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Short Communication

Pollen Morphology of Some Species of Rhamnaceae from West Bengal

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***Key words*:** Rhamnaceae, Pollen morphology, Berchemia floribunda, *Gouania leptostachya, Helinus lanceolatus*

The family Rhamnaceae consists of 55 genera and 900 species. It is a cosmopolitan family but most common in tropical and subtropical regions of the world. More than half the species belong to 5 large genera viz. Rhamnus (150), Ziziphus (100), Gouania (60), Berchemia (25) and Sageretia (35) and are mainly tropical [1]. The family is represented by 7 genera and 17 species in West Bengal. Researchers from all over the world have made valuable contribution on the pollen morphology of the family Rhamnaceae [2-19].

Fossil leaf remains have been described by Jones and Dilcher [20] from middle Eocene deposits of Kentucky and Tennesse but pollen grains identified as Rhamnaceous date back only from Oligocene. This study will also be helpful for future identification of fossil pollens and correlations of stratigraphy.

Materials studied for the present study are represented from all the tribes (sensuHooker, *l.c.*). polliniferous materials were collected from different university herbaria of the Central National Herbarium (CAL) and acotolysed for palynological preparation for light microscopy. Observations were made on the mean of 20 – 25 readings. Photo-micrographs were enlarged x 1000.

Six genera studied for the present contribution from four different tribes (Hooker, l.c.) of the family Rhamnaceae reveal that pollen morphologically it is a stenopalynous family. Pollen medium sized, oblate to oblate-spheroidal to prolate in shape, exine 1.5 - 2.5 µm thick, with psilate, granulate, regulate-reticulate, finely reticulate or reticulate ornamentations. Apertures either porate or colporate. Colpus long slit like mostly, pores circular or rarely lolongate or lalongate, sometimes crassimarginate. Pollen morphological characters of the individual species investigated are given below. Pollen morphological features of the materials studied are given in the (Table 1).

Pollen morphological descriptions

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Berchemia floribunda Wall.

Pollen grains spheroidal to oblate-spheroidal, P x E =16 – 17.5 x 17 – 19 (8.5-16.5) µm; colporate, colpus long, slit like, extending up to poles; endoaperture circular, 3.5 – 4 µm; exine 1 µm thick, sexine = nexine, surface obscure.

Gouania leptostachya DC.

Pollen grains oblate to oblate-spheroidal, P x E = 20 – 23 x 26 – 28 (21.5 – 27) µm; tricolporate, colpus long, extending up to poles; slit like, crassimarginate, endoaperture circular, ± 3.5 µm; exine 1 µm thick, sexine= nexine, finely reticulate, ±rugulo-reticulate encircling the apertures.

Helinus lanceolatus Brandis.

Pollen grains oblate spheroidal, P x E = 28 – 31 x 33 – 35 (30 – 34) µm; tricolporate, colpus long, slit like, crassimarginate, endoaperture 4.5 x 7.5 µm; lalongate; exine 1.5 µm thick. Sexine = nexine.

Rhamnus nipalensis Wall.

Pollengrains oblate to oblate-spheroidal, P x E = 19 – 22 x 24 – 26.5 (21 – 25) µm; colporate, slit like, endoaperture circular, exine 1 µm thick, sexine = nexine, finely reticulate, lumina 1 µm.

Rhamnus trangula L.

Pollen grains oblate to oblate-spheroidal. P x E = 20 – 22 x 22. – 24.5; colporate, colpus long slit like, crassimarginate, endoaperture lalongate = 3.5 x 5 µm; exine 1 µm thick, very finely reticulate, rugulo-reticulate near the apertures, sexine = nexine.

Ventilago madraspatana var. calyculata King.

Pollen grains prolate spheroidal, P x E = 27 – 29 x 29 – 31 (28.5 – 30) µm; tricolporate, colpus slit like, endoaperture circular, crassimarginate; exine = 2 µm thick, finely reticulate.

Ventilago madraspatana var. *madraspatana* Gaertn.

Pollen grains prolate spheroidal, P x E = 29 – 32 x 27 – 30 (30.5 – 28) µm; tricolporate, colpus slit like, extending up to poles, crassimarginate; endoaperture circular, ± 9 µm; exine thin, 1.5-2 µm thick, sexine = nexine, exine obscure/finely granulose.

Ziziphus mauritiana Lamk.

Pollen grains spheroidal, to oblate-spheroidal. P x E = 30 – 32.5 x 30 – 33 (31.5 – 32) µm; tricolporate, colpus long slit like, extending up to poles; endoaperture small, circular, ± 5 µm in diameter; exine finely reticulate, rugulo-reticulate surrounding the aperture, ± 2 µm thick, sexine = nexine.

Ziziphus oenoplia Mill.

Pollen grains oblate to oblate-spheroidal, P x E = 26 – 30 x 26.5 – 31 (27.5 – 30) µm; tricolporate, colpus long slit like, endoaperture circular, ± 8 µm, crassimarginate; exine ± 2 µm thick, finaly reticulate, sexine = nexine.

Ziziphus rugosa Lamk.

Pollen grains oblate spheroidal, P x E = 21 – 33 x 26 – 29 (29 – 27.5) µm; tricolporate, colpus long, slit like, extending up to poles; endoaperture circular, 5 µm; exine 1.75 – 2 µm thick, finely reticulate, sexine = nexine.

Ziziphus xylopyrus Willd.

Pollen grains spheroidal, rarely oblate spheroidal, 21 – 24 (22) µm; triporate, pore ± 4 µm including annulus; exine 1 – 1.5 µm thick, finely reticulate, ruguloreticulate in the aperture area, lumina less than 1 µm, sexine = nexine.

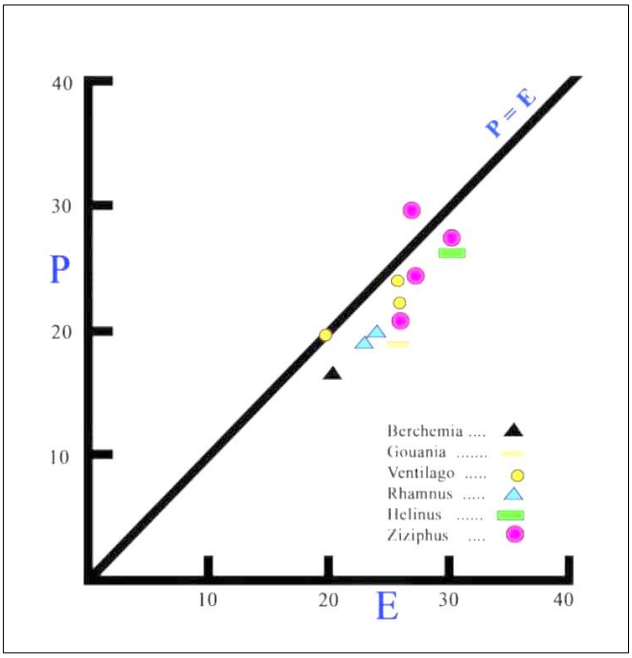

Fig 1 Pollen dimensional diagram in µm

Table 1 Palynological features of the material studied

Species	Shape	Size P x E Mean µm	EXINE Thickness µm	EXINE Ornamentation	APERTURE Type	APERTURE Ecto-aperture	APERTURE Endo-aperture	Remarks amb
Berchemia floribunda	Spheroidal to Ob. Spheroidal	16.5 x 18.5	1	Obscure	Colporate	Slit like	Circular	
Gouania leptostachya	Oblate to ob. Spheroidal	21.5 x 27	1	Finely reticulate/ rugulo-reticulate	Colporate	Slit like	Circular	
Helinus lanceolatus	Oblate Spheroidal	30 x 34	1.5	Microreticulate	Colporate	Slit like	Lalongate	
Rhamnus nipalensis	Oblate Spheroidal	21 x 25	1	Finely reticulate	Colporate	Slit like	Circular	
Rhamnus trangula	Oblate Spheroidal	21 x 23.5	1	Finely reticulate/ rugulo-reticulate	Colporate	Slit like	Lalongate	
Ventilago madraspatana	Oblate Spheroidal	30.5 x 28	1.5 – 2	Obscure/ finely Granulate	Colporate	Slit like	Circular	
var. *madraspatana* var. *calyculata*	Prolate Spheroidal	28.5 x 30	2	Finely reticulate	Colporate	Slit like	Circular	Triangular
Ziziphus mauritiana	Spheroidal to Ob. spheroidal	31 x 32	2	Finely reticulate/ rugulo-reticulate	Colporate	Slit like	Circular	Triangular
Ziziphus oenoplia	Oblate to ob. Spheroidal	27.5 x 30	2	Finely reticulate	Colporate	Slit like	Circular	Triangular, Sides straight
Ziziphus rugosa	Oblate Spheroidal	21 x 27.5	±1	Finely reticulate	Colporate	Slit like	Circular	
Ziziphus xylopyrus	Spheroidal to Ob. Spheroidal	21 x 24 µm In diameter	1 – 1.5	Finely reticulate/ rugulo-reticulate	Porate with annulus	Slit like	Circular	

From the foregoing observation it is apparent that pollen morphological characters of the family like shape, size, aperture, exine ornamentation etc. are very overlapping and it is difficult to prepare palynological key for identification up to species level. Pollen diamensional diagram of the genera studied (Fig 1) shows that only genus VENTILAGO has a tendency from prolate spheroidal to prolate shape and out of six genera studied only BERCHEMIA have exceptionally smaller pollen grains (16.5 x 18.5). all other genera studied are having overlapping shape and size. Palynologically the species of *Ziziphus* is to some extent different in having comparatively advance exine ornamentation with microreticulate to reticulate characters. It is apparent from the foregoing palynological observation and literature on chromosome number reports that the assemblage of the member of Rhamnaceae is quite natural but pollen morphology does not support any distinctiveness towards differentiations of the family into different tribes.

The origin of Rhamnales has been sought from the Rosales in common complex with the ancestors of the Celastrales and Sapindales. There are some strong serological affinities among the members of Rhamnaceae, Celastraceae, Hydrangeaceae and Crassulariaceae. The latter two families are newly created families and taken out from Rosaceae (s.l.). Pollen grains of Sapindales and Rourea complex of

Connaraceae are to some extent similar with that of Rhamnaceae. A detailed study covering world pollen materials of all the genera is essential to trace the phylogeny of the family.

SUMMARY

Pollen morphology of 10 species and 2 varieties of Rhamnaceous taxa belonging to all the four tribes have been worked out. Pollen morphology of the family shows a tendency of evolution from basic morpho forms to the derived ones. Pollen grains of all the taxa investigated have been found to possess triangular or sub-triangular amb with three equatorial apertures situated at the angles (anguloaperturate). In *Ziziphus xylopyrus* the pollen grains are porate and in rest nine species those are colporate with circular or lalongate endoapertures. Exine ornamentation shows a gradual tendency from granulose to rugulo-reticulate or reticulate pattern. Palynological features have been evaluated in understanding the taxonomy of the family.

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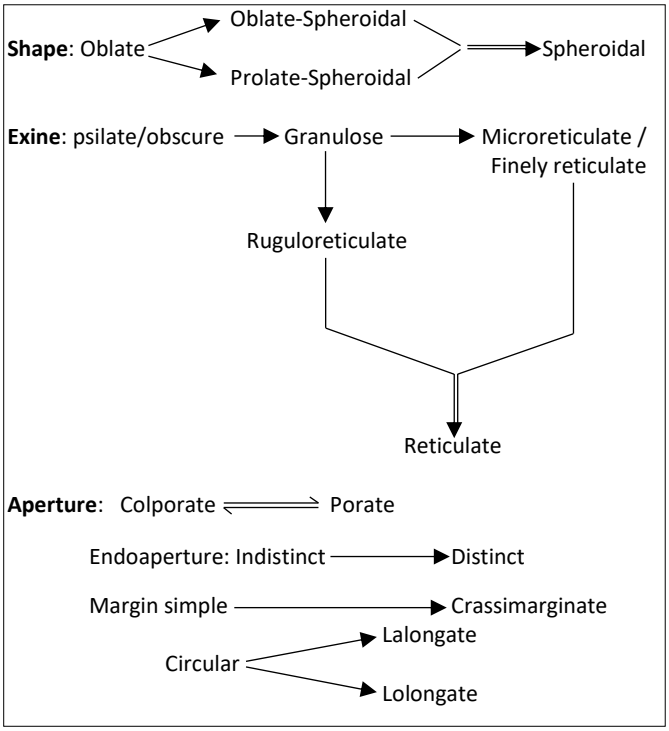

Fig 2 Pollen morphological trend in Rhamnaceae

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