAPP, B. 2004. Contributions to the bryoflora of the Pontic Mountains, North Anatolia, Turkey. – *Studia Botanica Hungarica* **35**: 81–89.
- ROS, R.M., V. MAZIMPAKA, U. ABOU-SALAMA, M. ALEFFI, T.L. BLOCKEEL, M. BRUGUES, R.M. CROS, M.G. DIA, G.M. DIRKSE, I. DRAPER, W. ELSAADAWI, A. ERDAG, A. GANEVA, R. GABRIEL, J.M. GONZALEZMANCIBO, C. GRANGER, I. V. HERRNSTADT, K. HUGONNOT, KHALIL, H. KÜRSCHNER, A. LOSADA-LIMA, L. LUIS, S. MIFSUD, M. PRIVITERA, M. PUGLISI, M. SABOVLJEVIÆ, C. SERGIO, H.M. SHABBARA, M. SIM-SIM, A. SOTIAUX, R. TACCHI, A. VANDERPOORTEN & O. WERNER. 2013. Mosses of the Mediterranean, an Annotated Checklist. – *Cryptogamie Bryologie* **34**: 99–283.
- ROS, R.M., V. MAZIMPAKA, U. ABOU-SALAMA, M. ALEFFI, T.L. BLOCKEEL, M. BRUGUES, M.J. CANO, R.M. CROS, M.G. DIA, G.M. DIRKSE, W. EL SAADAWI, A. ERDAĞ, A. GANEVA, J.M. GONZÁLEZ-MANCEBO, I. HERRNSTADT, K. KHALIL, H. KÜRSCHNER, E., LANFRANCO, A. LOSADA-LIMA, M.S. REFAI, S. RODRÍGUEZ-NUÑEZ, M. SABOVLJEVIÆ, C. SERGIO, H. SHABBARA, M. SIM-SIM & L. SÖDERSTRÖM. 2007. Hepatics and Anthocerotae of the Mediterranean, an annotated checklist. – *Cryptogamie Bryologie* **28** (4): 351–437.
- ŞAHİN A., S. URSAVAŞ & G. ABAY. 2009b. Türkiye'nin A5 karesinin karayosunları (Musci) kontrol listesi. – *I. Ulusal Batı Karadeniz Ormanlık Kongresi*, Bartın, Türkiye, 5-7 XI. 2009, pp.620–625.
- ŞAHİN, A., S. URSAVAŞ & G. ABAY. 2009a. Türkiye'nin A1 karesinin karayosunları (Musci) kontrol listesi. – *I. Ulusal Batı Karadeniz Ormanlık Kongresi*, Bartın, Türkiye, 5-7 XI. 2009, pp.604–612.
- TOWNSEND, C.C. 2005. Mosses from the Caucasian region and eastern Turkey. – *Journal of Bryology* **27**: 143–152.
- URSAVAŞ, S & G. ABAY. 2009. Türkiye'nin A2 Karesinin Karayosunları (Musci) Kontrol Listesi. – *Bartın Orman Fakültesi Dergisi* **11**: 33–43.
- URSAVAŞ, S & G. ABAY. 2012a. “Türkiye'nin B9 ve B10 Karesinin Karayosunları (Musci) Kontrol Listesi. – *21. Ulusal Biyoloji Kongresi, İzmir, Türkiye, 03-07 IX. 2012*: 581–582.
- URSAVAŞ, S & G. ABAY. 2012b. Türkiye'nin C13 Karesinin Karayosunları (Musci) Kontrol Listesi. – *21. Ulusal Biyoloji Kongresi, İzmir, Türkiye, 03-07 IX. 2012*: 582.
- URSAVAŞ, S., T. KEÇELI & G. ABAY. 2010. Türkiye'nin B8 Karesinin Bryophyta Kontrol Listesi. – *20. Ulusal Biyoloji Kongresi, Denizli, Türkiye, 21-25 VI. 2010*: 392–393.
- UYAR, G & B. ÇETİN. 2004. A new check-list of the mosses of Turkey. – *Journal of Bryology* **26**: 203–220.
- UYAR, G., G. ABAY, B. ÇETİN & T. KEÇELI. 2008. *Dicranum flexicaule* Brid., (Dicranaceae, Bryopsida), new to the moss flora of southwest Asia. – *Cryptogamie Bryologie* **29**: 103–106.