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Study of pollen morphology of some common economically important plants of Jalpaiguri district, West Bengal, India

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Abstract
Pollen morphology is one of the important tool for the taxonomic study of angiospermic plant groups. It is now widely used in the study of flora of many vegetations. In this study some pollen morphological feature including exine structure of some common economically important plant taxa growing in the area of Jalpaiguri district, West Bengal, India were studied using light microscopy during the period of January 2015 to February 2017.

Keywords: pollen, exine, striate, psilate, apertural pattern, taxonomic assessment

1. Introduction

Pollen grains are widely used tool for taxonomical analysis of angiosperic plants. Taxonomists and botanists have recognized the necessity of pollen morphology in clarifying the classification of angiospermic plant groups upto species level or even upto variety level. Mature angiospermic pollen grains are unusual vegetative cells that contain sperm cells and complete with cell walls and plasma membranes. This arrangement is accomplished soon after meiosis, when an asymmetric mitotic division produces a large cell that engulfs its diminutive sister, the generative cell (Yang and Sundaresan, 2000). Subsequently, the generative cell undergoes a second mitosis to form the second sperm cell required for double fertilization. The ''tricellular'' pollen completes this division before it is released from the anther, whereas ''bicellular'' pollen undergoes this division only later, within the elongating pollen tube (Twell *et al.*, 1998) [16]. The ability to identify plants from their pollen has enabled botanists and ecologists to reconstruct past assemblages of plants and identify periods of environmental change (e.g., Faegri and Iversen 1989) [4]. The scope for the application of pollen morphological characters in plant taxonomy is very wide due to their taxon-constant but much variable characteristics (Moore *et al.*1991) [8]. Morphological characteristics of pollen grains also can be useful characters in studies of plant taxonomy because many pollen traits are influenced by the strong selective forces involved in various reproductive processes, including pollination, dispersal, and germination (Erdtman 1952; Moore *et al.* 1991; Nowicke and Skvarla 1979; Stuessy 1990) [8, 11, 13]. Various pollen morphological features such as symmetry, shape, apertural pattern and exine configuration are very conservative features for the taxonomic assessment of the plants (Perveen, 1993) [12].

2. Material and Method

The mature flowers of some plant taxa growing around Jalpaiguri District were collected during the period of January 2015 to February 2017, and pollen morpho types studied following acetolysis method (Erdtman, 1952). After collection the anthers of the collected flowers were crushed in 70% alcohol in a centrifuge tube and it was centrifuged for 5 minutes at 2500 rpm. Water was decant off and acetolysis mixture (9 parts acetic anhydride and 1 part conc. H_2SO_4) added slowly to the residue sample. Then it was kept in hot water bath at 80º C for 2-3 minutes. It was then centrifuged again for 20 mins. After centrifugation the residue sample was mounted in glycerine jelly. Relative humidity and temperature of the month was recorded with the help of hygrometer and thermometer.The micro-photographs of the pollen grains were taken in a microscope. Identification of pollen types was done with the help of reference slides prepared from the local flora as well as from published accounts. Photomicrographs of pollen types were taken by Digital camera. The measurement of the pollen grains were taken with the help of an Ocular Stage Division and the measuring unit converted into µm (milimicron).

3. Result and Discussion

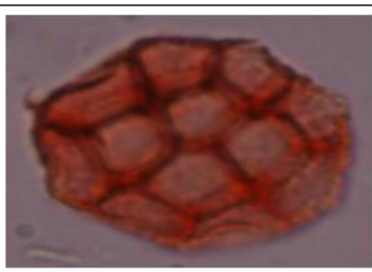
During the present work pollen morphology of 22 species belonging 10 families were studied.Each species is unique in pollen morphology.Species belonging to same family also differ in pollen morphology.

Table 1: Characteristics of Pollen of Some Economically Important Plants Of Jalpaiguri

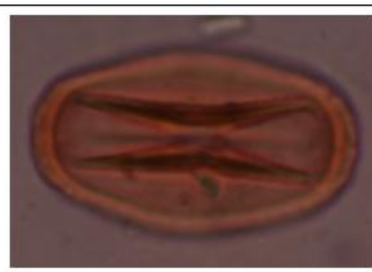
S. No.	Name	Family	Shape	Type of aperture	Flowering	L (µm)	W (µm)	L/W	Polar Outline	Surface Pattern
1	*Acacia auriculiformis* Benth.	Fabaceae	Spheroidal	Polyads	August-February	47.00	46.50	1.010	Circular	Faintly foveolate
2	*Albizia lebbeck* (L.) Benth.	Fabaceae	Perprolate	Inaperturate	April-June	66.00	33.00	2.000	Circular	Psilate
3	*Azadirachta indica* A.Juss.	Meliaceae	Prolate-Spheroidal	Tricolporate	March-April	40.00	38.00	1.052	Prolate spheroidal	Psilate
4	*Bauhinia variegata* L.	Fabaceae	Prolate-Spheroidal	Tricolporate	January-March	36.63	46.60	0.786	Triangular	Striate
5	*Bombax ceiba* L.	Bombacaceae	Oblate	Tricolporate	February-April	34.50	62.50	0.552	Triangular-obtuse plane	Reticulate
6	*Butea monosperma* (Lam.) Taub.	Fabaceae	Prolate	Tricolporate	February-April	33.50	12.50	2.680	Triangular-obtuse-convex	Obscure pattern
7	*Cassia fistula* L.	Fabaceae	Prolate-Spheroidal	Tricolporate	March-June	34.50	22.50	1.533	Triangular obtuse-convex	Psilate
8	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Fabaceae	Prolate-Spheroidal	Tricolporate	June-September	39.60	24.70	1.603	Triangular-obtuse-convex to circular	Psilate
9	*Dalbergia sissoo* DC.	Fabaceae	Prolate	Tricolporate	March-April	27.00	21.00	1.285	Semicircular, triangular and spheroidal.	Psilate
10	*Erythrina variegata* L.	Fabaceae	Sub-Oblate	Tricolporate	February-April	37.50	30.00	1.250	Triangular-obtuse-convex	Reticulate
11	*Lagerstromea speciosa* (L.) Pers	Lythraceae	Prolate	Tricolporate	April-June	32.00	23.00	1.391	Circular	Psilate
12	*Michelia champaca* L.	Magnoliaceae	Boat shaped Oblate	Sulcate	May-October	37.40	24.75	0.661	Circular	Psilate
13	*Moringa oleifera* Lam.	Moringaceae	Per-prolate	Tricolporate	February- June	30.52	14.80	2.062	Triangular-obtuse-convex to circular	Psilate
14	*Psidium guajava* L.	Myrtaceae	Oblate	Tricolporate	April-September	18.00	26.50	0.679	Triangular-obtuse-plane	Psilate
15	*Sesbania grandiflora* (L.) Pers.	Fabaceae	Prolate	Tricolporate	September-November	26.15	19.21	1.361	Triangular-obtuse-convex	Reticulate
16	*Tamarindus indica* L.	Fabaceae	Oblate-Spheroidal	Tricolporate	April-June	30.00	35.00	0.857	Oblate spheroidal	Striate
17	*Alstonia scholaris* (L.) R. Br.	Apocynaceae	Spheroidal	Tricolporate	October-January	37.00	37.00	1.000	Triangular-circular	Psilate
18	*Delonix regia* (Bojer) Raf.	Fabaceae	Sub-prolate	Tricolporate	April-June	42.40	32.10	1.320	Circular	Reticulate
19	*Lagerstroemia thorelii* Gagnep.	Apocynaceae	Prolate-Spheroidal	Tricolporate	May-July	35.00	31.50	1.111	Circular	Psilate
20	*Tectona grandis* L.f.	Lamiaceae	Prolate	Colpate	July-August	40.00	27.50	1.454	Oblate spheroidal-Circular	Psilate
21	*Plumeria alba* L.	Apocynaceae	Triangular	Tricolporate	March-August	32.00	24.00	1.333	Semicircular,triangular-spheroidal	Psilate
22	*Camellia sinensis* (L.) Kuntze	Theaceae	Sub-Prolate	Tricolporate	September-February	40.00	31.50	1.269	Circular- spheroidal	Psilate

4. Conclusion

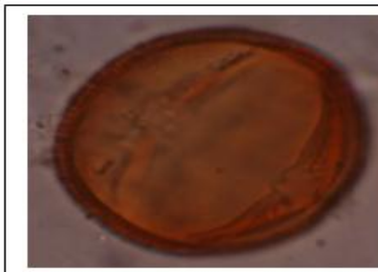
The current study was done considering the pollen morphology analyses, of some plants of social forest and indoor plant which are known for their edible use, medicinal use, Gardening etc. Pollen morphology of such taxa is extremely varied which can be correlated with the varied habit and family. It is apparent from the present observation that members of the such family show much variation in pollen morphology and pollen charateristics. These interesting characters can be correlated with other biosystematical characters like Pollen-Ovule ratio, leaf architecture, Seed characteristics, cytology, chemistry, anatomy, etc. for better understanding of the intra- and inter-relationship of the taxa and phylogeny of the family.



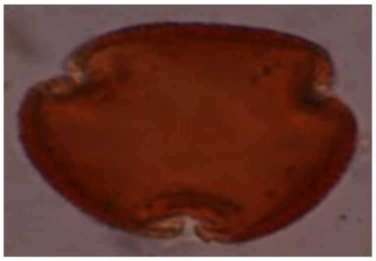
Acacia auriculiformis Benth

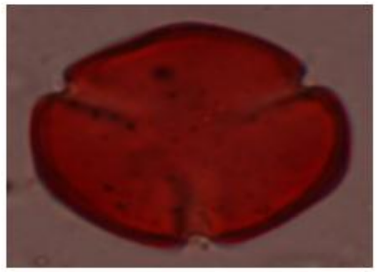


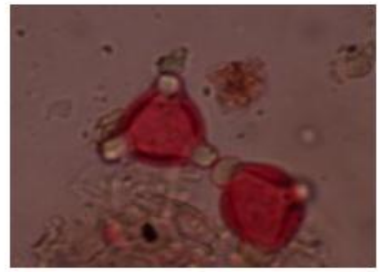
Bombax ceiba L.

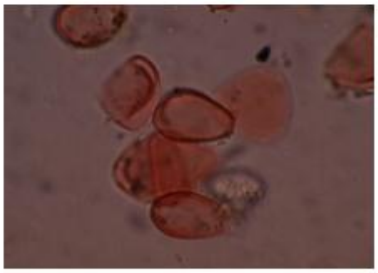


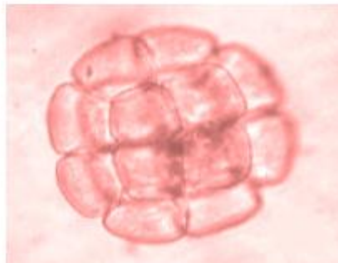
Bauhinia variegata L. (Equatorial view)

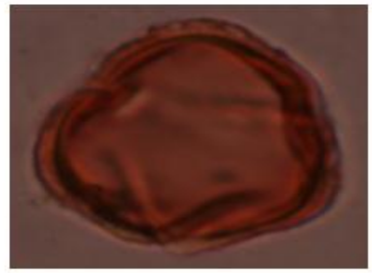

Bauhinia variegata L. (Polar view)


Senna siamea (Lam.) H.S.Irwin & Barneby;

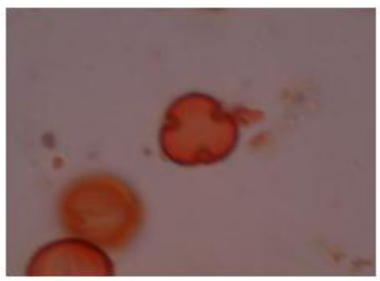

Dalbergia sissoo DC.

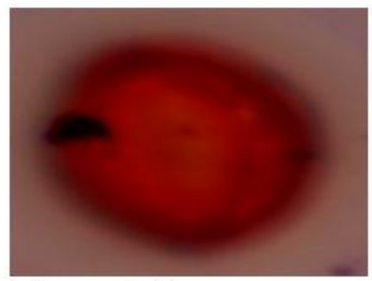

Erythrina variegata L.;

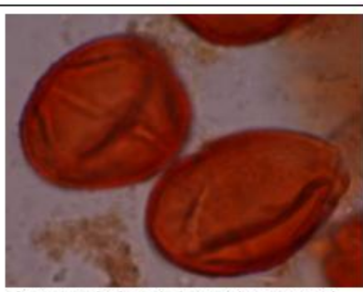

Albizia lebbeck (L.) Benth.

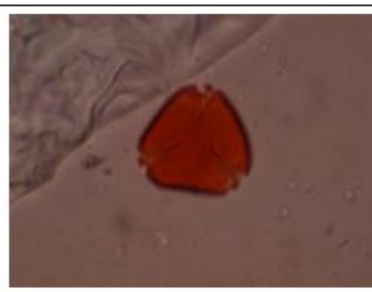

Lagerstroemia thorelii Gagnep


Sesbania grandiflora (L.) Pers

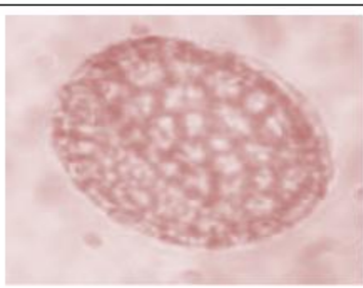

Moringa oleifera Lam


Tectona grandis L.f


Alstonia scholaris (L.) R. Br.(Equatorial view)

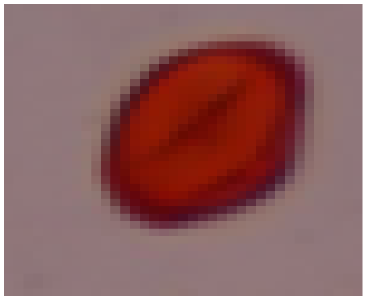

Alstonia scholaris (L.) R. Br.(Polar view)


Butea monosperma (Lam.) Taub.

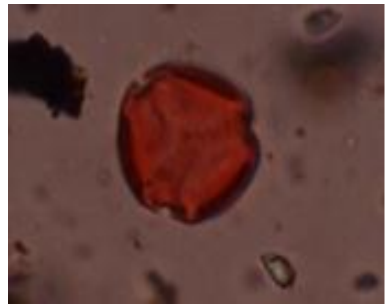

Delonix regia (Bojer) Raf


Psidium guajava L


Michelia champaca L.



Azadirachta indica A.Juss.



Plumeria alba L.

5. References

1. Bhattacharya A,Mondal S,Mandal S. Aeropalynological study of some angiospermic plants. Journal of National Botanical Soceity. 1997; 51:83-86.
2. Erdtman G. Pollen Morphology and Plant Taxonomy. Angiosperms. Chron. Bot. Co., Waltham, Massachusettes, 1952.
3. Erdtman G. An Introduction to the Study of Pollen Grains and Spores.Copenhagen, Denmark: Munksgaard, 1969.
4. Faegri K, Kaland PE, Krzywinski K. Which Plant? Identification keys for the Northwest European Pollen Flora extracted from Textbook of Pollen Analysis, 4th Editon. Wiley, Chichester, 1989.
5. Forster RM, Flenley JR. Pollen purification and fractionation by equilibrium density gradient centrifugation. Palynology. 1993; 17:137-155.
6. Kuriakose ME. Pollen morphology of the tribe Dalbergiae from S. India. J Palynol. 2005; 41:59-68.
7. Mitra K, Mondal M. Pollen morphology of Exstipellate and Stipellate Hedysareae Leguminosae. Proc. Ind. Nat. Sci. Acad. 1982; 6:755-769.
8. Moore PD, Webb JA, Collinson ME. Pollen Analysis, 2nd Edition. Blackwell, Scientific, Oxford, 1991.
9. Nair P. Pollen Morphology of angiosperms a historical and phylogenetic study. New York: Barnes and Noble, Inc, 1970.
10. Nowicke JW, Skvarla JJ. Pollen morphology and the relationship of the Plumbaginaceae, Polygonaceae, Primulaceae to the order Centrospermae. Smithson Contrib. Bot. 1977; 37:1-64.
11. Nowicke JW, Skvarla JJ. Pollen morphology: The potential influence in higher order systematics. Annl. Missouri Bot. Gard. 1979; 66:633-700.
12. Perveen A. A preliminary study of the pollen flora of Karachi. Ph.D Thesis. University of Karachi, Karachi, 1993.
13. Stuessy TF. Plant taxonomy: the systematic evaluation of comparative data. Columbia University Press, New York, USA, 1990, XVIII, 514.
14. Thompson JD, Wilson P, Valenzuela MV, Malzon M. Pollen presentation and pollination syndromes, with special reference to Penstemon. Plant Species Biol. 2000; 15:11-29.
15. Tewari RB, Nair PKK. Pollen morphology of some Indian Papilionaceae. J Palynol. 1979; 15(2):49-73.
16. Twell D, Park SK, Lalanne E. Asymmetric division and cell fate determination in developing pollen. Trends Plant Sci. 1998; 3:305-310.
17. Yang WC, Sundaresan V. Genetics of gametophyte biogenesis in Arabidopsis. Curr Opin Plant Biol. 2000; 3:53-57.