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Original Article

A COMPARATIVE ASSESSMENT OF STROBILUS OF *S. DELICATULA* OF KERALA, WAYANAD

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ABSTRACT

Based upon the typed description of Dixit (1992), Manickam & Irudayaraj (1992) have mentioned the description of 12 species of the genus Selaginella occurring in the south of Palghat in the Western Ghats region of India. Mukhopadhyay (1997) studied the sporangial arrangement in the cones of 28 species of Selaginella belonging to India and added two more patterns to Horner and Arnott (1963) Viz "Mixture of patterns I & III & II and III" and "haphazard arrangement of micro and megasporangia" in the strobilus. He also discussed the possible evolutionary relationships among the total five patterns. It is therefore the sporangial arrangement of about 37 Indian species that are yet to be discovered. The cone morphology of S. delicatula has been studied on the parameters viz. no. per plant, no. of per branch, position, stalked or sessile, shape, colour, appearance & range. Similarly, sporophylls have also been studied on the parameters viz. form, shape, tip, margin, and range. Various aspects of strobilus, sporophyll arrangements, sporangial arrangement, heterospory, spore dispersal, variations in no. of megaspores within sporangia and spore morphology and ultrastructure of both megaspores and microspores have been reviewed. This study helps in finding the lacunas in Selaginella's reproductive biology and spore morphology, which also points out the significance of this study.

KEYWORDS: Strobilus, Sporangia, Microsporophylls Megasporophylls, Heterospory

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INTRODUCTION

Unlike *Lycopodium*, all species of *Selaginella* form strobili or cones. Strobili occur terminally one side branches, although in some forms the apical meristem of the cone may continue the meristematic activity, producing vegetative leaves. Because *Selaginella* is heterosporous, sporangia are of two types: microsporangia and megasporangia. The sporophylls associated with these two types of sporangia are termed, respectively, microsporophylls and megasporophylls. The pattern of distribution of Sporangia within strobilus in different species of *Selaginella* was studied by Mitchell (1910), Horner (1961, 1962), Horner & Arnott (1963) and Mukhopadhyay (1997). Strobili may consist entirely of microsporangia or megasporangia. There is variation in the distribution of sporangia within the strobili of different species,(Gifford & Foster 1989, Horner 1961,1962).

MATERIAL AND METHODS

The Western Ghats lie between 8^0-20^0 40'N and $73^0$77'E covering a distance of about 1600 Km from Tapiti valley in Gujarat to Kanyakumari in Tamil Nādu. Plants of different species of *Selaginella* from their population have been collected from Kerala near Pokkod lake. Plants have been collected from randomly selected three spots per population, per species and per area. A portion of collected plants have been well-preserved distinctly in FAA and labelled. Sizes of different features have been recorded with the support of the ocular scale. Many features of

sporophyll and sporangia have been recorded with the help of the ocular scale under LM. LM photography has been done with the support of the NIKON Optiphot model HFX II-A research microscope.

DISCUSSION

As above mentioned, the strobilus of *S. delicatula* has been studied on 8 parameters of which, Dixit (1992) noticed only two i.e., no. per branch and range. The number of cones is similar in both studies, and it differs only in size range which is 6-33 × 2-3 mm recorded in the present study as against 15-30 × 1-2 mm by Dixit (1992). Manickam & Irudayaraj (1992) noticed the quadrangular shape of the cone of this species. The present study agrees with Dixit (1992) and Manickam & Irudayaraj (1992) observations, although with different descriptive terms. Dixit (1992) reported this species' sporophylls as isomorphic, broadly ovate, acuminate and entire. Manickam & Irudayaraj (1992) found the sporophylls as uniform, ovate, acuminate and entire. The present study shows the tip of sporophyll, as acute which is not in accordance with Dixit (1992) and Manickam & Irudayaraj (2003). Dixit (1992) and Manickam & Irudayaraj (1992) have not described the sporangia of *S. delicatula* in terms of no. per cone, shape, position in cone, position in sporophyll and colour which is an additional record for the species (See, Table-1).

Table 1: Morphology of Strobilus of *S. delicatula*

Characters	Spot A	Spot B	Spot C
No./plant	108	139	55
No./ branch	Mostly 2 & 1	Mostly 2 & 1	Mostly 2 & 1
Position	Terminal	Terminal	Terminal
Stalked/ Sessile	Sessile	Sessile	Sessile
Shape	Elongated	Elongated	Elongated
Colour	Black	Black	Black
Compactness	Loosely arranged	Loosely arranged	Loosely arranged

Dixit (1992) mentioned the megaspores as dull brown, verrucoid and size range between 350-375 µm in diameter, which also broadly agrees with the study of Manickam & Irudayaraj (1992) *i.e.*, pale brown with the mean diameter of 400 µm. protuberances, (pustules) fused to form ridges. Dixit (1992) did not mention the ornamentation. Bajpai and Maheshwari (1986) have also observed the megaspores of *S. delicatula* and described them as subtrianguloid to globose in proximo-distal view, trilete, triradiate wart-like protuberances and the average 268 µm in diameter. Dixit (1992) mentioned the pale colour of microspores of *S. delicatula*, and size ranges between 20-30 µm, whereas, Manickam & Irudayaraj (1992) described the colour as green and mean size of 30µm.

CONCLUSIONS

The comparative assessment of the sporophyll of *S. delicatula* reveals that the previous studies did not specify the morphology of megasporophyll and microsporophyll separately. None of the previous studies have recorded the sporangia of *S. delicatula* in detail. The Present study reveals that the megaspores are black in colour with a diameter range of 54.63 - 449.63 µm. The ornamentation is pustulate and the pustules are with blunt apices, some inter pustular spaces are covered by very fine spines of silica gel fibres, whose bases fused and form reticulated areoles. In contrast to the above-mentioned studies, our observation shows that the microspores are black, spherical, trilete and cristate. The range is between 12.85-51.42µm (See, Table-2).

Table 2: Comparative Assessment of Spores of *S. delicatula*

Characters		Present Study				Dixit (1992)	Manickam & Irudayaraj (1992)
		Megaspore		Microspore			
No./ cone		4		36		-	-
Shape		Trianguloid		Spherical		-	-
Colour		Black		Black		-	-
Position in cone		2 penultimate, remaining 2 at anywhere		At the remaining whole Cone		-	-
Position in sporophyll		Basal		Basal		-	-
		L	B	L	B	-	-
Range (µm)	Min.	304.17	395.24	313.49	216.71	-	-
	Max.	935.46	1090.4	695.13	626.98	-	-
Mean (µm)		710.02	805.20	453.60	493.01	-	-

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