

Pollen Morphology of Some Species of Acanthaceae from Murshidabad District, West Bengal

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Abstract: The Acanthaceae represent about 229 genera and 3450 species distributed in the tropical regions, Central America, Brazil, Indo-Malaysia and Africa. Some plants occurs in Mediterranean regions, some are xerophytic species found in steppes. Acanthaceae is a eurypolynous family and all polynological studies of the family remark on the pollen diversity. Polynological observations were carried out 11 genus with 15 species collected from various localities of Murshidabad District, West Bengal, India. Polynological features have been evolved in understanding the taxonomy of the family.

Key Words: Acanthaceae, Pollen morphology.

INTRODUCTION

The use of Pollen morphological data as a source of information for systematic studies within Acanthaceae has been appreciated since Rodlkofer (1883). Subsequently several studies have investigated the relationship between Pollen morphology of Acanthaceae classification (Blakwill and Gettiffe Norris 1988, Bremekamp 1944,1965; Graham 1988, indan 1893,1895; Raj1961,1973, Scotland 1991;1992a;1992b;1993.)

Pollen of Acanthaceae is diverse and because it is often rather homogeneous within a genus polynological characters will continue to be used both in characterization of genera and in assessing their phylogenetic relationships (Scotland 1993 and Tantawy et al 2003). Pollen morphology is one of the characteristics which have been used extensively to fine tune most existing classification of the family at the genus level(Perveen and Qaiser,2010).

Lindau(1895) first used Pollen variability for the recognition of taxonomic groups. Polynological studies of Acanthaceae with contorted corollas have evidenced the limits, and the inadequacy of Lindau's system (Scotland, 1993). Description of Pollen is considered as necessary in the diagnosis of new species (Nilsson and Praglowsky,1992).

The district Murshidabad is located in 23°43' and

24°52', North latitude and 87°49' and 88°44' East longitude. The shape of the district resembles an isosceles triangle with its apex pointing towards NorthWest. It is bounded on the East by the river Padma; on South by the districts of Burdwan and Nadia and to its West lie the districts of Birbhum and Sauthalparganas . The town Berhampur is the headquarter of the district the river Bhagirathi, flowing through the district from North to South divides it into two more or less equal portion of contrasting physiography. The tract to the West of Bhagirathi is locally referred to as Rarh and the tract of the East as Bagri. Bagri the Eastern tract is low lying alluvial plain occasionally getting flooded by the spill of Bhagirathi and other rivers, having a relatively humid climate and fertile soil. In the Western tract on the other hand the surface is high and undulating, the soil is haw clay and the climate is drier in the eastern tract. Being situated in the lower Gangetic valley, The overall inclination of the district is from North-West to South-East. The members of this family are mainly distributed in tropics. About 70 genera and 340 species have been reported from India. Prain (1903) reported 32 genera and 81 species from West Bengal. About 15 species belonging to 11 genera of Acanthaceae have been collected from different parts of Murshidabad district, West Bengal.

The study was aimed at improving the general knowledge of the polynology in this family and to contribute towards the constitution of a regional Pollen flora of the country, which has received very little attention in this field of research.

MATERIALS AND METHOD

The work is primarily based on fresh collection of materials from different regions of Murshidabad District of West Bengal. Polliniferous material were preserved in FAA along with preparation of corresponding herbarium sheets of plant specimen. Acetolysed preparation of polleniferous material was

done Erdtman's (1960) acetolysed technique. Pollen morphological characters were studied under Leitz, Laborlux (Germany) microscope. Photomicrographs of suitable magnifications were made under a Leica DMLB(Germany) microscope. Pollen grain have been described as per standard terminologies of Erdtman (1953), Faegri and Iversen (1975) and Walker and Doyle(1975).

Description of pollen grains :

Adhatoda zeylanica Medi

Pl. 1, Fig. 1

Pollen grains prolate, amb circular, PXE = 55-65 x 28-35 μm ; trizonocolporate, colpi linear 26 μm long and 1 μm wide at the equator, sides gradually tapering to acuminatetips. Ora circular 8-9 μm in diameter, 18-20 μm wide, apocolpium \pm 20 μm wide; exine 4 μm thick, sexine thicker than nexine; surface reticulate.

Andrographis paniculata (Burm.f)

Wallich ex Ness.

Pl. 1, Fig. 1

Pollen grains prolate to subprolate, amb subtriangular, anguloaperturate, PXE = 45- 54 x 40-46 μm , sides convex; trizonocolporate, colpi 40-45 μm long and \pm 5 μm wide at the middle, endoaperture circular \pm 11 μm in diameter, mesocolpii 15-17 μm wide and apocolpi 5-9 μm wide; exine 2.5 μm thick. Sexine thicker than nexine; sculpturingreticulate, lumina typically polygonal, \pm 3 μm across.

Ecbolium viride (Forrskal) Alston.

Pl. 1, Fig. 2

Pollen grains prolate, equatorial online elliptic, PXE= 20-23 x 14-17 μm ; trizonocolporate, colpi narrowly elliptic, 13-14 μm long, 1-2.5 μm wide at the middle, endoaperture lalongate (1.5x2.5 μm); exine 2.5-3.5 μm thick, sexine 1-2 μm thick, nexine 1-1.5 μm thick, sculpturing reticulate.

Hemigraphis hirta (vahl.) T. Anders.

Pollen grains suboblate, equatorial outline subcircular, PXE = 32-35 X 41-44 μm ; polyzonocolpate, colpi linear, 24-32 μm long, 1.5-2.5 μm wide at equator, sides tapering, tips acuminate; exine 1.5-3.5 μm thick, sexine 1.25-2 μm thick, nexine 0.5-1.5 μm thick; sculpturing microreticulate.

Hygrophila auriculata (K.

Schumann) Heine.

Pl. 1, Figs. 11-12.

Pollen grains oblate spheroidal, PXE = 48-50 x 51-54 μm , amb circular; polyzonoheterocolpate with 4 colporate apertures, colpi linear, 40-45 μm long and 1- μm wide at equator, tips acuminate, ora circular, 6-7 μm wide; exine 1-2 μm thick, sexine thicker than nexine; sculpturing reticulate, lumina polygonal typically 3 μm wide at mesocolpi, gradually becoming narrower towards apocolpi.

Hygrophila difformis (L.) Srum & Bennet.

Pollen grains prolate spheroidal, equatorial outline elliptic, PXE = 64-73 X 62-66 μm ; Trizonocolporate, colpi narrowly elliptic, 50-55 μm long, 3-3.5 μm wide at the middle, sides tapering, tips acute, tenuimarginate, endoaperture lolongate (2.5 x 1.5 μm); exine 2.5-3.5 μm thick, sexine slightly thicker than nexine; sculpturing reticulate, lumina gradually narrow towards apertures.

Justicia betonica L.

Pl. 26, Figs. 6-7

Pollen grains prolate, amb subtriangular with straight sides, PXE = 38-43 x 27-30 μm ; trizonocolporate, sinoaperturate, colpi narrowly elliptic, crassimarginate, 34-36 μm long and about 3 μm wide near equator, ends pointed, endoaperture distinctly circular, \pm 3 μm in diameter; exine 2.5-3 μm thick, distinctly tegillate, sexine as thick as or slightly thinner than nexine, sculpturing ruguloreticulate.

Justicia gendarussa Burm. F.

Pl. 2, Figs. 5-6.

Pollen grains spheroidal, 48-56 μm in diameter; amb subtriangular; trizonocolporate, sinoaperturate, colpi linear, 35-38 μm long and about 2 μm wide near equator, endoaperture indistinct; exine about 6 μm thick, sexine thicker than nexine; sculpturing reticulate, lumina irregularly polygonal, 1-2 μm across, muri \pm 1.5 μm high.

Justicia simplex D. Don.

Pl. 1, Figs. 5-6

Pollen grains prolate, amb triangular with rounded corners, PXE = 40-45 x 22-25 μm ; trizonocolporate, sinoaperturate, colpi narrowly elliptic, 30-33 μm long and 2.5-3 μm wide at the middle, endoaperture lalongate (3 x 2.5 μm); exine \pm 3 μm thick, distinctly tegillate, sexine slightly thicker than nexine; sculpturing reticulate.

Peristrophe bicalyculata (Retz.)

Nees.

Pl.1, Fig. 8

Pollen grains subprolate, PXE = 45-51 x 35-41 μm, amb subcircular – subtriangular, trizonocolporate, anguloaperturate, colpi linear, 40-44 μm long and 3-4 μm wide at the middle, ends acute, endoaperture circular to lalongate (6 x 4 μm); exine 2.5-3 μm thick, sexine thicker than nexine, sexine distinctly tegillate; sculpturing reticulate, lumina polygonal, 1-1.5 μm across.

Pseudoranthemum malabaricum (cl.)

Gamble.

Pl. 1, Figs. 9-10

Pollen grains prolate spheroidal, amb triangular, PXE = 44-47 x 40-43 μm; trizonocolporate, sinoaperturate, colpi long, slit like, 30-35 μm long and 2-2.5 μm wide at the middle, endoaperture lalongate, 6 x 4 μm; exine 3.5 x 4 μm thick, sexine thicker than nexine; sculpturing reticulate, lumina polygonal, 1-1.5 μm across in apocolpi and finer towards mesocolpi.

Ruellia tuberosa Linn.

Pl. 2, Fig. 3-4

Pollen grains spheroidal, 62-74 μm in diameter; trizoporate, pore circular to oval, 12-15 μm in diameter; exine 5-6 μm thick, sexine 3.5-4 μm thick,

nexine 1.5-2 μm thick, suprategal pila reticulately arranged with pila heads touching each other giving rise topolygonal lumina of 8-10 μm diameter.

Rungia pectinata Linn.

Pl. 1, Figs. 3-4

Pollen grains prolate spheroidal to subprolate, amb circular, PXE = 62-70 x 48-54 μm;trizonocolporate, colpi linear to narrowly elliptic typically, 54 μm long and 5.5 μm wideat the middle tapering to acuminate tips. Ora broadly oval in outline, lalongate, 9 x 15 μm. Mesocolpium 18 μm wide, apocolpium not distinctly demarcated; exine 3.5 μm thick, sexine little thicker than nexine; sculpturing reticulate, lumina polygonal, 2-2.5 μm across.

Rungia repens (Linn) Nees.

Pollen grains prolate PXV = 32-36 x 20-25 μm; dizonocolporate, colpi linear with pointed ends, 30-35 μm long and 2-3 μm wide at the equator, endoaperture lolongate, 4 x 2 μm, exine 3-4 μm thick, sexine thicker than nexine; sculpturing reticulate, luminapolygonal, 1.5-2.5 μm across.

Thunbergia grandiflora Roxb.

Pl. 2, Figs. 1-2

Pollen grains spheroidal, 80-85 μm in diameter; sinoaperturate, 3.5-5 μm wide; exineabout 3.5-5 μm thick, sexine thicker than nexine, sexine tegillate, sculpturing reticulate

PLATE--- 1

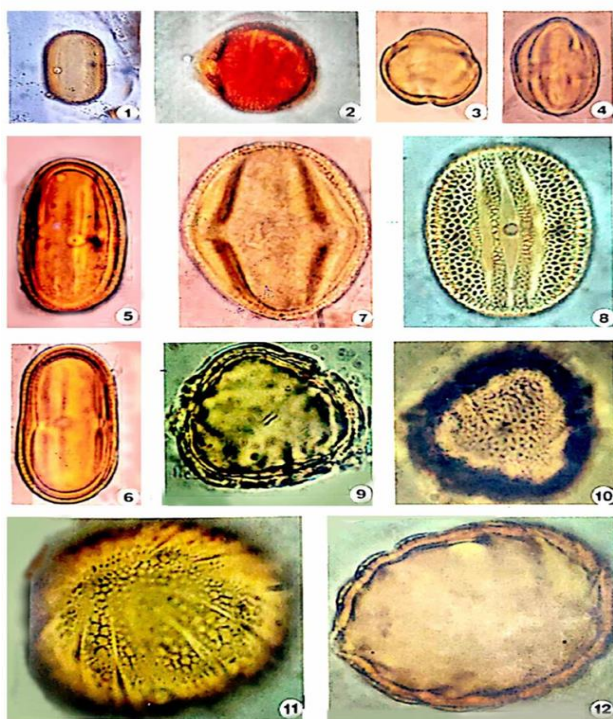
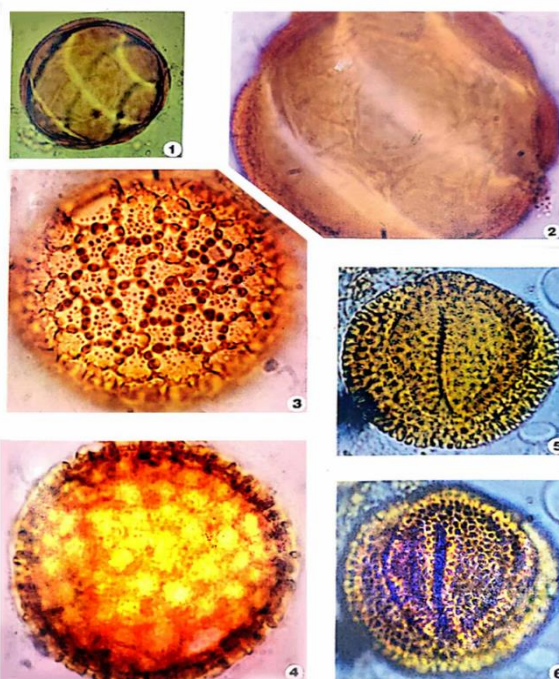


PLATE--- 2



EXPLANATION OF PLATE – 1

- Fig 1. Pollen grain of *Adhatoda zeylanica* in equatorial view showing the Colporate aperture with linear colpi and circular ora on left and the reticulate ornamentation on the right, x 460
- Fig 2. Pollen grains of *Ecbolium viridi* in equatorial view showing lalongate endoaperture and surface ornamentation, x 1180
- Fig 3-4. Pollen grains of *Rungia pectinata*, x 1180
3. Polar view in optical section
 4. Equatorial view showing narrowly elliptical colpium with lalongate endoapertures
- Fig 5-6. Pollen grains of *Justicia simplex*, x 1180
5. Equatorial view showing lalongate endoaperture.
 6. Equatorial view in optical section.
- Fig 7. Pollen grains of *Andrographis paniculata* in optical section of equatorial view, X 1180.
- Fig 8. Pollen grain of *Peristrophe bicalyculata* in equatorial view showing reticulate ornamentations and a colporate apertures, x 1180
- Fig 9-10. Pollen grains of *Peristrophe malabaricum*, x 1180
9. Polar view in optical section.
 10. Same grain showing surface with reticulate ornamentations.
- Fig 11-12. Pollen grains of *Hygrophila auriculata*, x 1180
11. Sub polar view, apocolpium and parts of mesocolpium in focus showing surface reticulations and meridional colpium.
 12. Same grain in optical section showing the sporoderm.

EXPLANATION OF PLATE – 2

- Fig 1-2. Pollen grains of *Thunbergia grandiflora*
1. Equatorial view showing the aperture in the form of a pole to pole spiral band x 460
 2. Equatorial view in magnified optical section, x 1180
- Fig 3-4. Pollen grains of *Ruellia tuberosa*, x 1180
3. Polar view showing exine ornamentation and polar aperture close to the margin at 11 O'clock position
 4. Same grain in optical section showing the exine stratification
- Fig 5-6. Pollen grains of *Justicia gendarussa*, x 1180
5. Equatorial view in optical section
 6. Same grain showing reticulate sculpturing

DISCUSSION

Morphologically as a whole Acanthaceae is eurypalynous family. among the collected materials 10 taxa shows trizonocolporateapertural types, one is polyzonocolpate and another one belongs to polyzonoheterocolpate type. One taxa exhibit trizonoporate, diazonoporate aperture is found in one taxa and *Thunbergia* shows sinoaperturate type. Taxa showing trizonocolporate grains are *Adhatoda*, *Andrographis*, *Ecbolium*, *Hygrophiladiformis*, *Justicia*, *Peristrophe*, *Rungia*, *Pseudoranthemum*. *Hygrophila auriculata* show polyzonoheterocolpate type. Polyzonocolpate type of Pollen grain found in *Hemigraphis hirta*. Trizonoporate type of pollen

grain found in *Ruellia tuberosa*. dizonocolporate type exhibit by *Rungia repens*. All the taxa investigated are characterised by more or less radially symmetrical, oblate to prolate type. Endoaperture varies from Lalongate-circular to lalongate type. Exines of 15 species are crassinexinous with clearly discernible tegillate organisation and the exine surface of the grains varies from faintly reticulate to reticulate type.

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