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

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Abstract: During the present investigation, Pollen morphological studies of 11 species belonging to 6 families of monocot from Murshidabad District, West Bengal have been studied by light microscopy. The investigated families are Agavaceae, Amaryllidaceae, Arecaceae, Cannaceae, Commelinaceae and Pontideriaceae. The apertural type belongs to anasulcate to trichotomosulcate. The shape of the Pollen grains varies from oblate to spheroidal. Palynological studies remark on the Pollen diversity of different families. Palynological features have been evaluated in understanding the taxonomy of different monocot families.

Key Words: Monocot pollen, Sulcate, Trichotomosulcate, Oblate.

INTRODUCTION

Pollen morphology is now recognized as an important tool in taxonomic studies. Diversity in pollen size, shape, polarity, symmetry, apertural types and ornamentations can be used to understand the taxonomic relationships (Bhattacharya et al.2009, Ganga Kailas et al.2016). Unlike dicots, the pollen of monocots has received very little attention. Pollen morphological data were used by Dahlgren and Clifford (1982) and Dahlgren et al. (1985) during comparative studies and toward a more natural, phylogenetic classification of monocots. Murshidabad, West Bengal is floristically unexplored; there are few publications on floristic aspects of it (Guha-Bakshi, 1984).

Pollen morphological data is helpful in investigations of allergies and melissopalynology (Ganga Kailas et al.2016b; Devender et al.2016). Now a days, Pollen morphology is considered as an important tool to resolve the place and sometimes the season of the year of a fact in forensic investigation (Passarelli and Cortes, 2017). In the absence of no comprehensive study on the diversity of monocot plants in Murshidabad District, the present work was undertaken. Prain (1903) reported 241 genera and 740 species of monocots from West Bengal. In the present investigation, Pollen grains of 10 genera and 11 species belonging to 6 families were collected from different part of Murshidabad District. The study was aimed to improve the general knowledge of palynology.

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.

MATERIALS AND METHOD

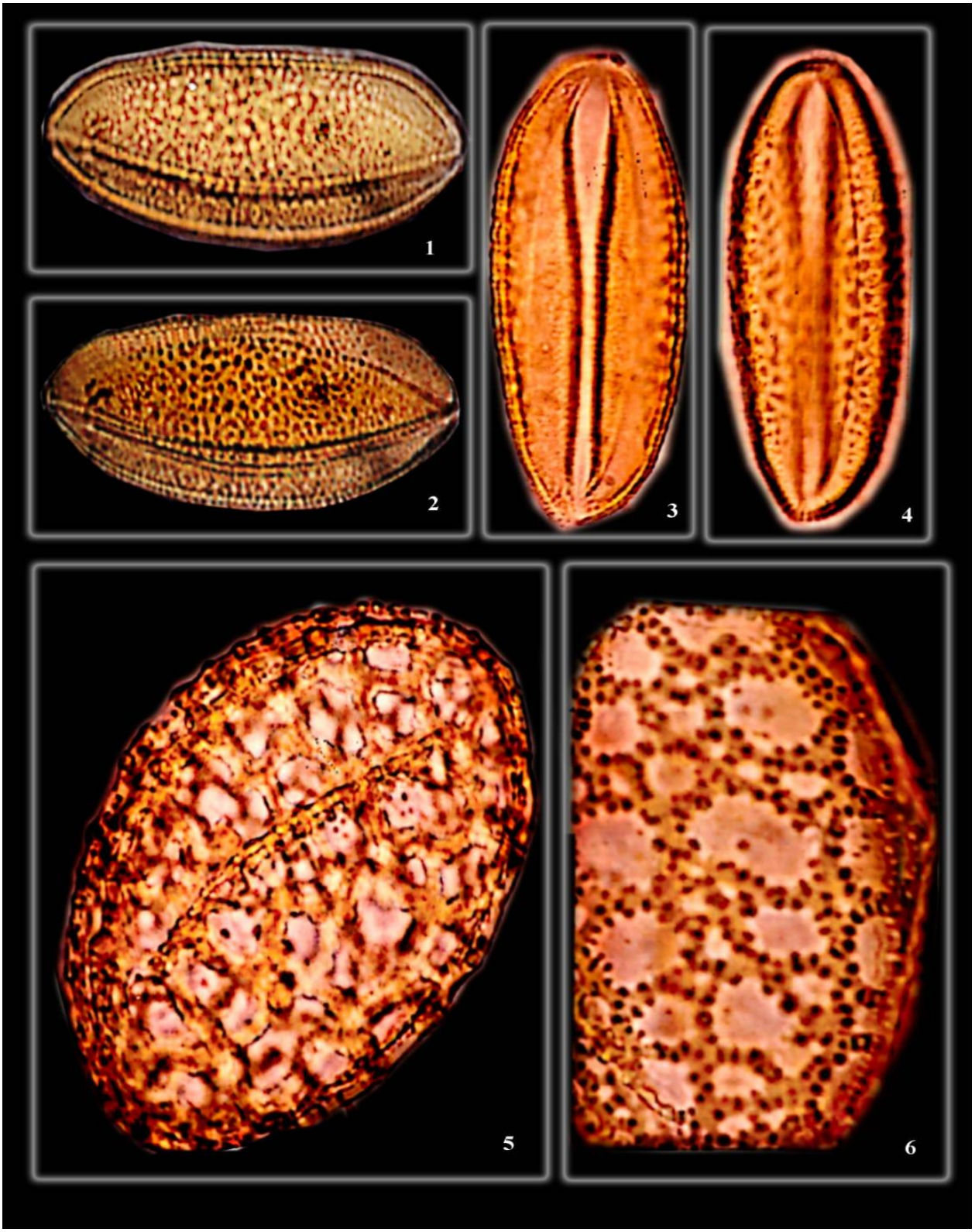
The work is primarily based on fresh collection of materials from different regions of Murshidabad District of West Bengal. Polliniferous material were preserved in FAA along with preparation of corresponding herbarium sheets of plant specimen. Acetolysed preparation of polleniferous material was

done Erdtman's (1960) acetolysed technique. Pollen morphological characters were studied under Leitz, Laborluxs (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

Agave angustifolia Haw.
Pl. 1 Fig. 5,6
Pollen grains bilaterally symmetrical, amb elliptical, PXE_1XE_2= 46-55 x 78-93 x 48-59 µm; anasulcate, sulcus 55-63 µm long, tenuimarginate; exine 2.5-3 µm thick, tegillate, sexine thicker than nexine; sculpturing reticulate, lumina broad, polygonal, 8-15 µm across.
Crinum defixum Ker-Gawler.
Pollen grains bilaterally symmetrical, elliptical in polar view, PXE_1XE_2= 25-40 x 70-75 x 25-45 µm, anasulcate, sulcus 65-68 µm long, 2-3.5 µm wide, tips acuminate, crassimarginate; exine 2.5 µm thick, sexine equal to nexine, sculpturing reticulate, lumina polygonal, 1-1.25 µm broad, muri 0.5-0.75 µm wide.
Crinum asiaticum L.
Pl. 1 Fig. 3,4
Pollen grains bilaterally symmetrical, elliptical in polar view, PXE_1XE_2= 28-44 x 75-86 x 30-45 µm, anasulcate, sulcus 72-80 µm long, 2-4.5 µm wide, tips acuminate, crassimarginate, exine 2.5 µm thick, sexine equal to nexine, sculpturing coarselty reticulate, lumina polygonal, 1-1.5 µm broad, muri 0.4-0.65 µm wide.
Polyanthus tuberosa L.
Pollen grains spheroydal, 70-80 µm in diameter, trichotomosulcate; exine 3-3.5 µm thick, sexine thicker than nexine, sculpturing reticulate, lumina polygonal, 1.5-2 µm broad.
Hemanthus multiflorus Martyn.
Pl. 1 Fig. 1,2
Pollen grains bilaterally symmetrical, narrowly ellipsoidal, PXE_1XE_2= 18-35 x 51-60 x 20-30 µm; anasulcate, sulcas elliptic, 10-12 µm wide, occupying whole length of the grain, tenuimarginate; exine ± 2 µm thick, sexine thicker than nexine; sculpturing reticulate, lumina irregularly polygonal, 1.5-3 µm across.
Borassus flabellifer L.
Pl. 2 Fig. 3
Pollen grains bilaterally symmetrical, equatorial outline elliptic, PXE_1XE_2= 25-30 x 48-64 x 28-44 µm; anasulcate, sulcus narrowly elliptic, 44-48 µm long and 2.5-3 µm wide, tenuimarginate; exine 2-2.5 µm thick; tegillate, sexine as thick as nexine; sculpturing reticulate, gemmae 2.5-3.5 µm in diameter, sparsely distributed.
Cocos nucifera L.
Pollen grains oblate, equatorial outline elliptic, PXE= 58-61 x 35-38 µm ; anasulcate, 45-48 µm long and 2-3 µm wide; exine 2-3 µm thick, sexine and nexine are almost equal thickness; surface granulose.
Canna indica L.
Pollen grain spheroidal, 62-71 µm in diameter; inaperturate; exine 5-7 µm thick, sexine and nexine not discernible; surface spinulose, spinules 1.4-1.7 µm long, ends pointed, distance between the spines-5-6 µm, basal diameter 1-1.5 µm.
Commelina benghalensis L.
Pl. 2 Fig. 1,2
Pollen grains bilaterally symmetrical, oval in polar view and plano-convex in equatorial view, PXE_1XE_2= 14-17 x 26-30 x 17-20 µm; anasulcate, sulcus elliptic, 21-23 µm long, 5-7 µm wide; sulcal free area with connate insuli, 0.75 µm wide at the base and 1-1.25 µm high, insuli arranged in parallel rows.
Eichhornia crasipes (Mart.) Solms.
Pl. 2, Fig. 5
Pollen grains bilaterally symmetrical, spindle shaped plano-convex, PXE_1XE_2= 15-22 x 43-62 x 18-29 µm; anasulcate, sulcas narrowly elliptic, 3-7 µm wide occupying whole length of the grain tenuimarginate; exine 1.5-2 µm thick, sexine thicker than nexine; surface psilate.
Monochoria hastata L.
Pl. 2, Fig. 4
Pollen grains bilaterally symmetrical, ellipsoidal convex, PXE_1XE_2= 16-21 x 47-72 x 24-30 µm; anasulcate, sulcas broad occupying almost whole length of the grain, tenumarginate; exine ±1.5 µm thick, sexine as thick as nexine; surface granulose.

PLATE - 1



Explanation of plate – 1
Figs 1-2.Pollen grains of *Hemanthus multiflorus* x 1180

1. Equitorial view in optical section
2. Equitorial view with surface in focus

Figs 3-4.Pollen grain of *Crinum asiaticum* x 1180, equatorial view showing surface and meriodional sulcas

Figs 5-6.Pollen grains of *Agave angustifolia* x 1180

5. Polar view in optical section
6. Part of the grain with surface in focus

PLATE – 2

Explanation of plate – 2

Figs 1-2.Pollen grains of *commelina benghalensis* x 1180

1. Polar view
2. Equatorial view

Fig 3. Pollen grain of *Borassus flabellifer* x 1180, equatorial view in optical section
Fig 4. Pollen grains of *Monochoria hastata* x 1180, polar view
Fig 5. Pollen grains of *Eichhornia crassipes* x 1180, polar view

DISCUSSION

Pollen grains are microscopic and develop to maturity in a protected environment that is only indirectly affected by external factors such as climate, habitat and soil type. Pollen morphological types of 11 species belonging to 6 families in Murshidabad District have been worked out. Among those 4 species belongs to Amaryllidaceae, 2 species to Arecaceae, 2 species from Pontideriaceae and one each from Agavaceae, Cannaceae and Commelinaceae. Most of the grains are bilaterally symmetrical. *Agave* Pollen is anasulcate and tenuimarginate, *Crinum* pollen is anasulcate and crassimarginate. In case of *Polyanthus*, pollen grains are spheroidal and trichotomosulcate. Pollen grains of *Cocos* is oblate and surface granulose. Gemmae found in *Borassus* pollen and sparsely distributed. *Canna* pollen is inaperturate and spheroidal. *Commelina* pollen shows the character of sulcal free area with connate insuli. *Eichhornia* pollen is spindle shaped with psilate surface but *Monochoria* pollen is ellipsoidal convex with granulose surface.

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