

Investigation of Pollen Morphology in a Few Plant Species Belonging to the Mimosaceae Subfamily from Wani, Dist. Yavatmal (M.H) India

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Abstract:- The Fabaceae (legume family) subfamily Mimosaceae, also called the mimosa family, is distinguished by the unique form of its pollen. Comprehending the properties of Mimosaceae pollen is essential for taxonomic categorization, evolutionary investigations, and ecological studies. Under a light microscope, the Mimosaceae subfamily has investigated the pollen morphology of four taxa: *Acacia nilotica* (L.), *Leucaena leucocephala* (Lam) de Wit., *Mimosa hamata* (Wild.), and *Prosopis juliflora* (SW.) DC. It has been found that the morphological variability of pollen grains in terms of size, shape, surface texture, and pattern is advantageous at the species or generic level of the pollen morphological features. An essential component of the Mimosaceae family that facilitates a wide variety of scientific investigations, from taxonomy to ecology, is pollen morphology. The morphological variations in pollen from four Mimosaceae species are described in the current research. Its distinguishing characteristics, including size, exine structure, aperture type, and surface ornamentation, help distinguish between species and shed light on how this varied plant family has adapted.

Keywords:- Pollen, Morphology, LM, Mimosaceae, etc.

I. INTRODUCTION

Pollen characteristics help resolve complex issues involving the connections between different taxa and determining where those taxa fall in the classification, especially considering the tribes, genera, families, and subfamilies, both subspecies and species. The study of pollen morphology is done as a valuable tool for morphological research and a help contemporary taxonomists define species boundaries. The coarse to powdery particles known as pollen grains, which blooming plants generate, are the organic markers that are naturally resistant to deterioration because they contain sporopollenin, an organic walled substance. It is possible to infer migratory paths, foraging resources,

pollination methods, and insect and other pollinator source zones. Consequently, certain information may be acquired from pollen analysis. The goal of the current study was to examine the morphology of pollen from four Mimosaceae family taxa, emphasizing traits that are crucial for diagnosis in taxonomy and acting as a reference pollen guide for later use. The scientific field of paleontology studies pollen, spores generated by angiosperm and gymnosperm seed plants, and spore-producing pteridophytes, bryophytes, algae, and fungi (Moore et al., 1991). Erdtman. G (1921) with the publication of his thesis in German, he had systematically studied pollen morphology and developed a unique and most widely accepted method for pollen preparation the acetolysis method in pollen studies. Erdtman G. (1945 & 1952) published “An Introduction to Pollen Analysis” & contributed 232 articles on palynology, where he coined terms used in palynology. Wodehouse (1935) illustrated the detailed structure of pollen grains including legumes and the significance of palynological studies in the field of science and medicine.

II. MATERIALS AND METHODS

Using standard literature, plant samples were obtained from diverse Wani areas (Cook 1901, Singh 2001, Yadav and Sardesai 2002). The collected samples were stored in 70% alcohol. The collected material was crushed with a glass rod in a plastic centrifuge tube and then filtered through small meshes to separate pollen grains. (Rajurikar, 2012). The pollen grains were processed for light microscopy according to the conventional procedure (Erdtman 1960, Arora and Modi 2008). The pollen grains were put in dyed glycerine jelly for light microscopy, and observations were done with a Carl Zeiss bright field trinocular microscope at magnifications of 10x and 40x to determine pollen particle size, colpi size, exine ornamentation, and so on. Erdtman (1971), Bhattacharya et al. (2006), and Agashe (2006) proposed several terminologies for pollen morphological investigations.

III. OBSERVATION AND RESULT

➤ Observation

Table 1 General Information on Plant Species

Sr. No	PLANT NAME	FAMILY	SUBFAMILY	FLOWERING PERIOD	HABIT
1	<i>Acacia nilotica</i> (L).	Leguminosae	Mimosaceae	July-September	Tree
2	<i>Leucaena leucocephala</i> (Lam) de Wit.	Leguminosae	Mimosaceae	July-October	Shrub
3	<i>Mimosa hamata</i> (Wild.)	Leguminosae	Mimosaceae	July-October	Shrub
4	<i>Prosopis juliflora</i> (SW.) DC	Leguminosae	Mimosaceae	September-March	Tree

➤ Description of Pollen Types Mimosaceae

- *Acacia nilotica* (L.):

Pollen grains on PA 36.37µm (37.56) 38.55µm and ED is 29µm (29.7) 30.40µm. Size in PA/ED*100 ratio is 126, sub-prolate shape with no aperture i.e. non-aperturate, Exine thickness of 0.76-0.90µm with foveolate-rugulate exine ornamentation.

- *Leucaena Leucocephala* (Lam.) de Wit.:

Pollen grains on PA 48.38µm (49.91) 50.44µm and ED is 41.19µm (42.41) 43.64µm. Size in PA/ED*100 ratio is 117, sub-prolate shape, tricolporate aperture with pore size 8.43-9.03µm, exine thickness of 2.87-3.53µm with Sub-Psilate exine ornamentation.

- *Mimosa Hamata* (Wild.):

Pollen grains on PA 11.98µm (14.91) 17.85µm and ED is 11.55µm (11.98) 12.42µm. Size in PA/ED*100 ratio is 124, sub-prolate shape having no aperture i.e. Non-aperturate, exine thickness of about 0.70-0.78µm with foveolate to fossulate exine ornamentation.

- *Prosopis Juliflora* (SW.) DC.:

Pollen grains on PA 29.43µm (30.04) 30.65µm and ED is 31.13µm (32.11) 33.10µm. Size in PA/ED*100 ratio is 93, oblate-spheroidal shape and trizonocolporate aperture with pore size 3.88-5.67µm, exine thickness 1.76-2.14µm having reticulate exine ornamentation.

➤ Pollen Morphology of Mimosaceae

Mimosaceae, commonly referred to as the mimosa family, is a subfamily within the Fabaceae (legume family) known for its distinctive pollen morphology. Understanding the pollen characteristics of Mimosaceae is crucial for taxonomic classification, evolutionary studies, and ecological research.

➤ Key Features of Mimosaceae Pollen

- *Pollen Shape and Size*

- ✓ Pollen grains in Mimosaceae are typically small to medium in size, ranging from 10 to 40 micrometers in diameter.
- ✓ The shape is often spheroidal or slightly ellipsoidal, which is a common characteristic within the family.

- *Exine Structure*

- ✓ The exine, which is the outer layer of the pollen wall, is usually thin and intricately sculptured.
- ✓ Mimosaceae pollen often exhibits a distinctive reticulate (net-like) or perforate exine pattern, which aids in identification.

- *Aperture Type*

- ✓ Mimosaceae pollen is predominantly tricolporate, meaning it has three furrows or colpi, often with associated pores.
- ✓ This tricolporate condition is a distinguishing feature that separates Mimosaceae from other leguminous subfamilies.

- *Surface Ornamentation*

- ✓ The ornamentation on the pollen surface ranges from psilate (smooth) to granulate or even echinate (spiny) in some genera.
- ✓ Surface ornamentation plays a significant role in the dispersion mechanism and interaction with pollinators.

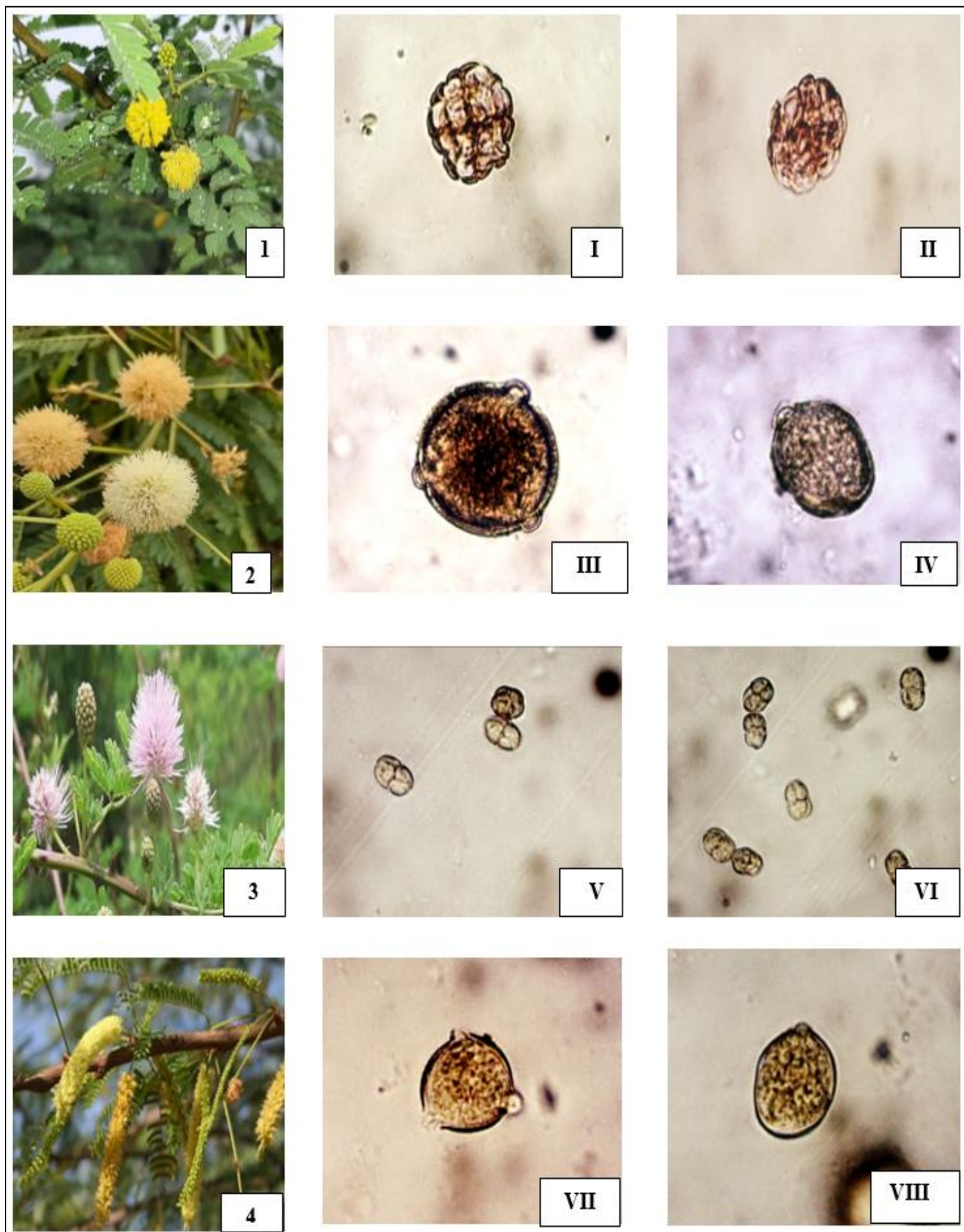


Fig 1 Light Microscopic Images Showing Structure of Pollen Grains Polar and Equatorial View. 1. *Acacia nilotica* (L.) (I- Polar View, II- Equatorial view), 2. *Leucaena leucocephala* (Lam.) de Wit. (III- Polar View, IV - Equatorial view), 3. *Mimosa hamata* (Wild.) (V- Polar View, VI- Equatorial view), 4. *Prosopis juliflora* (SW) DC.) (VII- Polar View, VIII- Equatorial view)

➤ Observation

Table 2 Morphological Characteristics of Pollen Grains

Sr. No	Plant Name	PA (μm)	ED (μm)	*100	Pollen Shape	Pollen Aperture	Exine Thickness	Exine Ornamentation	Pollen Size Class
1.	<i>Acacia nilotica</i> (L.)	37.56	29.7	126	Sub-prolate	Non-aperturate	0.76-0.90	Foveolate, Rugulate	Medium
2.	<i>Leucaena leucocephala</i> (Lam.) de Wit	49.91	42.41	117	Sub-prolate	Tricolporate	2.87-3.53	Sub-psilate	Medium
3.	<i>Mimosa hamata</i> (Wild.)	14.91	11.98	124	Sub-prolate	Non-aperturate	0.70-0.78	Foveolate, Fossulate	Small
4.	<i>Prosopis juliflora</i> (SW.) DC	30.04	32.11	93	Oblate-spheroidal	Trizonocolporate	1.76-2.14	Reticulate	Medium

IV. CONCLUSION

Pollen morphology is a vital aspect of Mimosaceae that supports a broad range of scientific inquiries from taxonomy to ecology. Its distinctive features such as size, exine structure, aperture type, and surface ornamentation not only assist in species identification but also contribute to understanding the evolutionary adaptations of this diverse plant family.

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