

A checklist of liverworts, hornworts and mosses of Uttar Pradesh, India

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ABSTRACT

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A checklist of 27 species of Marchantiophyta (liverworts), 3 species of Anthocerotophyta (hornworts) and 24 species of Bryophyta (mosses) from Uttar Pradesh is presented here. Currently accepted nomenclature and distribution of each species within Uttar Pradesh are provided.

Key-words: Liverworts, hornworts, mosses, checklist, Uttar Pradesh.

INTRODUCTION

Uttar Pradesh has an area of 243,290 km² and constitutes a major part of Gangetic Plains. The state is bordered by Uttarakhand, Haryana and Delhi in the north and north-west, Rajasthan in the west, Madhya Pradesh, Chhattisgarh and Jharkhand in the south and south-east and Bihar in the east. It shares an international border with Nepal in the north. Climatically, the area delimits itself within the subtropical zone and exhibits xeric conditions. The temperatures usually range from 12.5 to 17.5°C in winter and from 27.5 to 32.5°C (sometimes up to 49.9°C) in summer. Rainfall starts generally in the month of June and continues up to September (southwest monsoon). The average rainfall ranges between 99 and 201 cm every year in the eastern part and between 61 and 99 cm in the western part. The periodic failure of the monsoon results in drought conditions.

The area is not much suitable for the growth of bryophytes because most of the forests are degraded probably due to increased human activities for commerce and agriculture and harsh climate. The forests are shrinking and are confined to some small localized

areas in the state. Several plant species are facing threat and struggling for their existence. As the bryophytes play important role in nutrient cycling and maintenance of soil at greater extent, their inventory is needed. So far, about 54 species (including infra-specific taxa) of marchantiophytes, anthocerotophytes and bryophytes are recorded from different parts of Uttar Pradesh, but are in scattered form. In the present list, an attempt has been made to bring out all the known species and their up-to-date nomenclature. The distribution within the state is based on published record and its references are provided.

ENUMERATIONS

Marchantiophyta (Liverworts)

Asterella wallichiana (Lehm. & Lindenb.) Pande, K. P. Srivast. & Sultan Khan ex Grolle, *Khumbu Himal.* 1(4): 262. 1966. [**Aytoniaceae**]. Faizabad (Singh & Kumar 2003 as *Asterella angusta* (Steph.) Mahab. & Bhate), Lucknow (Long 2006).

Asterella multiflora (Steph.) Pande, K. P. Srivast. & Sultan Khan ex Kachroo in *J. Hattori Bot. Lab.* 19: 3. 1958. *Fimbriaria multiflora* Steph., *Sp. Hepat.* 1: 124. 1900. [**Aytoniaceae**]. Saharanpur -

Kauran Pass (Stephani 1900 as *Fimbriaria multiflora* Steph.), Modinagar (Bapna & Kachroo 2000 as *Asterella pathankotensis* Kashyap).

Cyathodium cavernarum Kunze ex Lehm., in Lehm., Nov. Stirp. Pug. 6: 18. 1834. [Cyathodiaceae]. Lucknow, Bareilly (Srivastava & Dixit 1996), Faizabad (Singh & Kumar 2003), Raebareli (Kumar et al. 1991).

Cyathodium tuberosum Kashyap in New Phytol. 13: 210. 1914. [Cyathodiaceae]. Allahabad, Lucknow, Varanasi 'Banaras' (Kashyap 1929).

Marchantia paleacea Bertol., Opusc. Sci. 1: 242. 1817. [Marchantiaceae]. Uttar Pradesh (Bischler 1989).

Marchantia papillata Raddi subsp. *grossibarba* (Steph.) Bischl. in Cryptog. Bryol. Lichénol. 10: 78. 1989. *Marchantia grossibarba* Steph. in Mém. Soc. Sci. Nat. Cherbourg 29: 221. 1894. [Marchantiaceae]. Barabanki (Singh 1966 as *Marchantia palmata* Reinw. et al.).

Marchantia polymorpha L., Sp. Pl.: 1137. 1753. [Marchantiaceae]. Faizabad (Kanaujia & Singh 1975). This report probably belongs to *Marchantia paleacea*.

Mannia indica (Steph.) Kachroo in J. Hattori Bot. Lab. 19: 4. 1958. *Grimaldia indica* Steph., Sp. Hepat. 6: 10. 1917. [Aytoniaceae]. Saharanpur (Stephani 1917 as *Grimaldia indica* Steph.).

Plagiochasma appendiculatum Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 4: 14. 1832. [Aytoniaceae]. Saharanpur (Kashyap 1929).

Plagiochasma cordatum Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 4: 13. 1832. [Aytoniaceae]. Saharanpur (Bischler 1979).

Reboulia hemisphaerica (L.) Raddi, Opusc. Sci. 2(6): 357. 1818. *Marchantia hemisphaerica* L., Sp. Pl.: 1138. 1753. [Aytoniaceae]. Meerut (Bapna & Kachroo 2000).

Riccia billardieri Mont. & Nees in Gottsche, Lindenberg & Nees, Syn. Hepat. 4: 602. 1846. [Ricciaceae]. Lucknow (Srivastava 1964), Gorakhpur (Sinha et al. 1990), Faizabad (Singh & Kumar 2003).

Riccia cavernosa Hoffm., Deutschl. Fl. 2: 95. 1796 emend. Raddi, Opusc. Sci. (Bologna) 12: 351. 1818. [Ricciaceae]. Lucknow, Banda (Kashyap 1929, Pande 1933 as *R. robusta*).

Riccia cruciata Kashyap in J. Bombay Nat. Hist. Soc. 24: 349. 1916. [Ricciaceae]. Gorakhpur (Sinha et al. 1990).

Riccia crystallina L., Sp. Pl.: 1138. 1753 emend. Raddi, Opusc. Sci. (Bologna) 12: 353. 1818. [Ricciaceae]. Gorakhpur (Sinha et al. 1990 also as *Riccia plana* Taylor).

Riccia cruciata Kashyap in J. Bombay Nat. Hist. Soc. 24: 349. 1916. [Ricciaceae]. Banda, Lucknow, Kanpur (Srivastava 1964), Gorakhpur (Sinha et al. 1990).

Riccia curtisii (James ex Austin) Austin in Bull. Torrey Bot. Club 6: 305. 1879. *Cryptocarpus curtisii* James ex Austin, Proc. Acad. Natl. Sci. Philadelphia 21: 231. 1870. [Ricciaceae]. Lucknow (Pande & Ahmad 1944, Srivastava 1964).

Riccia discolor Lehm. & Lindenb., in Lehm., Nov. Stirp. Pug. 4: 1. 1832. [Ricciaceae]. Lucknow (Srivastava 1964).

Riccia fluitans L., Sp. Pl.: 1139. 1753. [Ricciaceae]. Gorakhpur (Sinha et al. 1990).

Riccia frostii Austin in Bull. Torrey Bot. Club 6: 17. 1875. [Ricciaceae]. Banda, Allahabad (Kashyap 1929 as *R. sanguinea*), Dalmau (Kumar et al. 1987), Gorakhpur (Sinha et al. 1990), Raebareli (Singh et al. 2005a, b), Karma-Faizabad (Present record).

Riccia gangetica Ahmad in Curr. Sci. 11: 433. 1942. [Ricciaceae]. Lucknow, Unnao, Aligarh (Ahmad 1942), Gorakhpur (Sinha et al. 1990), Raebareli (Singh et al. 2005a).

Riccia grollei Udar in Curr. Sci. 34: 126. 1965. [Ricciaceae]. Unchahar, Raebareli, (Kumar & Kazmi 2004, 2006).

Riccia hirta (Austin) Underw. in Bot. Gaz. 19: 274. 1896. [Ricciaceae]. Gorakhpur (Sinha et al. 1990).

Riccia huebeneriana Lindenb., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 18:

504d. "1836" 1837. [**Ricciaceae**]. Gorakhpur (Sinha et al. 1990).

Riccia melanospora Kashyap, Liwerw. W. Himal. 1: 94. 1929. [**Ricciaceae**]. Lucknow (Srivastava 1964), Gorakhpur (Sinha et al. 1990).

Riccia perssonii S. A. Khan, Svensk Bot. Tidskr. 49: 433. 1955. [**Ricciaceae**]. Gorakhpur (Sahai & Sinha 1972).

Riella affinis Howe & Underw., Bull. Torrey Bot. Club. 30: 221. 1903. [**Riellaceae**]. Lake Latif Shah-Varanasi (Pande et al. 1954 as *Riella vishwanathii* Pande et al.).

Anthocerotophyta (Hornworts)

Anthoceros crispulus (Mont.) Douin, Rev. Bryol. 32: 27. 1905. [**Anthocerotaceae**]. Gorakhpur (Sahai 1962), Lucknow (Bapna & Kachroo 2000).

Anthoceros punctatus L. Sp. Pl.: 1139. 1753. [**Anthocerotaceae**]. Gorakhpur (Bapna & Kachroo 2000).

Notothylas indica Kashyap, Proc. Lahore Phill. Soc. 4: 54. 1925. [**Notothyladaceae**]. Allahabad, Lucknow (Singh 1995).

Bryophyta (Mosses)

Archidium birmannicum Mitt. ex Dix. J. Indian Bot. 2: 175. 1921. [**Archidiaceae**]. Allahabad (Lal 2007)

Archidium birmannicum Mitt. ex Dix. var. *pariharaii* J. Lal in Nat. Conf. Bryol. Symp. Rec. Adv. Bryol. Lucknow: 14-15. 1995. [**Archidiaceae**]. Allahabad (Lal 2007). This variety does not follow the rules of ICBN for valid publication and therefore its validation is required.

Barbula consanguinea (Thwaites & Mitt.) A. Jaeger, Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1877-78: 409. 1880. *Tortula consanguinea* Thwaites & Mitt., J. Linnean Soc., Bot. 13: 300. 1873. [**Pottiaceae**]. Unchahar, Raebareli (Kumar & Kazmi 2004, 2006).

Barbula constricta Mitt. in J. Proc. Linn. Soc., Bot., Suppl. 1: 33. 1859. [**Pottiaceae**]. Faizabad (Singh & Kumar 2003).

Barbula javanica Dozy et Molk., Ann. Sci. Nat., Bot., sér. 3, 2: 300. 1844. [**Pottiaceae**]. Allahabad, Jajmau, Raebareli (Singh et al. 2005a, Lal 2007).

Bryum klinggraeffii Schimp. in Klinggr., Höh. Crypt. Preuss. 81. 1858. [**Bryaceae**]. Allahabad (Lal 2007).

Ceratodon purpureus (Hedw.) Brid., Bryol. Univ. 1: 480. 1826. *Dicranum purpureum* Hedw., Sp. Musc. Frond. 136. 36. 1801. [**Ditrichaceae**]. Raebareli (Lal 2007).

Ceratodon stenocarpus Bruch & Schimp. in B. S. G. Bryol. Eur. 2: 146 (fasc. 29/30. Mon. 4). 1849. [**Ditrichaceae**]. Unchahar, Raebareli (Kumar & Kazmi 2004, 2006, Singh et al. 2005a).

Erpodium mangiferae Müll. Hal., Linnaea 37: 178. 1873. [**Erpodiaceae**]. Allahabad, Saharanpur (Lal 2007).

Fissidens curvatoinvolutus Dixon, Notes Roy. Bot. Gard. Edinburgh 19: 279. 1938. [**Fissidentaceae**]. Dalmu, Raebareli, Saharanpur (Singh et al. 2005a; Lal 2007).

Funaria hygrometrica Hedw., Sp. Musc. Frond. 172. 1801. [**Funariaceae**]. Unchahar, Raebareli (Singh et al. 2005a; Kumar & Kazmi 2006).

Gymnostomiella vernicosa (Hook. ex Harv.) M. Fleisch., Musci Buitenzorg 1: 310. 53. 1904. *Gymnostomum vernicosum* Hook. ex Harv. Icon. Pl. 1: pl. 17. f. 4. 1836. [**Splachnaceae**]. Allahabad (Lal 2007).

Hyophila involuta (Hook.) A. Jaeger, Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1871-72: 354. 1873. *Gymnostomum involutum* Hook., Musci Exot. 2: 154. 1819. [**Pottiaceae**]. Lucknow, Allahabad (Lal 2007, Nath et al. 2010).

Hyophila rosea R. S. Williams in Bull. New York Bot. Gard. 8: 341. 1914. [**Pottiaceae**]. Allahabad (Lal 2007).

Hyophila spathulata (Harv.) A. Jaeger, Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1871-72: 353. 1873. *Gymnostomum spathulatum* Harv. Icon. Pl. 1: pl. 17: f. 1. 1836. [**Pottiaceae**]. Allahabad (Lal 2007).

Physcomitrium coorgense Broth., Rec. Bot. Surv. India 1: 319. 1899. [Funariaceae]. Allahabad (Lal 2007).

Physcomitrium cyathicarpum Mitt., J. Proc. Linn. Soc., Bot. Suppl. 1: 54. 1859. [Funariaceae]. Allahabad (Lal 2007).

Physcomitrium eurystomum Sendtn, Denkschr. Bayer. Bot. Ges. Regensburg 3: 142. 1841. [Funariaceae]. Allahabad (Lal 2007).

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Physcomitrium japonicum (Hedw.) Mitt. in Trans. Linn. Soc. Bot. London 3: 164. 1891. *Gymnostomum japonicum* Hedw., Sp. Musc. Frond. 34. 1 f. 7-9. 1801. [Funariaceae]. Gorakhpur, Shuklaganj, Kalakankar, Unchahar, Raebareli (Singh et al. 2005a, b, Kumar & Kazmi 2006; Lal 2007).

Semibarbula orientalis (F. Weber) Wijk & Margad. Taxon 8: 75. 1959. *Trichostomum orientale* F. Weber Arch. Syst. Naturgesch. 1(1): 129. 4 f. 6. 1804. [Pottiaceae]. Lucknow (Nath et al. 2010).

Splachnobryum indicum Hampe & Müll. Hal., Linnaea 37: 174. 1873. [Splachnaceae]. Allahabad (Lal 2007).

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Trematodon capillifolius Müll. Hal. ex G. Roth, Aussereur. Laubm. 296. 28 f. 3. 1911. [Dicranaceae]. Raebareli (Singh et al. 2005a).

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