



Study of stamen diversity in family Leguminaceae

Project Report

Under

DBT Star College Scheme
Department of Biotechnology, New Delhi

By

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Certificate

This is to certify that the work incorporated in the project report **Study of stamen diversity in family Leguminaceae**, by Miss. Jadhav Poonam Balasaheb, Miss. Ghorpade Shruti Babasaheb, Miss. Chavan Suvarna Nandkumar, Miss. Lokhande Aditi Rajendra, Miss. Lokhande Shivani Anil, are students of Arts, Commerce and Science College Sonai, Tal. Newasa, Dist. Ahmednagar. Affiliated to the Savitribai Phule Pune University Pune successfully completed project.


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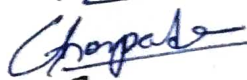
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Declaration

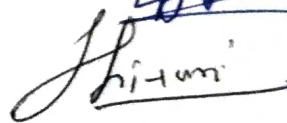
We hereby declare that the work done in this thesis entitled on **Study of stamen diversity in family Leguminaceae**, is submitted to Department of Botany, Arts, Commerce and Science College Sonai. This project is completed under the DBT Star College Scheme and the supervision **Dr. A. R. Tuwar**. The work is original and not submitted in part or full by me or any other to this or any other University.


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INTRODUCTION:

Pollen grains represent the smallest reproductive structures in the anthers or male parts of the seed plants.

Palynology: scientific discipline concerned with the study of plant pollen, spores, and certain microscopic planktonic organisms, in both living and fossil form.

Pollen morphology is one of the significant tools in solving some taxonomic problems on the family, generic or specific level and has become part of the multidisciplinary and collaborative approach in plant systematic and evolution.

The present investigation deals with study of pollen grains from dicotyledons members of Angiosperms from Arts, Commerce and Science College Sonai, campus during February to March. 2020 This investigation was carried out to study different types of pollen grains and their identification using NPC system of classification.

The pollen grains are smallest unit of the plants, which contain so many characters of taxonomic & phylogenetic importance. The shape & size of the pollen grains, germinal furrows & the number of germ pores are important taxonomic features, which are taken into consideration in classification of plants.

Light microscopic studies give information on the extreme subsurface morphology & not the extreme surface of pollen grains. In recent years the scope of pollen morphology has widened with advent of scanning electron microscopy (SEM) & with regards to unipalynous taxa, particularly the understanding of finer morphology is of fundamental of exine surface & ornamentation pattern of the pollen grains.

Now a day's study of pollen is an important area of research. Various pollen morphological features such as symmetry, shape, apertural pattern and exine configuration are very conservative features for the taxonomic assessment of the plant. Moreover, some plants growing in the surroundings cause respiratory troubles or allergy in human beings, the pollen grains of which are responsible for allergy.

MATERIALS AND METHOD:

A) Collection of pollen grains and identification of plants species

Survey of Sonai College campus and surrounding area for localizing the Dicotyledonous species. Fresh flowers of different dicot members of Angiosperms were collected early in the morning before anthesis. After collection of flower buds the anthers were removed and preserved with the help of 70% ethanol in the sample tubes and labelled after identification with the help of our project guide and flora of Ahamednagar.

B) Preparation of Glycerin jelly

Kisser's method of preparation of glycerine jelly is usually followed by palynologists. The following ingredients are required for glycerine jelly preparation:

1. Gelatin 50 gram
2. Distilled water 175 ml
3. Glycerine 150 ml
4. Phenol crystals 7 gram

Glycerin jelly is prepared by dissolving 50 grams of gelatin in 175ml of cold distilled water. 150ml of glycerine is added, warmed gently and stirred until is dissolved; 7 grams of phenol is then added to prevent the growth of mould. Then it is ready to use.

C) Safranin 1%: -

Safranin powder (0.5 gram) was dissolved in 50 ml of 96% alcohol. Then solution was then stored in a bottle and allowed to stand for 24 hours in the darkness. The solution was then filtered using filter paper.

D) Preparation of slide (both stained and unstained):-

Pollen from the known plant is shaken on to a microscope slide or the anthers are placed on a slide and a drop of ether is added to disperse the pollen. Any visible particles that are larger than the pollen grains should be removed. Drops of ether are then carefully run over the pollen from a pipette. This will dissolve any oil in the pollen and carry it to one side where it can wipe off or where the solution can be absorbed by the tissue.

Then two drops, one of warmed, stained jelly and another of unstained jelly, are placed on the pollen by means of a glass rod. A cover slip is carefully positioned on top, one edge lowered first to avoid trapping air bubbles.

D) Aceolysis of pollen grains (Erdtman, 1952):-

The preserved material was transferred to a plastic centrifuge tubes and crushed with a glass rod. The dispersion was sieved through muslin cloth and was collected in glass centrifuge tube. (Or the fresh material consisting of full flowers or anthers were placed in test tube, crushed with glass rod in 70% alcohol and then filtered.)

The sediment left in the test tube after decantation of alcohol is covered with glacial acetic acid, centrifuged and the sediment covered with fresh acetolysis mixture prepared by mixing 9 parts of acetic anhydride and 1 part of concentrated sulphuric acid, the latter being put drop by drop.

The tube with the mixture is placed in a hot water bath until the pollen grains become brownish black. The test tube was then cooled and centrifuged and this centrifuged acetolysis mixture was decanted and again centrifuged with glacial acetic acid and then decanted. This procedure was repeated 2-3 times with distilled water.

After decanting water, 50% glycerin was added and centrifuged, small quantity of glycerin jelly was placed on warming the slide, gently pollen sample was added from test tube; it was then covered with cover slip, the slide thus was sealed with paraffin wax and then kept for microscopic observation.

RESULTS AND DISCUSSION:

The present investigation deals with pollen morphological studies of Dicot members of Angiosperms growing at college campus. Fresh flowers from different plants collected early in the morning before anthesis.

Collected pollen grains were preserved and then stained with safranin and also treated by acetolysis technique and observed under light microscope for pollen morphological studies.

The purpose of this survey work was to collect the pollen materials from different plants growing in the field and study of different pollen parameters such as shape, size, colpi and exine ornamentation.

Total eighteen types of pollen grains from different plants collected which are tabulated and photographed. Out of these pollen grains Four members belonging to family Malvaceae, four members belonging to family Fabaceae, three members belonging to family Cesalpiniaceae, two members belonging to family Cucurbeteaceae, and one members belonging to family brassicaceae, Roseaceae, Moringaceae, Cappariaceae, and Papaveraceae family respectively.

The pollen grains of *Hibiscus Rosa sinensis*, *Hibiscus scizopetolus*, *Abutilion palmeri* *Abelmolschus esculonturn* are belongs to family Malvaceae the pollens are spheroidal in shape, pentaporate type and exine spinate.

Family Fabaceae members are *Bauhinia tamentosa L. Bauhinia verigata L, Ceasalpina pulcherrima Trigonella foenum graecum* are spheroidal in shape except the *Trigonella foenum graecum* is prolate in shape. *Bauhinia tamentosa L* are the polycolpate type, *Bauhinia verigata L. are the Tricolporate* with thick exine, *Ceasalpina pulcherrima* are Syncolpate with isopolar, radial symetricaly. and *Trigonella foenum graecum* are Monocolporate with bipolar thin colpi.

Cassia uniflora L. Cassia sophera L. Cassia auriculata L. are belongs to family cesalpineaceae, the pollen shape is spheroidal, subprolate and prolate in shape. *Cassia uniflora L. are Trizonocolporate* and. *Cassia sophera L. Cassia auriculata L* are the zonocolporate. 3 colpi, thine exine with *Cassia uniflora* and *Cassia sophera. Cassia auriculata L.* ornamentation is the thick exine with acute tip.

Belongs to family Cucurbeteaceae members *Momardica carantia* and are the spheroidal and spherical in shape. *Momardica carantia* are Tricolporate in type and *Luffa aegyptica L* are thr trizonocolporate with three colpi and thick exine.

Brassica nigra is belongs to family Brassicaceae are the prolate in shape, with circular outline and three aperture and syncolpate type.

Rosa gallica belongs to roseaceae family the acetolysied pollen shape is perprolate, with Tricolporate type and elliptic ornamentation with thick outline.

Moringaceae family member *Moringa oleifera L.* are spheroidal in shape with periprostate type and the ornamentation is Psilate exine, radial symmetry.

Capparis spinosa belongs to family Cappariaceae the pollen are prolate in shape with the tricolporate type and Monad colporate, isopolar ornamentation.

The last member of the investigation *Argimone Mexicana* is belongs to family papaveraceae the pollen shape is spheroidal, with tricolporate type and Psilate,3 – zonocolpate ornamentation.

CONCLUSION:

Out of many members of polypetalous species only eighteen species belong were studied for their pollen. These eighteen species are belonging to nine different families which are Malvaceae, Fabaceae, Cesalpinieaceae, Cucurbitiaceae, Brassicaceae, Roseaceae, Moringaceae, Cappariaceae, Papaveraceae.

Out of eighteen species twelve members have spheroidal to spherical shape. Four species have spinate exine and eleven members are with thick or thin exine. About five members show tricolporate type of aperture. And same family members malvaceae show same pentaporate aperture.three colpi are showed in three members in different families.

All malvaceae members have similarities in their shape, aperture, ornamentation and symmetry. Cesalpinieaceae members showed the same Some characters.The present investigation showed that the plant species belonging to single genus or a family shoed almost similar characters.

Further investigations are needed to be carried out for the study pollen grains and their correlation with allergic reactions and forensic investigations. Also measurements of diameter, thickness and size of pollen grains are needed to be measured.

This data base useful in identification, comparison of different species within the different families and identification comparison of pollen grains in rest of the study area.

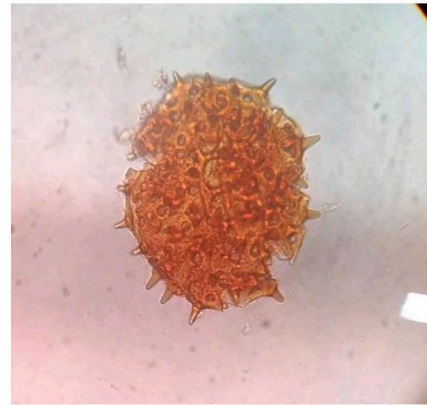
Table No. 1- Botanical Name, Family, Habit etc

Sr. No	Botanical Name	Family	Habit	Shape	Type	Ornamentation
1	<i>Hibiscus Rosa sinensis</i>	Malvaceae	Shrub	Spheroidal	Pentaporate	Exine spinate
2	<i>Hibiscus scizopetolus</i>	Malvaceae	Shrub	Spheroidal	Pentaporate	Exine spinate
3	<i>Abutilion palmeri</i>	Malvaceae	Shrub	Spheroidal	Pentaporate	Exine spinate
4	<i>Abelmolschus esculonturn</i>	Malvaceae	Shrub	Spherical	Pentaporate	Spinat exine
5	<i>Bauhinia tamentosa L.</i>	Fabaceae	Small tree	Spheroidal	Polycolpate	Thick exine, circular outline
6	<i>Bauhinia verigata L.</i>	Fabaceae	Herb	Spheroidal	Tricolporate	Exine thick,3 grains colpate
7	<i>Ceasalpina pulcherrima</i>	Fabaceae	Tree	spheroidal	Syncolpate	Isopolar,3 corporate radially symmetrical
8	<i>Trigonella foenum graecum</i>	Fabaceae	Herb	Prolate	Monocolporate	Bipolar,thin colpi, acute ends
9	<i>Cassia uniflora L.</i>	cesalpiniaceae	Herb	Spheroidals	Trizonocolporate	3colpi, thine exine.
10	<i>Cassia sophera L.</i>	cesalpiniaceae	Shrub	Subprolate	Zonocolporate	3 colpi,thine exine
11	<i>Cassia auriculata L.</i>	cesalpiniaceae	Shrub	Prolate	Zonocolporate	Thick exine,acute tip
12	<i>Momardica carantia</i>	Cucurbitaceae	Climber	Spherical	Tricolporate	Sexine tectum
13	<i>Luffa aegyptica L.</i>	Cucurbitaceae	Climber	Spheroidal	Trizonocolporate	3 colpi thick exin
14	<i>Brassica nigra</i>	Brassicaceae	Shrub	Prolate	Syncolpate	Circular outline,3 aperture
15	<i>Rosa gallica</i>	Roseaceae	Shrub	Perprolate	tricolporate	Eliptic
16	<i>Moringa oleifera</i>	Moringaceae	Tree	Spheroidal	Periporate	Psilate exine,radial symmetry
17	<i>Capparis spinosa</i>	Capparidaceae	Tree	Prolate	Tricolporate	Monad colpate,isopolar
18	<i>Argimone Mexicana</i>	Papaveraceae	Herb	Spheroidal	Tricolpate	Psilate,3 - zonocolpate

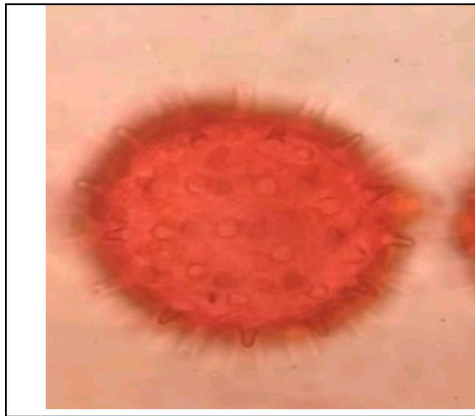
Photographs of pollen grains under light microscope (45x)



1.Hibiscus Rosa sinensis (S)



1.Hibiscus Rosa Sinenssiis(A)



2.Hibiscus scizopettolus (S)



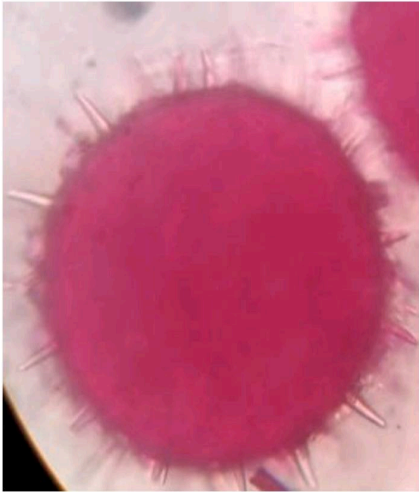
2)Hibiscus scizopetalous(A)



3.Abutilion palmeri(S)



3.Abutilion palmeri(A)



4. *Abelmoschus esculentum* L(S)



4. *Abelmoschus esculentum* L(A)



5. *Bauhinia tomentosa* L.(S)



5. *Bahunia tomentosa* L.(A)



6. *Bauhinia verigata* L.(S)



6. *Bahunia verigata* L.(A)



7. *Cesalpina pulcherima* L. (S)



7. *Cesalpina pulcherima* L. (A)



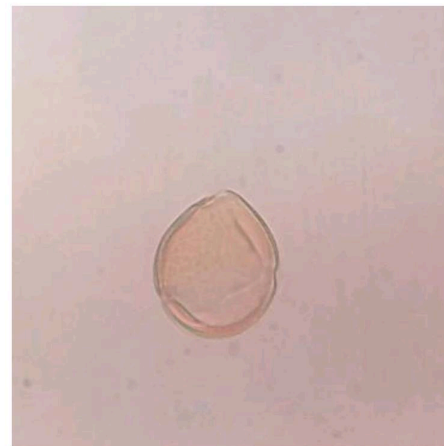
8. *Trigonella foenum graecum* (S)



8. *Trigonella foenum graecum* (A)



9. *Cassia uniflora* L. (S)



9. *Cassia uniflora* L. (A)



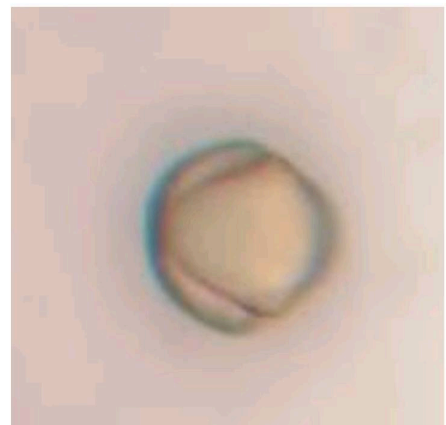
10. Cassia sophera L.(S)



10. Cassia sophera L.(A)



11. Cassia auriculata L.(S)



11. Cassia auriculata L.(A)



12. Momardica carantia(S)



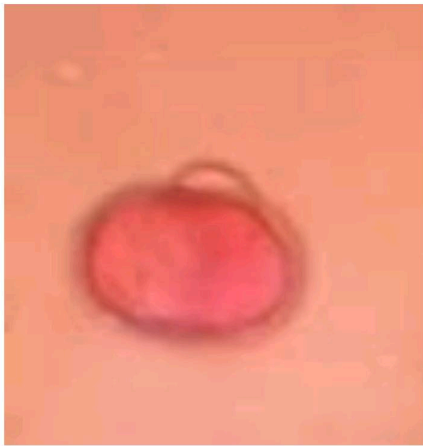
12. Momardica carantia(A)



13.Luffa aegyptica L (S)



13.Luffa aegyptica L (A)



14.Brassica nigra(S)



14.Brassica nigra(A)



15.Rosa gallica (S)



15.Rosa gallica (A)



16. *Moringa oleifera*(S)



16. *Moringa oleifera*(A)



17. *Capparis spinosa*(S)



17. *Capparis spinosa*(A)



18. *Argimone maxicana*(S)



18. *Argimone maxicana*(A)

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