MOSS FLORA OF THE BANKS OF RIVER GANGA BETWEEN SHUKLAGANJ (UNNAO) AND KALAKANKAR (PRATAPGARH)

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Abstract

Morphotaxonomic characteristics and ecological distribution of five moss species, viz., *Trematodon capillifolius* C. Muell. ex. Roth, *Physcomitrium indicum* Dix. Gangulee, *P. japonicum* (Hedw.) Mitt., *Hydrogonium consanguineum* (Thw. et Mitt.) Hilp. and *Fissidens curvatoinvolutus* Dix. belonging to Polytrichales and Bryales collected from various selected sites of the banks of river Ganga between Shuklaganj (Unnao) and Kalakankar (Pratapgarh) in Uttar Pradesh have been studied. It was observed that the distribution and density of various species varied from site to site in the stretch of the river.

Introduction

Mosses constitute the simplest and the most primitive land plants whose ecological importance is being gradually recognised. Although a number of mosses have been reported from higher altitude of Indian hills (Herzog, 1939; Dixon, 1942), very few of them are known from the plains (Chopra, 1960; Chopra & Kumar, 1981). Only one moss species *Funaria hygrometrica* has been reported from Ganga banks (Pandey *et al.*, 1986). During a survey of the banks of river Ganga between Shuklaganj (Unnao) and Kalakankar (Pratapgarh) in Uttar Pradesh, five moss species were collected. Since these were collected for the first time from the banks of river Ganga their morphotaxonomic characteristics, ecological distribution and population density were studied and the observations are embodied in this paper.

Material and methods

Eleven selected sites between Shuklaganj (Unnao) and Kalakankar (Pratapgarh) in Uttar Pradesh were regularly serveyed and moss specimens collected brought to the laboratory, washed to remove adherent soil, dried and preserved in packets. The identification was done with the help of standard texts and confirmed at Botanical Survey of India, Dehradun. While morphotaxonomic studies were carried out on fresh materials, their population density and ecological distribution were also studied visibly.

Observations

Five moss species identified and studied are: *Trematodon capillifolius* C. Muell ex. Roth., *Physcomitrium indicum* (Dix.) Gangulee, *P. japonicum* (Hedw.) Mitt., *Hydrogonium consanguineum* (Thw. et Mitt.) Hilp., and *Fissidens curvato-involutus* Dix. Of these, *Hydrogonium consanguineum* belongs to order Polytrichales while the remaining species belong to the Order Bryales. A short morphological description of each species is given below.

Trematodon capillifolius C. Muell ex Roth.

Plants erect green, gametophyte 2-3 mm long; stem 0.12 mm in diameter; rhizoids few, present at the base of the stem, 12-40 μm in diameter, branched, septate with oblique septa; bunch of leaves arising from the base; leaves lanceolate, ovate, apex acute, 0.25 to 0.30 mm broad, 0.80 to 0.95 mm long, whorled, margin entire, midrib 5-7 cells wide, cells more or less rectangular, inflorescence terminal; archegonia about 5 in number, 0.3-0.5 mm long, venter 0.12 to

Table 1—Distribution and population density of moss species at various selected sites

Name of Species	Name of Site										
	Shukla-ganj	Jajmau	Jajmau Pumping Station	Chander-pur	Buxer	Ralpur	Gagasso	Dalmau	Gokana	Arkha	Kalakan-kar
Trematodon capillifolius (C. Muell Ex Roth.)	+	+	—	+	+	++	++	+++	—	+++	—
Physcomitrium indicum (Dix.) Gangulee	+++	+	—	—	++	—	+++	++	—	++	++
Physcomitrium japonicum (Hedw.) Mitt.	+++	+	—	—	++	—	+++	++	—	++	++
Hydrogonium eonsanguineum (Thw. et Mitt.) Hilp.	—	++	+++	++	—	—	+++	+	—	—	—
Fissidens curvato-involutus Dix.	—	—	+	—	—	—	++	+++	—	—	—

— = Absent; + = Rare; ++ = Frequent; +++ = Abundant

in number, flask-shaped, venter 0.025 mm wide, neck 0.24-0.26 mm long; sporophyte consists of foot, seta and capsule; seta 4-5 mm long and 0.14-0.15 mm in diameter; apophysis slightly bent at apex; calyptra dome-shaped; peristome consists of single row of teeth, 12 pairs, split half-way down.

Specimens examined—ERC 33/86, Loc: Dalmau, Date: April 15, 1986; ERC 34/86, Loc: Gagasso, Date: May 14, 1986; Coll.: D. C. Pandey; Det.: D. C. Pandey, A. Kumar, A. K. Sinha and Anupama Sinha.

Distribution and population density of the above species at different sites have been shown in Table 1. It is apparent that their distribution and density vary from site to site. It is interesting to note that all the species have been collected from Gagasso and Dalmau while none from Gokana. *F. curvato-involulus* was found abundantly growing at Dalmau, frequently growing at Gagasso and rarely at Jajmau Pamping Station. Similarly *T. capillifolius* generally growing on the moist plain ground near the bank of the river, was found abundantly at Dalmau and Arkha forming a belt. However, it was found growing frequently at Ralpur and Gagasso and rare at Shuklaganj, Jajmau, Chanderpur and Buxer. *P. japonicum* and *P. indicum* both have been found in association at various sites. Mostly they are restricted to polluted places near nullah and tanneries. They are abundant at Shuklaganj and Gagasso, frequent at Buxer, Dalmau, Arkha and Kalakankar and rare at Jajmau. *H. consanguineum* was collected from the walls of sewage nullah in abundance at Jajmau Pumping Station and Gagasso whereas frequent at Jajmau and Chanderpur and rare at Dalmau.

Discussion

The physico-chemical characteristics of Ganga water between Shuklaganj (Unnao) and Kalakankar (Pratapgarh) in Uttar Pradesh has been studied by Sinha (1988). On the basis of water quality, various sites have been classified as heavily polluted, moderately polluted and least polluted. Pandey *et al.* (1986), who initiated a survey of the bryophytes along the river Ganga between Shuklaganj (Unnao) and Kalakankar (Pratapgarh) have concluded that the Hepatics were affected by the water quality. Present observations clearly show that the water quality of the river also governs the distribution and population density of mosses. Although *Trematodon* sp. was found growing mostly at all the sites, its abundance was recorded at moderately polluted sites, while it is rare polluted sites. Contrary to it, both the species of *Physcomitrium* were found on highly polluted as well as on the cleaner sites. *Fissidens* sp. was restricted to moderately polluted sites but its presence was rare at highly polluted Jajmau Pumping Station. *Hydrogonium* sp. was mostly confined to the highly polluted sites but their presence was also observed on cleaner sites. Our observations support those of Cooke (1953) who concluded that sewage supports luxuriant growth of mosses.

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