ISSN: 2287-688X

Annals of
Plant Sciences

Volume 14, Issue 05 (2025) pp. 6832-6840

Research Article

Pollen Characterization of Some Tropical Flora of Kollapur Revenue Division of Nagarkurnool District of Telangana State, South India

Chaya Pallati and M. Jeevan kumar

Palynology and Paleobotany Research Lab. Department of Botany, University College of Science, Saifabad, Osmania University, Hyderabad – 500004

Abstract

The present paper deals with the ongoing pollen morphological studies of the flora of Kollapur division of Nagarkurnool district of Telangana state, India. Pollen morphology of fifteen taxa referable to thirteen families was analysed. Pollen morphology of *Alstonia scholaris, Cordia sebestena, Dichrostachis cinerea, Dodonea viscosa, Gyrocarpus americanus, Leucophyllum frutescens, Mimosa aculeticarpa, Mimosa pudica, Nyctanthes arbor tristis, Prunus mahleb, Santalum album, Senna occidentalis, Styrax officinalis, Syzygium cumini, Zizyphus mauritiana,* were analysed under light microscopy. The pollen slides were prepared by using standard acetolysis method (Erdtman, 1960). In this study, pollen morphological features including grain units, size and shape, number and character of apertures, exine sculpture were examined. Pollen grain units were mostly monads but tetrads and octads were also recorded. The shapes of all pollen grain varied from oblate, oblate-spheroidal, prolate, prolate-spheroidal to spheroidal. Apertures were simple and composite types, colpate, colporate and porate aperture types were characterized in the pollen taxa. The exine sculptring patterns of studied pollen taxa ranged from psilate, verrucate, microreticulate, reticulate, retipilate, striate-rugulate, and scabrate.

Keywords: *Tropical flora, Pollen morphology, Kollapur division, Nagarkurnool district, Telangana state, India.*

Introduction

Kollapur region is an area spanning the Nallamala forest on the banks of the river Krishna of Nagarkurnool district in the state of Telangana. Kollapur is located at a distance of 178 kms from Hyderabad and 50.3 Kms from Nagarkurnool. Most of the Nallamala region along the Krishna River was under Kollapur division and is located at 18.0°N 79.58°E. It has an average elevation of 458 metres (1503 feet) and is settled in the central Deccan plateau and northern part of Nallamalla Hills with dry deciduous forests towards the southern region of the Nagarkurnool district. The Tiger Reserve is rich in flora and fauna and the floral diversity is moderately rich with medicinal properties. Pollen morphology is one of the most significant tool for the taxonomic study as well as systematics of plant taxa. The present paper is a part of an ongoing work on pollen morphological studies of the flora of Kollapur revenue division and it deals with the study of pollen characters of fifteen taxa recorded from the study area.

Materials and Methods

Polleniferous material of fifteen genera of thirteen families during their flowering period were collected for palynological studies from kollapur division of Nagarkurnool district of Telangana state south India (Map-1 and ll). The flowering plants collected include *Alstonia scholaris, Cordia sebestena, Dichrostachis cinerea, Dodonea*

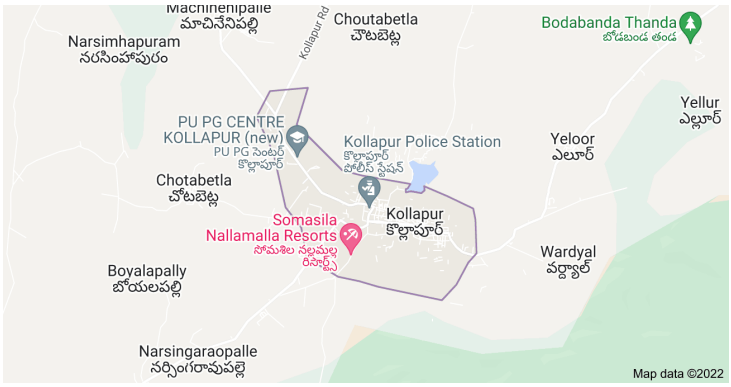
***Corresponding Author:**
Chaya Pallati;
DOI: https://doi.org/ 10.5281/zenodo.15578776

viscosa, Gyrocarpus americanus, Leucophyllum frutescens, Mimosa aculeticarpa, Mimosa pudica, Nyctanthes arbor tristis, Prunus mahleb, Santalum album, Senna occidentalis, Styrax officinalis, Syzygium cumini, Zizyphus mauritiana. Pollen slides of the plants collected were prepared by using Erdtman's acetolysis technique (1960).

Preparation of Pollen Slides by Acetolysis Technique (Erdtman, 1960)

For pollen slide preparation, polleniferous material / anthers of the flowering plants were picked with the help of a forceps into a test tube containing 70% alcohol. They were crushed with a glass rod and then filtered. The filtrate was centrifuged and to the sediment 5ml. of Glacial acetic acid was added and centrifuged. The pollen sediment was processed by adding acetolysis mixture and mounting of the pollen grains was done in glycerine jelly. Three slides were prepared for each pollen type. Later the pollen slides were scanned under the microscope and morphological characters were studied according to the standard literature (Bhattacharya, *et al*., (2015), Bhaskar, (1992), Erdtman, (1952). Punt, (2007), Nayar, (1990). Nair (1970). Pramanick, *et al*., (2015). Perveen, & Qaiser, (2005). Panicker, & Sreedevi. (2004). Photomicrographs of the pollen types studied was taken by using a trinocular Olympus microscope attached with a digital camera.

Map I: showing Nagarkurnool district , Telangana State



Map II: Showing the Kollapur division of Nagarkurnool district, Telangana state, south India.

Results

The results of pollen morphological studies of fifteen flowering plants viz. *Alstonia scholaris, Cordia sebestena, Dichrostachis cinerea, Dodonea viscosa, Gyrocarpus americanus, Leucophyllum frutescens, Mimosa aculeticarpa, Mimosa pudica, Nyctanthes arbor tristis, Prunus mahleb, Santalum album, Senna occidentalis, Styrax officinalis, Syzygium cumini, Zizyphus mauritiana* showed diversity in morphological

features. The pollen types varied in size, shape, apertural pattern and sporoderm ornamentation. Details regarding the phenology and the mophological characteristics of the pollen types are given below. Plate 1-4 shows the photomicrographs of the palynotaxa studied.

Pollen Morphological Characters and Phenology of Collected Plant Species:

1. ***Senna occidentalis (L.) Link.***
English name: Coffee senna
Vernacular name: Kassinda
Flowering period: Throughout the year
Size, shape and symmetry - Pollen grains in monads,46-48 amb triangular, 48 x 44 um, prolate spheroidal, isopolar, radially symmetrical.
Aperture- Tricolporate, colpi very narrowly elliptic, tips acute, ora-lalongate
Exine- 3um thick, tectate, surface ornamentation psilate.

2. ***Cordia sebastena L.***
English name: Geiger tree
Vernacular name: Virigi
Flowering period: Throughout the year
Size, shape and symmetry - Pollen grains in monads, 41-45 um, amb spheroidal, 37 x 45um, oblate, isopolar, radially symmetrical
Aperture- Tricolporate, colpi is wide, tips acute, margins thick, ora circular
Exine- 2.5 um thick, pollen ornamentation reticulate, lumina polygonal

3. ***Styrax officinalis (L.)***
English name: Styrax
Vernacular name: Storax or Snowbell
Flowering period: May-June
Size, shape and symmetry - Pollen grains monads, 40-45 um, amb rounded triangular, 30-32 x 40-45 um, oblate, isopolar, radially symmetrical
Aperture- Tricolporate, colpi wide, ora-lalongate
Exine- 2um thick, subtectate, surface ornamentation scabrate

4. ***Leucophyllum fruitescence (Berland.) I.M.Johnst.***
English name: Texas sage
Vernacular name: Purple sage
Flowering period: Aprl-Aug
Size, shape and symmetry - Pollen grains-monads, 22 x 17 um, amb-25, rounded triangular, prolate, isopolar, radially symmetrical.
Aperture- Tricolporate, colpi long, elliptic, ora-circular, wide.
Exine- 1.5um, thick, subtectate, collumella distinct, surface ornamentation microreticulate

5. ***Mimosa aculeaticarpa Ortega***
Engish name: Cat's Claws
Vernacular name: Attapatti
Flowering period: May-Aug,Aprl-Sep
Size, shape and symmetry - Pollen grains in 8- celled polyads, individual grains 10-12 um in diameter
Aperture- Triporate, pores faint
Exine- 1.5 um thick, tectate, surface ornamentation psilate

6. ***Mimosa pudica L.***
English name: Touch me not
Vernacular name: Attapatti
Flowering period: Throughout the year
Size, shape and symmetry - pollen grains in 8-12 um, tetrahedral, tetrads; spheroidal; radially symmetrical.
Aperture- Individual grains provided with 4-5 faint pores.
Exine- 1µm thick, tectate, surface ornamentation psilate.

7. ***Alstonia scholaris (L.)R. Br***
English name: Devil's tree
Vernacular name:Edakulapala
Flowering period: Mar-July
Size, shape and symmetry - Pollen grains in monads, 13.5 , amb spheroidal, 21-22x 22-24 µm, oblate spheroidal, isopolar, radially symmetrical.
Aperture- Tricolporate, core margin thick, ora circular, thick, colpi fine.
Exine- 1.5 µm thick, sexine as thick as nexine, tectate, surface ornamentation psilate to granular

8. ***Dodonaea viscosa Jacq.***
English name: Broadleaf hop bush
Vernacular name: Bandaru
Flowering period: April-Aug

Size, shape and symmetry - 29-33 µm, amb sub-triangular to rounded with slightly projecting obtuce angles, 28-32 x 26-29 µm, prolate spheroidal, radially symmetrical
Aperture- Tricolporate, colpi long and narrow almost reaching the pores, ora lalongate with nexinous thickenings.
Exine- 2 µm thick, subtectate, surface faintly microreticulate

9. ***Gyrocarpus americanus Jacq.***
English name: Helicopter tree
Vernacular name: Poliki
Flowering name: Oct-Aprl
Size, shape and symmetry - Pollen grains in monads, 22 µm, amb spheroidal, 20 x 22 µm, sub-oblate isopolar, radially symmetrical.
Aperture- Tricolporate, colpi-fine, ora-incrassate.
Exine- 1-2 µm thick, tectate, surface ornamentation psilate

10. ***Prunus mahaleb L.***
English name: Mahleb cherry
Vernacular name: Cherry tree
Flowering name: Dec-Mar
Size, shape and symmetry - Pollen grains in monads, 26-50 µm, amb triangular, 48-50x 28-32 µm, oblate, isopolar, radially symmetrical.

Aperture- Tricolporate, colpi wide, ora circular
Exine- 1 um. thick, surface ornamentation perforate.

11. ***Santalum album L.***
English name: Indian sandalwood
Vernacular name: Chandana
Flowering period: Dec-Aprl
Size, shape and symmetry - Pollen grain in monads, rounded triangular, 24-30 X 18-22 µm, sub prolate, isopolar radially symmetrical.
Aperture-Triporate, pore margins thick, incrassate, pore diameter 4-6 µm.
Exine- 1.5 µm thick, sub tectate, surface ornamentation psilate to granular.

12. ***Dichrostachis cinerea (Linn.) wt&Arn.***
English name: Sicklebush
Vernacular name: Nalla veluturu chettu
Flowering period: Oct-Feb
Size, shape and symmetry - Pollen grain 28-30 um, Amb triangular, isopolar, radially symmetrical.
Aperture-Triporate, pores with annulus
Exine- 2.5 um thick, tectate, surface ornamentation verrucate.

13. ***Nyctanthes arbor tristis Linn.***
English name: Night blooming jasmine
Vernacular name: Parijatha
Flowering peroid: Aug-Dec
Size, shape and symmetry - Polen grains in monads, 72-88 um, Amb spheroidal, 65-86 x 60-74 um, Sub-prolate, isopolar, radially symmetrical.
Aperture - Tricolpate, colpi linear, long tips acute, margins thick incrassate
Exine- 5-6 um thick, subtectate, surface reticulate, piloid processes of two types (narrow & broad) lumina polygonal with free bacules, muri simplibaculate.

14. ***Syzygium cumini (Linn.) Skeels.***
English name: Black plum
Vernacular name: Neredu
Flowering period: Mar-Aprl
Size, shape and symmetry - Pollen grains in monads, 16-18 um, Amb triangular, occasionally quadrangular sides concave, 10 - 12 x 17-20 um, oblate, isopolar, radially symmetrical
Apeture - Tricolporate, rarely tetracolporate, syncolpate,parasyncolpate ora-lalongate
Exine- 1.2 um thick, tectate, surface psilate.

15. ***Zizyphus mauritiana Lam.***
English name: Jujube
Vernacular name: Regu
Flowering period: July-Nov
Size, shape and symmetry - Pollen grains in monads, 18-22 um, Amb triangular, sides 16-20 x 20-22 um, sub-prolate, isopolar, radially symmetrical
Aperture-Tricolporate, colpi long, tips acute, or-lalongate
Exine-1.5 um thick, tectate, surface psilate

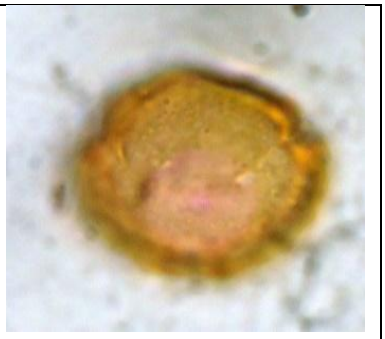
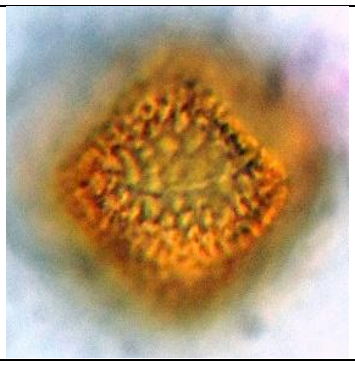
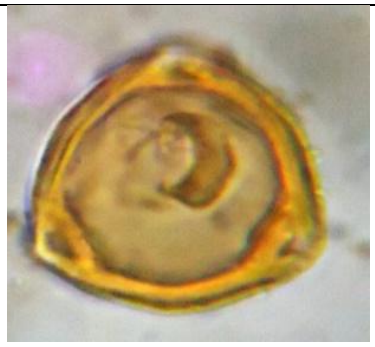
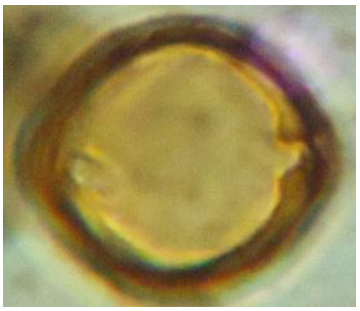
		
Alstonia scholaris	*Alstonia scholaris*	*Alstonia scholaris*
		
Cordia sebastena	*Cordia sebastena*	*Cordia sebastena*
		
Dichrostachis cinerea	*Dichrostachis cinerea*	*Dichrostachis cinerea*
		
Dodonia viscosa	*Dodonia viscosa*	*Dodonia viscosa*

Plate 1: Photomicrographs of the pollen types studied (All figures x 1000 magnification)

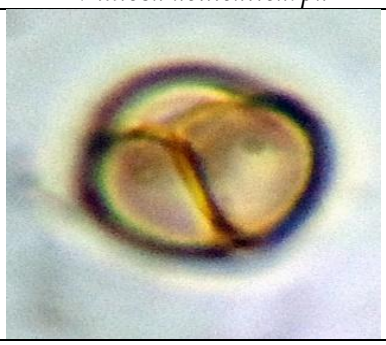
		
Gyrocarpus americanus	*Gyrocarpus americanus*	*Gyrocarpus americanus*
		
Leucophyllum frutescencs	*Leucophyllum frutescencs*	*Leucophyllum frutescencs*
		
Mimosa aculeaticarpa	*Mimosa aculeaticarpa*	*Mimosa aculeaticarpa*
		
Mimosa pudica	*Mimosa pudica*	*Mimosa pudica*

Plate: 2

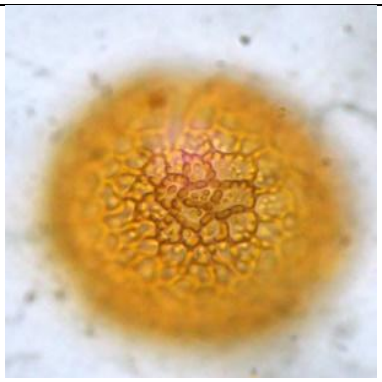
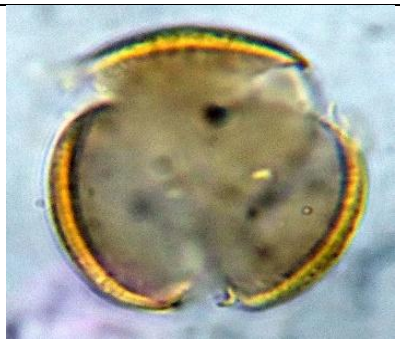
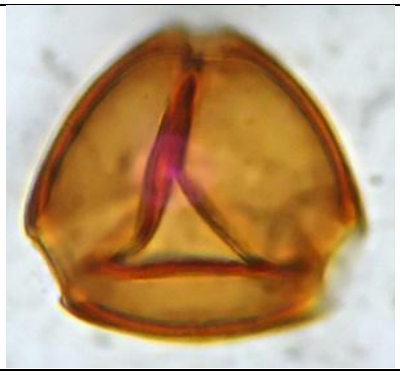
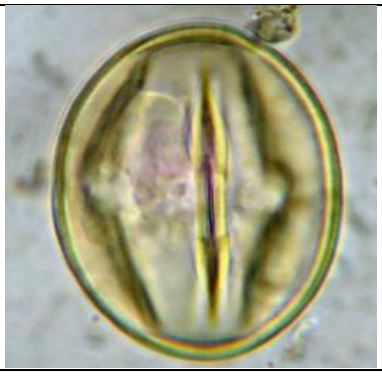
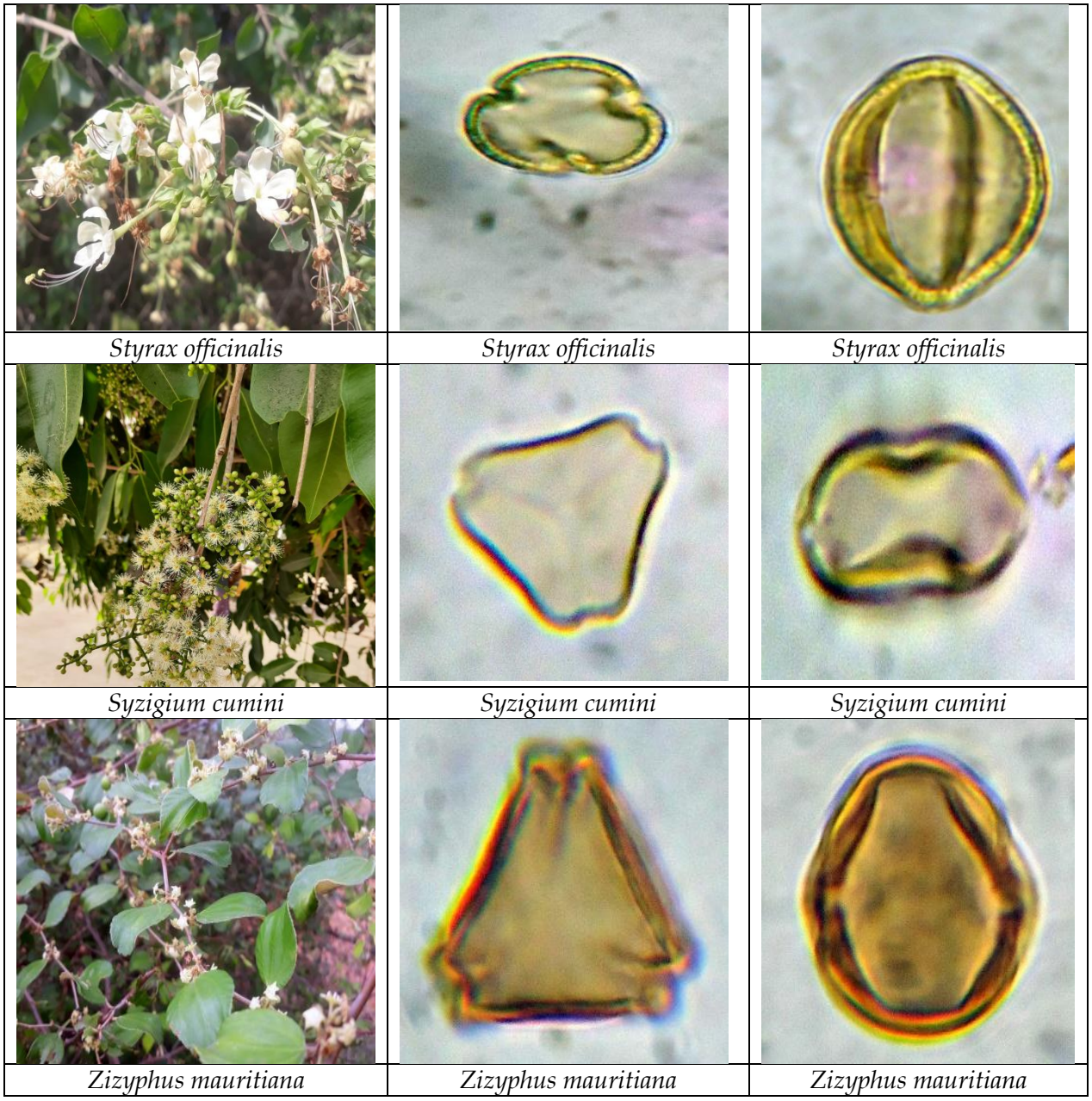
		
Nyctanthus orbor tristis	*Nyctanthus orbor tristis*	*Nyctanthus orbor tristis*
		
Prunus mahaleb	*Prunus mahaleb*	*Prunus mahaleb*
		
Santalum album	*Santalum album*	*Santalum album*
		
Senna occidentalis.	*Senna occidentalis.*	*Senna occidentalis.*

Plate – 3



Styrax officinalis	*Styrax officinalis*	*Styrax officinalis*
Syzigium cumini	*Syzigium cumini*	*Syzigium cumini*
Zizyphus mauritiana	*Zizyphus mauritiana*	*Zizyphus mauritiana*

Plate: 4

Discussion

Pollen morphological studies of fifteen plant species of Kollapur revenue division of Nagarkurnool district of Telangana State was carried out during 2022-2023. These fifteen plant species were referable to thirteen families. All the species belongs to Dicotyledons. Pollen characters of the taxa studied showed diversity in their size, shape, apertural pattern and exine ornamentation. Pollen grains were mostly in monads but tetrads (*Mimosa pudica*) and octads (*Mimosa aculeaticarpa*) were also recorded. The shapes of all pollen grain varied from oblate, oblate-spheroidal, prolate, prolate-spheroidal to spheroidal. Apertures were simple and composite types, colpate, porate and colporate aperture types were characterized in the pollen taxa. Out of 15 genera studied, tricolporate apertural pattern is dominant (67%) followed by triporate (27%) and tricolpate (6%) condition. The exine sculptring patterns of the pollen taxa ranged from psilate, verrucate, microreticulate, reticulate, retipilate, striate-rugulate, and scabrate. **Psilate** exine ornamentation is exhibited by most of the genera(53.3%) studied viz., *Alstonia scholaris, Gyrocarpus americanus , Mimosa aculeaticarpa Mimosa pudica. Senna occidentalis Santalum album, Syzygium cumini,*

and Zizyphus mauritiana followed by **reticulate** (*Cordia sebastena Nyctanthes arbor tristis*) and **microreticulate** (*Dodonaea viscosa Leucophyllum fruitescence*) (13.3% each), **scabrate** (*Styrax officinalis)*, **perforate** (*Prunus mahaleb*), and **verrucate** (*Dichrostachis cineria***)** (6.6% each) types.

Conclusions

Pollen grains show diversity in their morphological characters often considered as fingerprints of nature and are used in the identification and in the delimitation of the taxa up to the species level. This study underscores the significant taxonomic value of detailed pollen morphological characterization of the flora of Kollapur revenue division of Nagarkurnool district of Telangana State.

Acknowledgements

Authors are thankful to the Principal, University college of science, Saifabad, Osmania University, Hyderabad for providing lab facilities.

References

1. Bhaskar, V. "Pollination biology and fertilization in *Santalum album* L. (Santalaceae)." *Flora*, 187.1 (1992): 73–78.
2. Bhattacharya (Sasmal), P., Biswas, S. & Pal, J. K. "Kyno-taxonomic study of some plant taxa of Fabaceae from Arambagh region of Hooghly district, West Bengal, eastern India." *Bioscience Discovery*, 6.1 (2015): 27–34.
3. Erdtman, G. "*Pollen Morphology and Plant Taxonomy – Angiosperms*." *Almquist and Wiksell*, (1952).
4. Nair, P. K. K. "Pollen Morphology of Angiosperms: A Historical and Phylogenetic Study." *Scholar Publishing House*, (1970).
5. Nayar, T. S. "Pollen Flora of Maharashtra State, India." *Today and Tomorrow's Publishers*, (1990).
6. Panicker, K. T. C. & Sreedevi. "Studies in the pollen morphology of Mimosaceae monads, tetrads and octad taxa." *Journal of Palynology*, 40 (2004): 9–21.
7. Perveen, A. & Qaiser, M. "Pollen flora of Pakistan—XLIV. Rhamnaceae." *Pakistan Journal of Botany*, 37.2 (2005): 195–202.
8. Pramanick, D. D., Mondal, M. & Maiti, G. G. "Pollen morphological studies on some members of the family Nyctaginaceae in India." *Asian Journal of Plant Science and Research*, 5.2 (2015): 72–76.
9. Punt, W., Hoen, P. P., Blackmore, S., Nilsson, S. & Thomas, A. L. "Glossary of pollen and spore terminology." *Review of Palaeobotany and Palynology*, 143.1–2 (2007): 1–81

Source of support: Nil;
Conflict of interest: The authors declare no conflict of interests.

Cite this article as:
Pallati, C. and Kumar, M.J. "Pollen Characterization of Some Tropical Flora of Kollapur Revenue Division of Nagarkurnool District of Telangana State, South India." *Annals of Plant Sciences*.14.05 (2025): pp. 6832-6840.