

STATUS OF BRYOPHYTES IN RAJASTHAN-A REVIEW

Hemlata Ojha

Associate Professor, Department of Botany, Government College, Barmer (Rajasthan)

Abstract

Bryophytes are a proposed taxonomic division containing three groups of non-vascular land plants (embryophytes): the liverworts, hornworts and mosses. They are characteristically limited in size and prefer moist habitats although they can survive in drier environments. The bryophytes consist of about 20,000 plant species. Bryophytes produce enclosed reproductive structures (gametangia and sporangia), but they do not produce flowers or seeds. They reproduce sexually by spores and asexually by fragmentation or the production of gemmae.

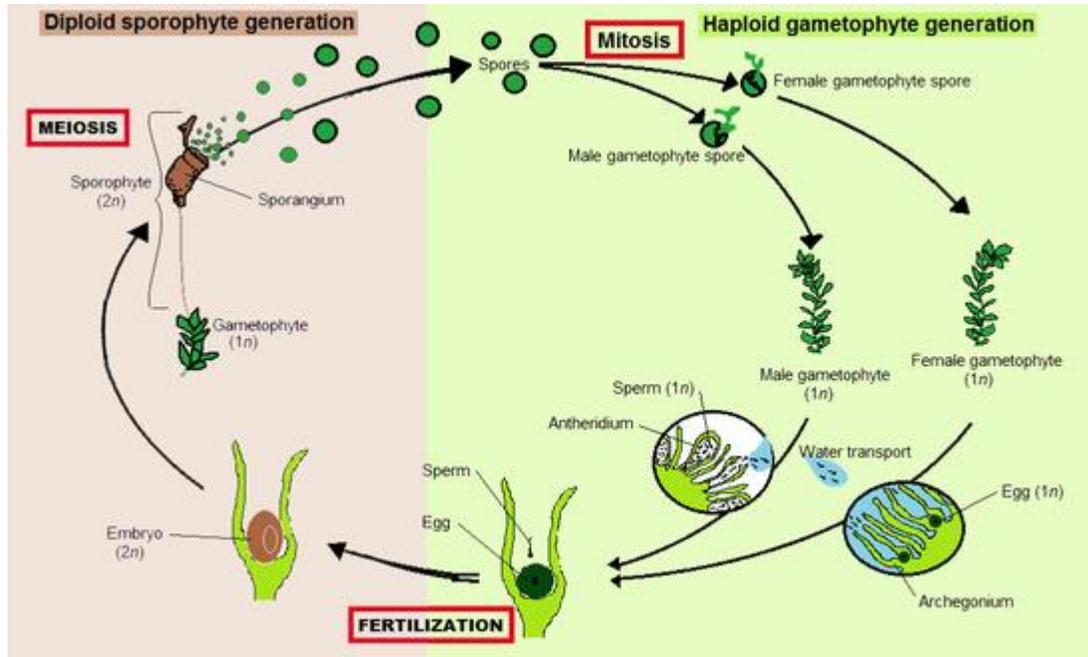
In case of bryophytes in Rajasthan, on the basis of compilation of earlier reports and results of fresh exploration, the present work provides a list of 113 bryophyte taxa from Mount Abu, Rajasthan including 24 taxa as new to the Mount Abu area. Out of these, 14 are new records to Rajasthan state, while 07 taxa are new to Central Indian bryo-geographical region. Bryophytes are most abundant and conspicuous in moist habitats, but are also found in grasslands and deserts where they endure prolonged dry periods. Number of Bryophyte species like *Funaria hygrometrica*, *Marcantia palmata*, *Riccia robusta* are collected from Thar desert of Rajasthan particular from Ganganagar district for the studies on morphological and anatomical adaptation. These studies reveal the anatomical adaptations of bryophytes to xeric conditions (like presence of tufts of tough rhizoids and longer rhizoids etc.). The study was carried out through section cutting using rotary microtome. Different photographs of these sections have been taken from microscope with the help of digital camera.

Keywords: moss, bryophytes, flora, rajasthan, areas, xeric, desert, taxa, rhizoids, adaptation

Introduction

The checklist of the bryophytes of India reports total 2489 taxa of bryophytes from India, comprising 1786 species in 355 genera of mosses, 675 species in 121 genera of liverworts and 25 species in six genera of hornworts. A total of 31 Species of bryophytes including 20 liverworts, 2 hornworts and 9 mosses under 17 family and 22 genera are reported here for the first time from the Bothamalai hills in the Eastern Ghats of India. In this checklist of Kerala, a total of 465 bryophyte taxa are accepted, comprising 148 taxa of liverworts, 10 taxa of hornworts and 307 taxa of mosses. Western Ghats (includes Nilgiris, Anamalais, Palnis and Agasthyamalai) and the Eastern Ghats (includes Shervaroyis) bryogeographical regions studied by Daniels in 2010. A checklist by him reports 712 taxa of bryophytes from Tamil Nadu, India, comprising 211 taxa in 56 genera and 32 families of liverworts, 8 taxa in 4 genera and 2 families of hornworts, and 493 taxa in 189 genera and 44 families of mosses. All workers have insisted that enough focus has not been given to study the bryoflora in India. They have so far been ignored for many reason especially their relatively less economic

value. But recent studies have proven that they could be the resource of many phytochemical and pharmaceutical compounds.[1,2]



The life cycle of bryophyte

The present study is a report based on survey of bryophytes of Rajasthan mainly in the district of Ganganagar, Jhalawar, Mount Abu, Jhalore, Jaipur etc.. Regular and periodical visits to different habitat were made during these years of intensive survey. Numbers of species of bryophytes like *Funaria hygrometrica*, *Marchantia palmata*, *Riccia robusta* were found to complete their life cycle here. Both gametophytic and sporophytic phases of life cycle of these species were collected successfully from the bank of lakes etc. during the months of February- March, August-September-October etc. for Morphological and anatomical Studies. It is observed that due to embankment of lakes and distributaries, mosses were unable to grow and anchor themselves to the substratum. Hence in these lakes, no or little growth of bryophytes was observed. Few bryophytes that grow in this region is a result of growth and germination of spores, Gemmae coming with water and it was possible due to onset of initiation of lake or pond. [3,4]



Riccia

The Bryophytes especially mosses travelled a long journey through these canals and river system and got introduced into a new environment of Thar desert of District Ganganagar.



Marchantia with gemma cups

The ponds and its adjoining moist areas along with reservoirs and ponds in monsoonal season serve as a major site for the flourished growth of bryophytes. The vegetative structure of bryophytes is completely adapted to land habit. However, they still rely upon water for sexual reproduction because the swimming habit is retained by their sperms. The plant body is thalloid; it lacks the true roots, stems or leaves. It is relatively simple in the lower forms and still reminds of the thallus of an alga. It grows prostrate on the ground (*Riccia robusta*) or on the banks of river or canals and is attached to the substratum by delicate, unbranched, unicellular hair like organs called rhizoids. In the higher bryophytes (mosses) the plant body is erect (*Funaria hygrometrica*). [5,6]



Funaria hygrometrica

It consists of central axis which bears leaf like extensions. It is attached to substratum by branched, multicellular rhizoids. Like the thallophytes, most conspicuous phase in the life cycle is gametophyte. It is independent and concerned with sexual reproduction. Anatomically bryophytes lack vascular tissue (xylem and phloem) but they have hydroids with similar functions as the tracheids of higher plants and moss leptoids are similar enough to sieve cells .[7,8]



Sphagnum



Golden Bog-Moss (*Sphagnum pulchrum*)

Discussion

The present checklist of moss flora of Rajasthan altogether has revealed the occurrence of 46 species of mosses which are belonging to 5 orders; 12 families and 30 genera. Out of these 44 retained their valid status, while 2 previously reported species come under the doubtful category i.e. unresolved name. Whereas, *Anoetangium clarum*, *Brachymerium indicum*, *Bryum uliginosum*, *Entodon plicatus*, *Entodon concinnus*, *Fissidens sylvaticus* var. *taraicola*, *Fissidens sylvaticus* var. *auriculatus*, *Hyophila spathulata*, *Plagiothecium cavifolium* and *Stereophyllum tavoyense*, *Polytrichum* have been reported new from the region. This great diversity of mosses here confirms the potential of Rajasthan in terms of bryodiversity particularly of mosses. Hence more explorations are required to this dessert region.[9,10]



Polytrichum

Conclusion

Bryophyte are used as indicator species, erosion control, bioindicators of heavy metals in air pollution, aquatic bioindicators, radioactivity indicators, as material for seed beds, fuel, medicines and food sources, pesticides, nitrogen fixation, moss gardening, treatment of waste, construction, clothing, furnishing. Some of the bryophytes species that are used in hepatic disorder are *Frullania tamarisci*, *Reboulia hemisphaerica*, *Conocephalum conicum*, *Marchantia polymorpha* and mosses *Sphagnum* spp., *Weissia controversa*, *Funaria hygrometrica*, *Bryum argenteum*, *Rhodobryum roseum*, *Climacium dendroides* and *Polytrichum commune*. The peat moss species *Sphagnum teres* is very popular to treat various eye diseases. Currently, scientific research on medicinal use of bryophytes is being carried out in most pharmaceutical laboratories, research institutes and universities. The current research is going on the active ingredients of medicinal bryophytes are used in curing diseases such as hepatic disorders, skin diseases, cardiovascular diseases, and many more other ailments. Another area of research is directed towards the discovery of new kinds of drugs from the medicinal bryophytes

which have not been explored so far. The drugs obtained from the traditional medicine, like Ayurveda, Unani and Siddha system need to be further evaluated and validated more scientifically.

References

1. ASTHANA A. K. AND S. C. SRIVASTAVA 1991. Indian Hornworts (A taxonomic study). Bryophytorum Bibliotheca Band 42: 1-158.
2. ALAM A., S. PANDEY, V. SINGH, S.C. SHARMA AND V. SHARMA 2014. Moss flora of Mount Abu (Rajasthan), India: An updated checklist. Tropical Plant Research 1(1): 8-13.
3. ALAM A., K.K. RAWAT, P.K. VERMA, V. SHARMA AND D.S. GUPTA 2015. Moss flora of Central India. Plant Science Today 2(4): 159-171. <http://dx.doi.org/10.14719/pst.2015.2.4.126>.
4. AZIZ N.M. AND J.N. VOHRA 2008. Pottiaceae (Musci) in India. Bishen Singh Mahendra Pal Singh, Dehradun, India, 366 pp.
5. BANSAL P. AND V.NATH 2014. Present status of genus Bryum Hedw. (Bryophyta) in Rajasthan, India. GJournal of Environmental Science & Technology 1(6): 118-122. <http://www.gjestenv.com>.
6. BANSAL P., V. NATH AND N.PANDE 2012. Bryum dunense Smith et Whitehouse (Bryophyta: Bryaceae): New to Central India. Proc. Natl. Acad. Sci. India, Sect. B. Biol. Sci. 82(3): 453-454.
7. BAPNA K.R. 1958. A note on hepatic flora of Mt. Abu. Curr. Sci. 7: 259-260.
8. BAPNA K.R. 1962. A new species of Riccia from Mount Abu (India). Trans. British Bryol. Soc. 4: 249-253.
9. BAPNA K.R. 1965. A note on the hepatics of Udaipur. Sci. & Cult. 32: 526.
10. BAPNA K. R. 1980. Occurrence of Fissidens Hedw. in Rajasthan. J. Indian Bot. Soc. 59: 20-26.