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Research Article

The arboreal diversity of the Pocharam wildlife sanctuary, Medak district, Telangana state, India based on pollen analysis

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Abstract

Palynological studies were carried out in 16 arboreal plants of Pocharam Wildlife area. These plants belong to 12 families viz. *Anacardiaceae*, *Apocynaceae*, *Bignoniaceae*, *Combretaceae*, *Cornaceae*, *Fabaceae*, *Lamiaceae*, *Muntingiaceae*, *Meliaceae*, *Rutaceae*, *Sapotaceae*, and *Lythraceae*. The pollen characters studied such as size, shape, aperture and ornamentation types. The pollen morphology shows diversity which will help in identification of taxa and is useful in taxonomy and Palynological studies of Medak district in future.

Keywords: Palynology, Arboreal plants

INTRODUCTION

Medak district is located in the Indian state of Telangana. Medak districts one of the Western districts of Telangana lies approximately between 17°27' to 18°19' North Latitudes and 77°28' to 79°10' East Longitudes. The district is bounded on the North by Nizambad and Karimnagar, East by Warangal and Nalgonda, South by Rangareddy district and West by Karnataka State. The total area of the district is 2,765 Sq. Km and ranks 16th position contributing about 3.53% area of the State. The shape of the district is rectangular from West to East.

Pocharam Wildlife Sanctuary (18-6 to 18-18 'N. Lat, and 78° 8.30 to 78"-20'. 30" E. Long.) It is named after the Pocharam Lake, formed from the bounding of the Allair from 1916-1922. It was a former hunting ground of the Nizam that was declared a wildlife sanctuary in the early 20th century. The Sanctuary, covering an area of 130 km², is spread across parts of Medak and Nizamabad districts. With damming of the river and consequent water outflow into the forests in the vicinity, forests here flourished well supporting rich and

diverse biota. The sanctuary has an ecotourism center for visitors. It is home to many species of birds and mammals.

The present study aimed to describe the pollen morphological characteristics (Bhattacharya et al., 2006) of the selected species in the Pocharam Wildlife Sanctuary Medak area.

METHODOLOGY

Present work was carried out during the period of 2019-2020; pollen material was collected from 16 arboreal plants of Pocharam forest and identified the diversity of pollen morphology. The pollen material was processed and permanent pollen slides were prepared by Erdtman's method (Erdtman, 1960). The pollen material was studied under a binocular research microscope LABOMED Lx 500, and noted the pollen characters (Figure 1). The methodology followed for the preparation of Herbarium, as described by Jain and Rao (1977), and the Herbarium with Voucher numbers were deposited at Department of Botany, Nizam College (A), Osmania University, and Hyderabad (Tables 1 and 2).

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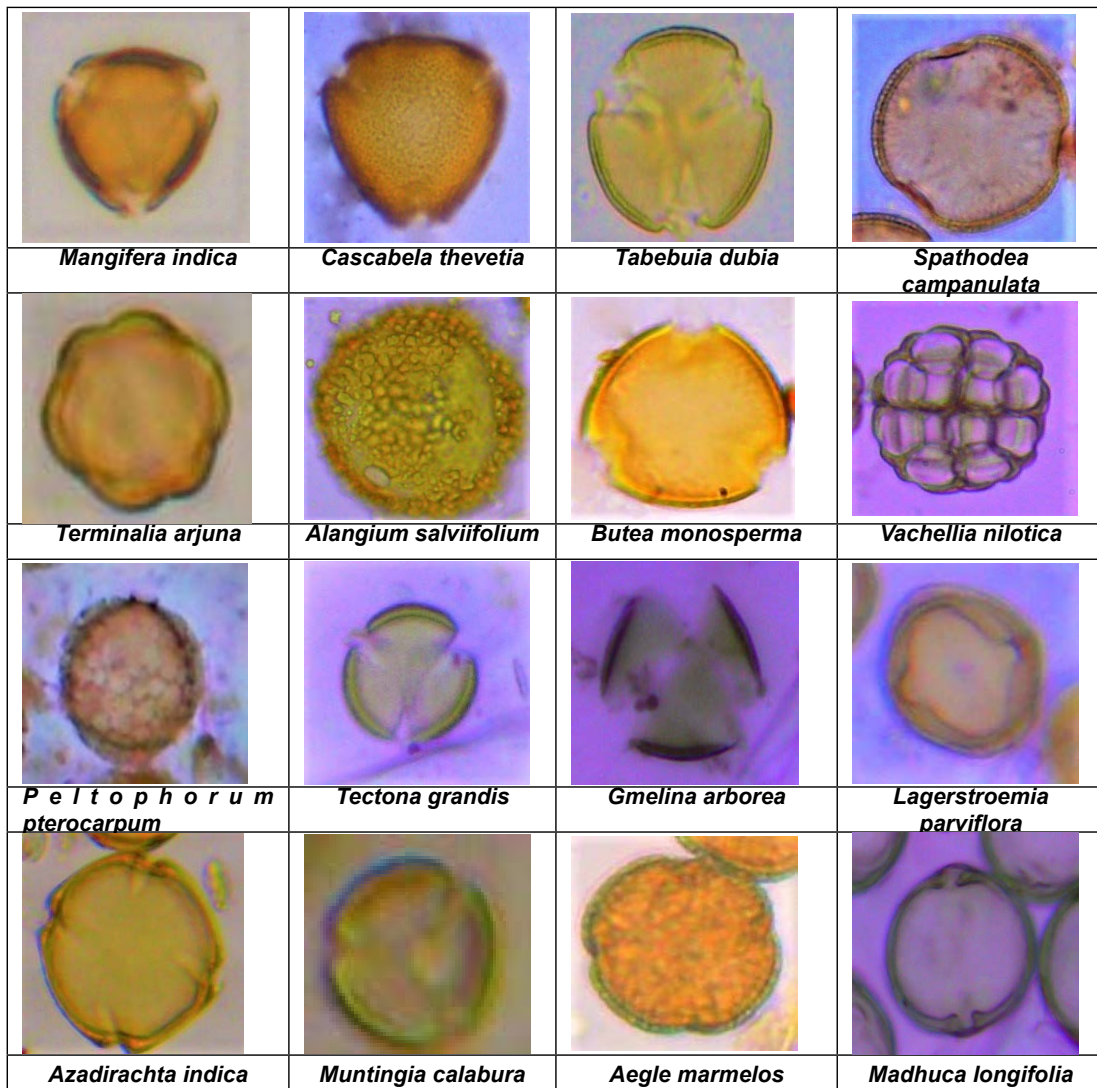


Figure 1: Pollen characters.

Table 1. 16 arboreal plants and flowering season from Pocharam Wildlife area Medak district, Telangana State.

S. No	Species Name	Family	Season of Flowering
1	<i>Mangifera indica</i> L.	Anacardiaceae	Nov-Apr
2	<i>Cascabela thevetia</i> (L.) Lippold	Apocynaceae	Throughout the year.
3	<i>Tabebuia dubia</i> (C. Wright ex Sauvalle) Britton ex Seibert	Bignoniaceae	Jan-Apr
4	<i>Spathodea campanulata</i> P.Beauv.	Bignoniaceae	Aug-Jan
5	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Combretaceae	May-June
6	<i>Alangium salviifolium</i> (L.f.) Wangerin	Cornaceae	Feb-Apr
7	<i>Butea monosperma</i> (Lam.) Kuntze	Fabaceae	Jan-Mar
8	<i>Vachellia nilotica</i> (L.) P.J.H.Hurter&Mabb	Fabaceae	July-Dec
9	<i>Peltophorum pterocarpum</i> (DC.) Backer	Fabaceae	Mar-Apr
10	<i>Tectona grandis</i> L.f.	Lamiaceae	Sep-Dec
11	<i>Gmelina arborea</i> Roxb. ex Sm.	Lamiaceae	Feb-Apr
12	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae	Apr-June
13	<i>Azadirachta indica</i> A.Juss.	Meliaceae	Feb-Apr
14	<i>Muntingia calabura</i> L.	Muntingiaceae	Dec-May
15	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Mar-June
16	<i>Madhuca longifolia</i> (J.Koenig ex L.) J.F.Macbr.	Sapotaceae	Feb-Mar

Table 2. Pollen Morphology of 16 arboreal plants from Pocharam Wildlife area Medak District, Telangana State.

S. No	Species Name	Size P. A In um	SizeE. D In um	P/E X 100	Shape	Type of Aperture	Ornamentation
1	<i>Mangifera indica</i> L.	24.81	20.76	1.19	Sub-Prolate	3-Zonocolporate	Striate-reticulate
2	<i>Cascabela thevetia</i> (L.) Lippold	64.52	63.18	1.02	Prolate-speroidal	3-Zonocolporate	Psilate
3	<i>Tabebuia dubia</i> (C. Wright ex Sauvalle) Britton ex Seibert	67.63	68.05	0.99	Oblate-speroidal	Inaperturate	Psilate
4	<i>Spathodea campanulata</i> P.Beauv.	42.72	29.85	1.43	Prolate	3-Zonocolporate	Reticulate
5	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	14.12	13.96	1.01	Prolate-speroidal	3-Zonocolporate	Granular
6	<i>Alangium salviifolium</i> (L.f.) Wangerin	74.39	69.51	1.07	Prolate-speroidal	Tetraporate	Verricate
7	<i>Butea monosperma</i> (Lam.) Kuntze	44.56	36.12	1.23	Sub-Prolate	3-Zonocolporate	Micro-reticulate
8	<i>Vachellia nilotica</i> (L.) P.J.H.Hurter & Mabb	133.85	126.36	1.05	Prolate-Speroidal	Inaperturate	Granular
9	<i>Peltophorum pterocarpum</i> (DC.) Backer	53.56	57.85	0.92	Oblate-speroidal	3-Zonocolporate	Reticulate
10	<i>Tectona grandis</i> L.f.	21.36	20.09	1.06	Prolate-speroidal	3-Zonocolporate	Finely-reticulate
11	<i>Gmelina arborea</i> Roxb. ex Sm.	29.76	24.26	1.22	Sub-Prolate	3-Zonocolporate	Finely-Reticulate
12	<i>Lagerstroemia parviflora</i> Roxb.	25.32	21.3	1.18	Sub-Prolate	3-Zonocolporate	Psilate
13	<i>Azadirachta indica</i> A.Juss.	40.12	33.56	1.19	Sub-Prolate	4-Zonocolporate	Psilate
14	<i>Muntingia calabura</i> L.	10.95	8.12	1.34	Prolate	3-Zonocolporate	Psilate
15	<i>Aegle marmelos</i> (L.) Corrêa	24.89	25.06	0.99	Speroidal	3-Zonocolporate	psilate
16	<i>Madhuca longifolia</i> (J.Koenig ex L.) J.F.Macbr.	40.12	37.02	1.08	Prolate-speroidal	6-Zonocolporate	psilate

RESULTS AND DISCUSSION

The 16 arboreal plants collected from Pocharam Forest shows diversity in pollen morphological characters such as size, shape, aperture type and ornamentation. According to size *Muntingia calabura* are recorded as smallest grains with 10.95 µm (Raj & Reddy, 2019a) and largest grains recorded as grains of *Vachellia nilotica* with 133.85 µm, rest of the 14 grains size falls in between 10.95 µm to 133.85 µm. Regarding shape spheroidal, prolate, prolate spheroidal, Eu-oblate, and oblate spheroidal types were recorded. Shapes of the grains were deduced by P.A/ E.D ratio multiplying with 100.

Pollen grains of *Aegle marmelos* showing spheroidal shape. Oblate spheroidal shape was shown by *Tabebuia dubia* and *Peltophorum pterocarpum* (Raj & Reddy, 2019a). Plants *Cascabela thevetia* (Kuijt & Van Der, 1997), *Terminalia arjuna*, *Alangium salviifolium*, *Vachellia nilotica*, *Tectona grandis*, *Madhuca longifolia* was recorded shape of prolate spheroidal.

Sub-Prolate shape was recorded in *Mangifera indica*, *Butea monosperma*, *Gmelina arborea*, *Lagerstroemia parviflora*, *Azadirachta indica*. Prolate shape was shown in *Spathodea campanulata*, *Muntingia calabura* (Raj & Reddy, 2019b).

Based on aperture type one species, *Alangium salviifolium* shows tetraporate type of aperture. Other grains are having inaperturate type showing *Tabebuia dubia*, *Vachellia nilotica* (Bhattacharya et al., 2015). Out of the 16 eleven pollen grains are of trizonocolporate type, one grain *Azadirachta indica* recorded 4-zonocolporate type of aperture.

Regarding ornamentation psilate, reticulate, micro reticulate, Finely-reticulate verricate and granulate types were recorded. Psilate type of ornamentation was observed in *Cascabela thevetia* (Ebigwai & Egbe, 2017), *Tabebuia dubia*, *Lagerstroemia parviflora*, *Azadirachta indica*, *Muntingia calabura*, *Aegle marmelos*, and *Madhuca longifolia*. Reticulate ornamentation shows in *Spathodea campanulata*, *Peltophorum pterocarpum*.

Finely-reticulate ornamentation was noticed in *Tectona grandis*, *Gmelina arborea*. Striate-reticulate type was observed in *Mangifera indica* (Assis et al., 2021) and granular ornamentation observed in *Terminalia arjuna*, *Vachellia nilotica*. Verricate ornamentation was noticed in *Alangium salviifolium*. The diverse morphological characters of pollen grains give clue of the significance of palynology in separation of taxa and the study establishes the significance of pollen characters (Agashe, 2006) such as shape, size, aperture and ornamentation in the systematics (Nayar, 1990; Rueangsawang et al, 2013; Shendage & Yadav, 2009).

Pollen Key

- 1a. Pollen grains Inaperturate -----2
 2a. Pollen grains monads ----*Tabebuia dubia*
 2b. pollen grains Polyads ----*Vachellia nilotica*
 1b. Pollen grains aperture -----3
 3a. Apertures simple type -----4
 4a. Apertures porate (tetraporate) ----*Alangium salviifolium*
 3b. Colpate grains -----5
 5a. Grains with trizonocolpate ---- *Lagerstroemia parviflora*
 2a. Grains with compound apertures -----6
 6a. Trizonocolporate Grains with striate reticulate ornamentation -----*Mangifera indica*
 6b. Tetrazonocolporate Grains with sub prolate shape ----*Azadirachta indica*
 6c. Hexazonocolporate Grains with prolate spheroidal shape ----*Madhuca longifolia*
 2b. Grains with 3 apertures -----7
 7a. Grains with other than Psilate ornamentation -----8
 8a. Grains with Granular ornamentation ----*Terminalia arjuna*
 8b. grains with Micro- reticulate ornamentation ----*Butea monosperma*
 8c. Grains with reticulate ornamentation ----*Spathodea campanulata*
 7b. Grains with oblate shape -----9
 9a. Grains with oblate spheroidal shape ---- *Peltophorum pterocarpum*
 9b. Grains with spheroidal shape ---- *Aegle marmelos*
 7c. Prolate shape ---- 10
 10a. Grains with. Prolate shape ----*Muntingia calabura*
 10b. Grains with prolate spheroidal shape ----*Cascabela thevetia*
 7d. Grains with finely -reticulate ornamentation ---11
 11a. grains size > 25 µm ----12
 12a. grains with prolate spheroidal shape ---- *Tectona grandis*
 11b. grains size < 25 µm -----13

13a. grains with sub prolate shape ----*Gmelina arborea*

CONCLUSION

This paper gives a common picture of little World called Palynology. Palynology is a subject of wide degree that began when magnifying lens was imagined. Based on the Palynological data systematic relations are generally related with the aperture characters. However, the present study revealed that secondary dust characters like exine ornamentation, pollen size and shape etc. are of significant role in the systematic considerations. The different morphological characters of dust grains provide insight of the meaning of palynology in partition of taxa.

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