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A SURVEY OF MOSS FLORA FROM PONMUDI HILLS

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Bryophytes are one among the plant groups which attain lesser attention in Kerala irrespective of its abundance and diversity. The present work was undertaken with the objective of surveying the moss flora along the hill station, Ponmudi. Ponmudi represents snow clad region of Western Ghats mountain ranges that run parallel to Arabian Sea. It has a tropical climate with a diversity of vegetation include grass lands, shola forest, evergreen and deciduous forest. Taxonomic survey was carried to identify the mosses seasonally. The present study reports 29 species of mosses, belonging to 13 genera and 9 families.

Keywords: Bryophytes; Mosses; Ponmudi; Survey.

Introduction

Mosses are unique among land plants in that gametophytic generation is photosynthetically dominant with the sporophyte permanently attached to and particularly parasitic up on the gametophyte. The developments of moss protonema with the subsequent differentiation of buds are regulated by a variety of environmental factors[1]. Their abundance often reveals unpolluted environment[2-7]. Mosses, which are the pioneers in soil formation possess a high range of adaptabilities in adverse climatic conditions[8]. Eventhough they are small in size, which are often becomes gregarious forming tufts[9]. Moss diversity is highly correlated with the diversity of angiosperms of forests, which provide a wide range of habitats to colonise[10]. Inspite of the richness of moss flora in India, this fascinating group of plants has not attracted the attention of research workers.

Ponmudi (The Golden Peak) is a hill station, perched at an altitude of 916 m above the sea level on the snow clad region of Western Ghats. The average elevation is 16 ft. from the sea level. It is a part of the Western Ghats mountain ranges that run parallel to Arabian Sea. It has a tropical climate. The mean maximum temperature 34°C and the mean minimum temperature is 21°C. The humidity is high and rises to about 90% during the monsoon season. It is located at 8.5° N 76.9° E on the west coast, near the southern tip of mainland India. Ponmudi is blessed with grasslands, shola, evergreen and deciduous forest. Kallar region which comes under the area of Ponmudi is also rich in mosses, inhabiting on rocks, soil, tree trunks, bark, rotten logs and leaves. The diversity of the moss flora along this belt was poorly documented.

In the present study an attempt was made to the taxonomy of moss flora in Ponmudi and could be useful as a guide for future reference. Vegetation and climate here is quite favourable for the growth and distribution of a large number of mosses.

Material and Methods

Systematic collections of Mosses were made from the study area from October 2007 onwards, by conducting regular field trips to Ponmudi in different seasons. Terrestrial and epiphytic species were collected. The high canopy species which were not easily accessible were collected from the fallen branches[11]. Corticolous and lithophytes species which were strongly attached to the substratum were collected with a portion of the bark and rock, respectively[12]. The identification of samples was carried out using various flora and monographs. The field data were recorded in the field book such as collection dates, collection number, altitude and habitat. All specimens were investigated taxonomically by morphological and anatomical characters.

Results and Discussion

Taxonomic Descriptions

BRYOPSIDA

POLYTRICHACEAE

Pogonatum P. Beauv

1. *Pogonatum microstomum* (Schwaegr.) Brid.

Small to robust plants, seta long and smooth, erect or inclined capsule, calyptra hairy. Seen along soil cuttings in grasslands, sometimes mixed with other mosses in semi evergreen, evergreen forests and grassland area. The

species was collected from the Kallar region and hill top in the study area and has a wide distribution in this area.

DICRANACEAE

Campylopus Brid.

2. *Campylopus ericoides*(Griff.)A.Jaeger- Robust glossy yellowish- brown plants, stem lacks central strand, seta reddish brown, alar cells colorless, ovate-cylindrical capsule. Seen on rocky patches along with Bryum and also on soil cuttings in grass lands. It is commonly seen in the second hair pin turn of Ponmudi hill and also reported widely in South India.

3. *C. flexosus* (Hedw.) Brid- Dark to olive green plants, seta inflexed, alar cells brownish, capsule reddish brown. Seen on rocks and soils in grasslands. This is a cosmopolitan species mostly occurring in high altitude areas. It is reported earlier from South India, Eravikulam National Park in Kerala.

Trematodon Michx.

4. *Trematodon longicollis* Michx - Yellowish-green plants, seta long, prominent, long and cylindrical apophysis, yellowish brown capsule. Seen on soil cuttings in evergreen forests. It is a cosmopolitan species distributed in South India.

FISSIDENTACEAE

Fissidens Hedw.

5. *Fissidens ceylonensis* Dozy&Molk - Yellowish-green plants, folded and curled leaves, seta small, brownish to red, capsule erect with orange calyptra. It is common in rocks and stones, brick walls and on exposed roots of trees and in homestead areas. It is a widely distributed species common in South India.

6. *F. zollingeri* Montin-Small, green plants, large leaves with one cell thickness in margin, terminal seta, erect and symmetrical capsule. Densely tufted and growing on moist soil and rocks. It is common in the Kallar regions.

7. *F. subbryoides* Gangulee-Very small plants, reddish-brown stem, narrow leaves, seta long and light brown in colour, capsule cylindrical with oblique operculum. Growing together with F. virens at Ponmudi hills.

8. *F. virens* Thwait. Ex Mitt - Very small plants, crowded leaves, leaf margin crenulated, seta apical, capsule cylindrical to ovate. Mostly epiphytic, rarely growing on soil and rocks. It is rare in the study area.

9. *F. splachnobryoides* Broth. - Plants robust, gregarious, dull yellowish green leaves contorted when dry, gemmae axillary and septate. Grows luxuriantly in July- August on moist soil or rocks. It is common in the study area.

10. F. *crispulus* Brid - Minute plants, prominent central strand, sheathing lamina unequal, costa excurrent.It is seen in shady areas and soils. Common in Kallar regions.

11. *F. crenulatus* Mitt-Small plants, yellowish green, leaves curled when dry, semilimbidium absent, seta orange-brown, capsule ovoid, erect, brown. Growing on soil and rotten wood. It is common in the study area.

12. *F. walkeri* Broth - Plants small, blackish-green, nerve precurrent, seta smooth, erect, capsule symmetrical, narrow at base. Growing on moist red laterite soil. It is most common in Ponmudi hills.

13. *F. minutus* Thwait - Plants very small, leaves oblong lingulate, nerve sub precurrent, sporophyte not seen. Growing on the bark of *Mangifera indica*. It is so common throughout Ponmudi.

FUNARIACEAE

Funaria Hedw.

14. *Funaria hygrometrica* Hedw - Plants loosely or closely tufted, leaves yellowish-green, nerve precurrent, seta long, reddish, capsule asymmetrical, reddish-brown, wide mouthed and pyriform. It is very common at different places of Ponmudi hills.

Entosthodon Schwaegr.

15. *Entosthodon wichurae* M. Ftesich - Plants gregarious, green, small, crowded leaves, seta apical, capsule erect to inclined, calyptra cucullate. It is a common species in moist grounds of Ponmudi.

BRYACEAE Schwaegr.

Rhodobryum (Schimp.) Limpr.

16. *Rhodobryum giganteum* (Schwaegr.) - Large and robust plants, greenish-brown, crowded leaves at apex, costa strong, excurrent, seta long, capsule pendulous. It is very common in the study area and confined to top of Ponmuid hills.

Bryum Hedw.

17. *Bryum argenteum* Hedw - Plants silvery white coloured, crowded leaves, nerve precurrent, seta apical, red and erect, capsule red, pendulous. Seen as dense cushion on bricks and stones. This "silver thread moss" is cosmopolitan in distribution in the study area.

18. *B. coronatum* Schwaegr - Dull yellowish-green plants, leaves contorted when dry, nerve excurrent, seta apical, erect and reddish, capsule pear shaped and pendulous. Very common on rocks and on calcareous walls of old buildings. It is common throughout the study area along the hairpin turns of Ponmudi.

19. *B. wightii* Mitti - Densely tufted, large, yellowish-green plants, leaves oblong-ovate, nerve excurrent, sporophyte not seen. Forming lax carpets on rocks on way to Ponmudi hill top.

20. *B.cellulare* Hook - Plants light greenish to brown, leaves closely overlapping, costa prominent, seta erect, capsule globose and pendulous. It is a cosmopolitan

species seen in soil and on rocks.

21. *B. pseudotriquertrum* (Hedw.) Schwaegr - Plants greenish- red, crowded leaves, seta reddish-brown, capsule elongated, cylindrical and pendulous. Seen on soil, rocks and barks of trees.

MNIACEAE Schwaegr.

Mnium Hedw.

22. *Mnium rostratum* Schrad - Robust yellowish-green plants, leaves contorted when dry, seta strong, reddish, capsule pendulous at maturity. It is very common in the study area, forming loose mats on soil, rocks and barks of trees.

BARTRAMIACEAE

Philonotis Brid.

23. *Philonotis fontana* (Hedw.) Brid- Yellowish-green plants, leaves lanceolate, costa strong, seta apical, capsule globose, erect or horizontal.It is very rare in the study area, seen on soil patches.

24. *P. thwaitesii* Mitt - Robust, yellowish-green plants, in dense tufts, crowded leaves, seta apical, erect, capsule erect to horizontal. It is widely distributed in the study area, on moist rocks and soil.

25. *P. hastata* (Duby) Wijk & Marg - Small plants, long and lanceolate leaves, nerve precurrent, costa precurrent, sporophyte not seen. Common species growing on rocks, soil and barks of trees.

26. *P. secunda* (Dozy & Molk.) Bosch & Sande-Lac.- Slender plants, tufted with brown tomentum, leave second, nerve long, excurrent sporophyte not seen. It is a cosmopolitan species in the study area, seen on rocks and soil patches.

RACOPILACEAE

Racopilum P.Beauv

27. *Racopilum cuspidigerum* (Schwaegr.) Angstr - Greenish glossy plants, prostrate, leaves oblong-ovate, seta long, erect, capsule horizontal to inclined. Sporophyte is not seen. It is very rare in this study area, occurring on rocks and sandy soils.

28. *R. orthocarpum* Wils. & Mitt. - Olive green and gloosy plants, costa prominent and excurrent, seta erect, spirally twisted when dry, capsule erect and cylindrical. It is a common species found throughout the study area on logs, barks of trees, bare rocks and soils.

ENTODONTACEAE

Entodon C. Muell

29. *Entodon flavescence* (Hook.) A Jaeger - Dark greenish, glossy and robust plants, leaves lanceolate and triangular, seta erect, yellowish orange, capsule erect to horizontal. It is widely distributed in shady and moist regions of Ponmudi, on rocks and rotten logs.

The present study report 29 species of mosses, belonging to 13 genera and 9 families from the Ponmudi hill station. Species such as *Fissidens virens, Philonotis fontana, Racopilum cuspidigerum* are some of the rarest found in this area. Based on the observations made during the field trips, apocarpous mosses are capable of surviving during arid conditions inspite of exposure to constant effects of sunlight and wind. On the other hand, pleurocarpous mosses were observed to be dominant in the habitats where water is abundant and the air is relatively humid. The maximum diversity of species seen in medium altitude[13-14]. This may be due to the mixing of low and high altitude species in the mid altitude zone.

As evident from the above data, Ponmudi hills reveal its bryological potentials. It opens new areas for studies related to the phytochemistry, biochemical, and molecular characterization of bryophytes[15] .The lack of literature is the main hurdle behind bryological research. The present study may fill this lacuna to certain extent and could lead to more exploration on bryophytes.

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