

Selaginella miniatospora (Dalz.) Bak. (Selaginellaceae) - a new record for Northeast India

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Selaginella miniatospora (Dalz.) Bak. (Selaginellaceae) a little known taxon among the allied ferns, has been record for the first time from Assam as well as from northeast India.

INTRODUCTION

Northeastern region is at the conjunction of the Eastern Himalayan and Indo-Burma biodiversity hotspots which is regarded as a major center of biodiversity and one of the hotspots of Pteridophyte diversity. The region also a meeting place of flora of the Himalayas and Peninsular India and represents the transition zone of the Indian, Indo-Malayan and Indo-Chinese biogeographic regions. Assam is one of the eight states of Northeastern India with rich pteridophytic flora which has distinctiveness on account of their species diversity and peculiar formations (Bir *et al.*, 1989). In spite of this, fern-allies of the state have not been studied in detail so far, except a few sporadic works (Alston, 1945; Barua *et al.*, 1989; Bhattacharya *et al.* 1995; Bir *et al.*, 1992; Dixit 1992; Dutta *et al.*, 1980; Handique and Konger 1986; Islam 1983; Nath and Bhattacharya, 2002; Panigrahi, 1960; Thakur 1962). During the course of on going studies on Fern-allies of Assam, the authors collected some specimens of *Selaginella* Beauve from Nagaon and Kamrup districts of the state and later identified as *Selaginella miniatospora* (Dalz.) Bak. Careful scrutiny of relevant literatures (Alston, 1945; Baishya and Rao, 1982; Barua *et al.*, 1989; Bhattacharya *et al.*, 1995; Bhattacharya *et al.*, 1998; Bir, 1976, 1987, 1993; Bir *et al.*, 1992, 1989; Borthakur *et al.*, 2001; Dixit, 1984, 1992; Dixit and Vohra, 1984; Dutta *et al.*, 1980; Fraser-Jenkins, 2008; Handique and Konger, 1986; Islam, 1983; Jain, 1991; Kachroo *et al.*, 1989; Kaur and Chandra, 1994; Manickam and Irudayaraj, 1992; Mukhopadhyay, 2001; Nath and Bhattacharya, 2002; Panigrahi, 1960; Panigrahi and Choudhury, 1962; Panigrahi and Dixit, 1967; 1967a, 1968; Singh and Panigrahi, 2005; Thakur, 1962; Fraser-Jenkins, 2008) revealed that the species has never been reported before from any of the Northeastern states of India and hence the occurrence of *Selaginella miniatospora* (Dalz.) Bak. in Sapanala area of Nagaon district and Rani Reserve forest of Kamrup district in Assam has been recorded for the first time from Assam as well as from northeastern India. A brief description of both morphological and anatomical attributes of the species along with photographs are provided here. The collected specimens were processed as per standard herbarium techniques following (Jain and

Rao, 1977) and have been deposited in the Herbarium of Botany Department, Gauhati University (GUBH).

Selaginella miniatospora (Dalz.) Bak., Journ. Bot. 23: 249. 1885; Handb., Fern Allies, 115. 1887; Alston, Proc. Nat. Inst. Sci. India 11. 227. 1943; Reed, Mém. Soc. Brotér. 18: 157. 1966; Dixit, Selaginell. India: 99, Plate LX, Figure 61A -H. 1992. *Lycopodium miniatosporum* Dalz. in Hook. Journ. Bot. 4: 114. 1852.

Plant body *ca.* 5-20 cm, terrestrial, semi-erect, found growing on the forest floor or on the inclined bases of hills or on the humus deposits on the rock



Plate I. Figures (A. Habit, B1-B2. Leaf arrangement, C. Axillary leaf, D1-D2. Lateral leaf, E1-E2. Median leaf, F. Ligule, G. Strobilli, H. Larger sporophyll, I1-I2. Smaller sporophyll, J. Microspore, K. Megaspore).

surface (Figure A). Light green young plants become pale-green to pale-brown at maturity. Primary stem is copiously-branched and the branches are erecto-patent (Figure B1). Rhizophores born and remain confined at the base of the primary stem. Vegetative leaves dimorphic, light green, distantly placed on the primary stem and branches exception at terminal position, denticulate, denticules minute and occur distantly; axillary leaves *ca.* 2.5-3x1.50-2mm, ovate, cordate, obtuse, entire, prominent mid-vein extends from the base to nearly apex (Figure C); lateral leaves *ca.* 2.5-3x1-1.25mm, ovate-oblong, obliquely-cordate at base and obtuse, inner-half of leaves semi-ovate, imbricated at base, outer-half of leaves semi-oblong (Figure D1 and D2); median leaves *ca.* 1-1.25x0.41-0.5mm, very small in comparison to other vegetative leaves, ovate, denticulate, cuspidate, apex acute (Figure E1 and E2). Ligule thin, membranous and lanceolate (Figure F). Strobilli *ca.* 5-7.5x2-2.5mm, one or two at branch apices (Figure G). Sporophylls dimorphic; larger sporophylls (Figure H) *ca.* 1.75-2x0.4-0.5mm, lanceolate-rhomboid, minutely but regularly dentate, an extra membranous structure called laminar flap develop from the base of the sporophyll and extends to one third of its length; smaller sporophylls *ca.* 0.5-0.85x0.35-0.41mm, semi-orbicular, cuspidate and uniformly dentate from the upper half of the leaf to apex (Figure I1 and I2). Microspore 20-30 μ m, deep-yellow, verrucoid, trilete (Figure J). Megaspore 180-225 μ m, deep-yellow (Figure K).

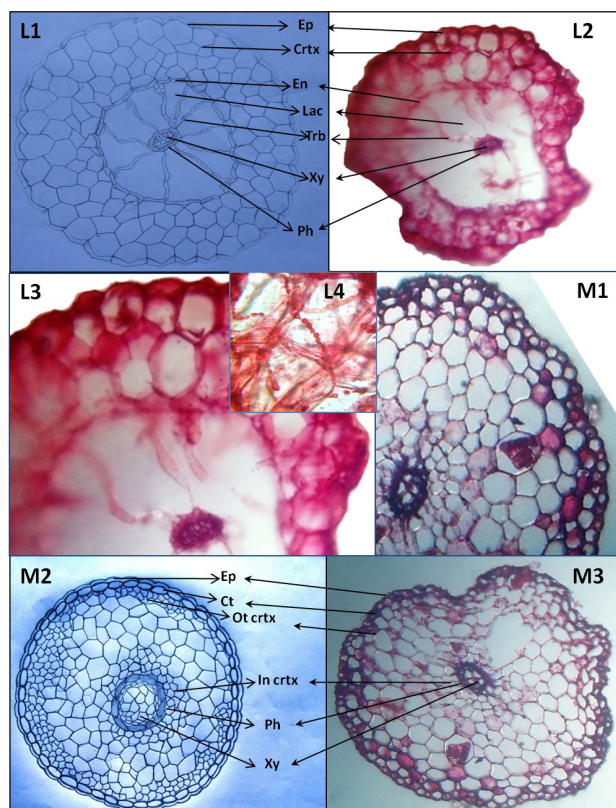


Plate II. Figures [L1-L3. T.S. of stem, L4. T.S. through stem shows endophytic organism, M1-M3. T.S. of rhizophore. (Ct. Cuticle, Ep. Epidermis, En. Endodermis, Lac. Lacuna, Ot. Crtx. Outer cortex, In crtx. Inner cortex, Ph. Phloem, Xy. Xylem, Trb. Trabaculae)].

Anatomical characters: Section (Figure M1, M2 and M3) of the rhizo-phore shows a thick exterior layer of

cuticle followed by the epidermis made up of a single layer of thick-walled cells. The cortical zone is divided into outer and inner cortex. The outer cortex, except 1-2 layer of thick-walled parenchymatous-cell, is almost homogeneous and consists of a mass of large penta-hexa-heptagonal parenchymatous-cells. Except for the smaller size of cells the inner cortex is similar to that of outer cortex. Endodermis and pericycle are not clear. The stele at the center is protostele, where mass of exarch xylem is surrounded by phloem. Anatomy of stem shows similar features to that of rhizophore which is almost circular in outline except in some cases with marginal ridges (Figure L1, L2 and L3). The cortex is made up of homogeneous mass of penta- or hexagonal parenchymatous cell sand followed by single layered endodermis. Trabaculae are found to be arisen from the inner wall of the endodermis which in turn consists of two-three layers of simple cells. There is a single vascular bundle.

Photograph examined: Type-Bombay: Miki, Dalzel (K-438; BSI Neg. CAL-4722).

Reproductive stage: November – February.

Occurrence: Found deep inside forest on moist rich floor .

Distribution: INDIA: Maharastra, Goa, South Kanara,

Ecology: Terrestrial herb generally grows isolate on moist forest floor or on shady surfaces of hill slopes.

RET Status: Endemic to India (Dixit, 1992).

Specimens examined: MAHARASTRA- Ampali Ghat, 26-11-1961, Ansari 78532(BSI); GOA: Sanguem: Patim, 14-11-1962, Rao 84768(BSI); SOUTH KANARA-Jalpad, 13-11-1990, Barber 2329(MH); ASSAM: Nagaon, Champawati, Sapanala Water Fall, 29/12/2009 Himu Roy 138 (GUBH) ; Kamrup, Rani RF, 01/06/2011, Himu Roy 210 (GUBH).

Note: This species can be easily identified from the smaller size of the plant, cuspidate apex of the median leaf is equal to or more than that of lamina, sporophylls gradually reduced in size towards the tips of the strobili thereby giving the strobili conical shapes, larger sporophyll with laminar flap and trilete deep yellow microspore of 20-30 μ m.

The species has been reported for the first time from Assam during the present work and scrutiny of literature revealed that the species has never been reported earlier from northeastern India. Hence the occurrence of this species in Assam recorded during the present study is a new report from Assam as well as for northeast India.

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