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Palynodiversity in the Climbers of Adilabad district in Andhra Pradesh.

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ABSTRACT

The present study deals with the study of palynodiversity in some important climbers viz., *Abrus precatorius, Argyreia pilosa, Asparagus racemosus, Benincasa hispida, Bougainvillaea spectabilis, Canavalia gladiata, Cardiospermum halicacabum, Cassytha filiformis, Celastrus paniculata, Clitoria ternata, Decalepis hamiltonii, Diascorea tomentosa, Gloriosa superba, Gymnema sylvestre, Holostemma adakodien, Ipomaea hederifolia, Luffa cylindrica, Momordica charantia, Mucuna pruriens, Pergularia demia, Piper longum* and *Tinospora cordifolia*. recorded from Adilabad district in Andhra Pradesh.These climbers are having diversity in ethnomedicinal importance. These plants have being used by inhabitant tribes viz., Gonds, Kolam, Koya, Lambada, Naikapods, Pardhan and Thoties to cure various ailments. Besides ethnomedicinal importance palynodiversity is also recorded in these plants. These pollen grains show diversity in apertural pattern viz., Monosulcate, Monocolpate, Dizonocolpate, Trichotomosulcate, Triporate, Tricolpate, Tricolporate, Polyporate and Pollinia.

Keywords: Pollen, climbers, ethnomedicinal plants, Adilabad district.

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INTRODUCTION

Adilabad is one of largest district of Telangana region in Andhra Pradesh. which occupies both irrigated and forest localities. It is situated in between 77º 47'and 80º 0' of the eastern longitudes and 18º 40' and 19º 56' of northern latitudes. It has dry deciduous forest with diversity in flora of herbs, shrubs and trees used as medicinal plants by inhabitant tribes of Adilabad and Utnoor revenue divisions in Adilabad district to cure various ailments. Diversity of pollen characters are recorded in the ethnomedicinal important climbers viz., *Abrus precatorius, Argyreia pilosa, Asparagus racemosus, Benincasa hispida, Bougainvillaea spectabilis, Canavalia gladiata, Cardiospermum halicacabum, Cassytha filiformis, Celastrus paniculata, Clitoria ternata, Decalepis hamiltonii, Diascorea tomentosa, Gloriosa superba, Gymnema sylvestre, Holostemma adakodien, Ipomaea hederifolia, Luffa cylindrica, Momordica charantia, Mucuna pruriens*, *Pergularia demia, Piper longum* and *Tinospora cordifolia.*

METHODOLOGY

The present study deals with collection of polleniferous material and identification of diversity in pollen characters in these climbers having ethnomedicinal importance from Adilabad district the pollen material of these taxa was collected by means of field study and recorded the ethnomedicinal data by interacting with the inhabitant tribes in summer, rainy and winter seasons during 2012-2013 from various localities of Utnoor, Nirmal and Adilabad revenue divisions of Adilabad district, Andhra Pradesh. The polleniferous material was processed and prepared pollen slides by means of [1]Erdtman's (1960) acetolyses technique.

These pollen slides were studied under trinocular research microscope and recorded the pollen morphological characters. The ethnomedicinal uses of these climbers pollen taxa were collected from the inhabitant tribes and local people of the present study localities.

OBSERVATION

Twenty two climbers which are having medicinal importance viz., *Abrus precatorius, Argyreia pilosa, Asparagus racemosus, Benincasa hispida, Bougainvillaea spectabilis, Canavalia gladiata, Cardiospermum halicacabum, Cassytha filiformis, Celastrus paniculata, Clitoria ternata, Decalepis hamiltonii, Diascorea tomentosa,Gloriosa superba, Gymnema sylvestre, Holostemma adakodien, Ipomaea hederifolia, Luffa cylindrica, Momordica charantia, Mucuna pruriens*, *Pergularia demia, Piper longum* and *Tinospora cordifolia* of Fabaceae, Convolvulaceae, Liliaceae, Cucurbitaceae, Nyctaginaceae, Sapindaceae, Lauraceae, Celastraceae, Periploceae, Dioscoreaceae, Asclepiadaceae, Piperaceae and Menispermaceae families were collected from Adilabad, Nirmal and Utnoor revenue divisions.These climbers taxa exhibit diversity of pollen morphological charecters i.e. Monosulcate, Monocolpate, Dizonocolpate, Trichotomosulcate, Triporate, Tricolpate, Tricolporate, Polyporate and Pollinia.(plate-1 & 2)These climbers are also used to cure various ailments. (Table-1)

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Table-1.List of plants used for various diseases

S.no	Name of the taxa	Part of used	Diseases
1	*Abrus precatorius*	Seed, Leaves, Root	Cold and Cough,Scorpion sting,Ulcers,Wounds
2	*Argyreia pilosa*	Leaves	Wounds
3	*Asparagus racemosus*	Leaves, Root	Dyspepsia,Galactogogue,Nervous weakness, Rhematic pains,Sunstroke
4	*Benincasa hispida*	Fruits	Evilspirits
5	*Bougainvilliaea spectabilis*	Leaves	Diabetes
6	*Canavalia gladiata*	Roots	Vomting,Diarrhoea
7	*Cardiospermum halicacabum*	Leaves, Dryroots	Hearattack,Cooling effect,Ring worm
8	*Cassytha filiformis*	Wholeplant	Eye infection,Eye inflammation,Skin diseases
9	*Celastrus paniculata*	Leaves, Root	Body pains,Cancer,Fever,Leucorrhoea,Memory power
10	*Clitorea terneate*	Flowers	Bronchitis,Diuretic,Filariasis,Purgative
11	*Decalepis hamiltonii*	Root,Rizome	Wounds,Asthma,Fever,Indigestion,Blood purification
12	*Dioscorea tomentosa*	Tuber	Menstruation problams
13	*Gloriosa superba*	Tuber	Heart attack
14	*Gymnema sylvestre*	Leaves	Diabetes,Galactogogue
15	*Holostemma adakodien*	Root	Gonorrhoea
16	*Ipomaea hederifolia*	Tuberus root, Leaves	Gonorrhoea,Skine diseases,Leprosy,Pimples
17	*Luffa cylindrica*	Fruit	Constipation
18	*Momordica charantia*	Seeds, Fruit	Anthelmintic,Joint pains,Liver disorders, Rheumaticpains,Worm killing
19	*Mucuna pruriens*	Seeds	Centipede bite, Filaria, Leucorrhoea,Scorpionsting
20	*Pergularia demia*	Leaves,Root, Stem	Amenorrhoea,Asthama,Bonefracture,Diarrhoea, Disuria,Dysmenorrhoea,Fever,Stomach ache
21	*Piper longum*	Root, Wholeplant	Asthama,Cold and cough,Dyspepsia
22	*Tinospora cordifolia*	Leaves,Fruit Tuberus root,	Bloodpressure,Cough,Diabetes,Fever,Leucoderma, Scorpionsting,Snakebite,Stomach ache

(Plate – 1): Ethnomedicinal plant with pollen grains

1. *Abrus precatorius*

2. *Argyreia pilosa*

3. *Asparagus racemosus*

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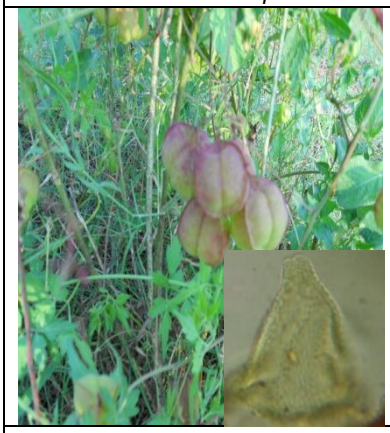
4. *Benincasa hispida*	**5**.*Bougainvelliaea spectabilis*	**6.** *Canavalia gladiata*
		
7.*Cardiospermum halicacabum*	**8.** *Cassytha filiformis*	**9.** *Celastrus paniculata*
		
10. *Clitoria ternatea*	**11.** *Decalepis hamiltonii*	**12.** *Dioscorea tomentosa*

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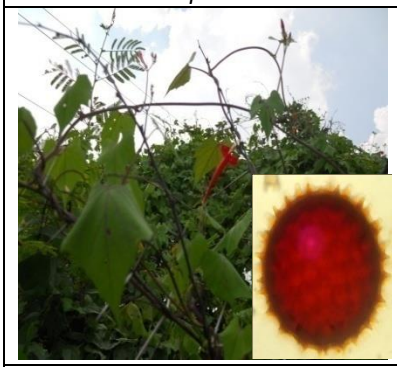
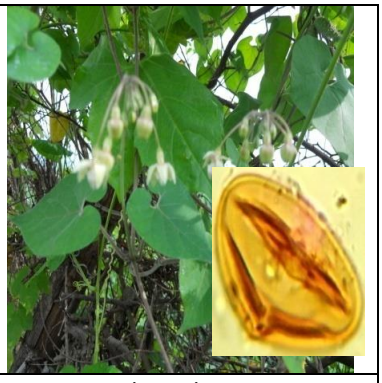
(Plate – 2)

		
13. *Gloriosa superba*	**14.** *Gymnema sylvestre*	**15.** *Holostemma adakodien*
		
16. *Ipomaea hederifolia*	**17.** *Luffa cylindrica*	**18.** *Momordica charantia*

	
19. *Mucuna pruriens*	**20.** *Pergularia demia*
	
21. *Piper longum*	**22.** *Tinospora cordifolia*

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DESCRIPTION OF POLLEN GRAINS MORPHOLOGY

***Abrus precatorius* L.** **Family: Fabaceae**

Pollen grains are subprolate, Amb 28.5 µm in diameter, rounded, P.V.27 µm, E.V.22.5 µm, Tricolporate
Colpi elliptic, 22.5 µm long, 2 µm wide, sides tapering, tips acute, ora lolangate. Exine 1.5 µm thick, sexine thicker than nexine, sculpturing reticulate.

***Argyreia pilosa* Wt&Arn.** **Family: Convolvulaceae**

Pollen grains spheroidal, Amb 93 µm in diameter, circular, pantoporate. Pori circular 7.5 µm in diameter, inter polar distance 13.5 µm.
Exine 6 µm thick, spines 7.5 µm long, base 4.5 µm, tips obtuse, sculpturing echinate.

***Asparagus racemosus* Willd.** **Family: Liliaceae**

Pollen grains prolate, Amb 19.5 µm in diameter, rounded. P.V.28.5 µm, E.V. 15 µm in diameter, monosulcate.
Sulcus 21 µm long, 1.5 µm in wide, tips obtuse.Exine 2 µm thick, sexine as thick as nexine, sculpturing micro reticulate.

***Benincasa hispida* (Thunb.)** **Family: Cucurbitaceae**

Pollen grains oblate shape, Amb circular, 72 µm in diameter, tricolporate. Colpi narrowly elliptic, 27 µm long, 4.5 µm wide in diameter, tips acute, sides tapering.
Exine 2.5 µm thick, nexine thicker than sexine, sculpturing perforate.

***Bougainvilliaea spectabilis* Willd.** **Family: Nyctaginaceae**

Pollen grains oblate spheroidal, Amb 24 µm in diameter, tricolporate. Colpi elliptic 11 µm long, 2.5 µm wide, sides tapering, tips acute,
Exine 2.5 µm thick, sexine as thick as nexine, sculpturing reticulate.

***Canavalia gladiata* (Jacq.) Dc.** **Family: Fabaceae**

Pollen grains spheroidal, Amb triangular, 57 µm in diameter, tricolporate.
Exine 4.5 µmthick, columella distinct, footlayer 1.5 µm, sexine thicker than nexine, sculpturing micro reticulate.

***Cardiospermum halicacabum* L.** **Family: Sapindaceae**

Pollen grains oblate, Amb 52-57 µm in diameter, triangular, tricolporate.
Exine 2.5 µm thick, sculpturing coarsely reticulate lumina 2-3 µm across.

***Cassytha filiformis* L.** **Family: Lauraceae**

Pollen grains spheroidal, Amb 21 µm in diameter, circular to triangular, tricolpate.
Exine 3µm thick, sexine 1.5 µm, nexine 1.5 µm, columella distinct, sculpturing granulate.

***Celastrus paniculata* Willd.** **Family: Celastraceae**

Pollen grains in monads, monads are prolate, Amb 14 µm in diameter, triangular, trizonocolporate.
Colpi narrowly elliptic, 18.5 µm long, sides tapering towards the poles, tips acute, ora oblong to circular, mesocolpia 14.5 µm long.
Exine 2.5 µm thick, sexine thicker than nexine, columella distinct, 0.5 µm long, sculpturing reticulate, lumina variously polygonal.

***Clitoria ternata* Linn.** **Family: Fabaceae**

Pollen grains subprolate, Amb 58.5 µm in diameter, triangular, tricolporate.
Colpi linear 35 µm long, tips acute.
Exine 1.5 µm thick, sexine as thick as nexine, sculpturing psilate.

***Decalepis hamiltonii* W & A.** **Family: Periplocaceae**

Pollen grains united in tetrads (Pollinia).tetrads 25-45 µm in diameter.
Tetrads of varying shape (tetrahedral, rhomboidal, linear etc).There are 3-6 apertures per grain.The exine is very thin and it's sculpturing obscure.

***Dioscorea tomentosa* Heyne.** **Family: Dioscoreaceae**

Pollen grains subprolate, P.V. 22.5 µm, E.V.18 µm in diameter, Dizonocolpate.
Colpi narrowly elliptic, 16.5 µm long, 1.5 µm wide, tips acute, apocolpia distinct.
Exine 1.5 µm thick, nexine thicker than sexine, sculpturing psilate.

***Gloriosa superba.* L .** **Family: Liliaceae**

Pollen grains are prolate, P.V.30 µm , E.V.19.5 µm, monocolpate.
Colpi narrowly elliptically 25.5 µm long, 1.5 µm wide, sides tapering, tips acute.
Exine 1.5 µm thick, sexine slightly thicker than nexine, sculpturing reticulate.

***Gymnema sylvestre* R.Br.** **Family: Asclepiadaceae**

Pollen grains spheroidal, Amb rounded 19.5 µm in diameter, trizonoporate, costate.
Pori circular, 7.8 µm in diameter, annulus 1.5 µm in across.
Exine 1.2 µm, sexine and nexine are distinct, sculpturing retipilate.

***Holostemma adakodien* Schult.** **Family: Asclepedaceae**

Pollen grains united in tetrads, 31.5 µm in diameter.
Tetrads of varing shapes (tetrahedral, rhomboidal, linear etc).
The exine is very thin and its sculpturing obscure.

***Ipomaea hederifolia* L.** **Family: Convolvulaceae**

Pollen grains spheroidal, Amb 132 µm in diameter, outline circular, pantoporate.
Pori circular to oblate, 8 µm in diameter, inter polar distance 10.5 µm in diameter.
Exine 1.5 µm thick, sexine thicker than nexine, sculpturing echinate, echina 9 µm long, echina base 4.5 µm, sides slowly tapering, tips obtuse, 4 µm in diameter at tips.

***Luffa cylindrica* (L.) Roem.Fam.** **Family: Cucurbitaceae**

Pollen grains spheroidal, Amb rounded 81 µm in diameter, trichotomosulcate.
Sulcate long 37.5 µm, 30 µm wide, tips obtuse.
Exine 1.5 µm thick, sexine as thick as nexine, sculpturing reticulate.

***Momordica charantia* L.** **Family: Cucurbitaceae**

Pollen grains subprolate, Amb 58.5 µm in diameter, circular,
P.V.63 µm, E.V.49.5 µm in diameter, tricolporate
Colpi narrowly melliptic, 45 µm long, wide 4.5 µm in diameter, tips acute, sides tapering, ora lolongate.
Exine 4 µm thick, sexine thicker than nexine, lumina irregularly polygonal condition, sculpturing reticulate.

***Mucuna pruriens* Bak.** **Family: Fabaceae**

Pollen grains spheroidal, P.V.60 µm, E.V. 52.5 µm in diameter.
Colpi elliptically narrow, 40.5 µm long,4.5 µm wide in diameter, mesocolpy 39 µm in diameter, tips acute, ora lolangate.
Exine 1.5 µm thick, sexine thicker than nexine, columella distinct, sculpturing reticulate.

***Pergularia demia* (Forssk.)Chiov.** **Family: Asclepidaceae**

Pollen grains united in tetrads, 30.5 µm in diameter.
Tetrads of varing shapes (tetrahedral, rhomboidal,linear etc).
The exine is very thin and its sculpturing obscure

***Piper longum* L.** **Family: Piperaceae**

Pollen grains subprolate, P.V.10.5 µm, E.V.9 µm in diameter, monosulcate.

Sulcate 7.5 µm long, 1 µm in wide, tips acute.
Exine 1.5 µm thick, sexine as thick as nexine, sculpturing psilate.

Tinospora cordifolia **Miers.** **Family: Menispermaceae**

Pollen grains prolate, P.V.16.5 µm, E.V.12 µm in diameter, tricolporate.
Colpi linear, operculate, 12 µm long, 3 µm wide, sides almost parallal, ora not distinct.
Exine 1.5 µm thick, sexine thicker than nexine, lumina polygonal conditions, sculpturing microreticulate.

DISCUSSION

These 22 ethnomedicinal climbers are not only useful to cure various ailments but also show diversity in pollen morphological charecters. The pollen grain aperture in these taxa exhibit variation in morphology i.e., Monosulcate, Monocolpate, Dizonocolpate, Trichotomosulcate, Triporate, Tricolpate, Tricolporate, Polyporate and Pollinia conditions. Monocolpate pollen grain is *Gloriosa superba*. *Abrus precatorius, Benincasa hispida, Canavalia gladiata, Celastrus paniculata, Momordica charantia, Mucuna pruriens* and *Tinospora cordifolia* are Tricolporate pollen grains. *Bougainvilliaea spectabilis, Cardiospermum helicacabum, Cassytha filiformis* and *Clitoria ternata* are Tricolpate pollengrains. Pollinia are recorded in *Decalepis hamiltonii*, *Holostemma adakodien* and *Pergularia demia*. *Argyreia pilosa* and *Ipomaea hederifolia* are Polyporate which Trizonoporate pollen grain is *Gymnema sylvestre*. Monosulcate pollen grains are *Asparagus racemosus* and *Piper longum*. Dizonocolpate grain is *Dioscorea tomentosa*. Trichotomosulcate pollen grain is *Luffa cylindrica*.

In these taxa there is diversity in symmetry, shape, polarity and sculpture. Except *cardispermum helicacabum* the remaining genera show radial symmetry. *Abrus precatorius, Clitoria ternatea, Dioscorea tomentosa, Momordica charantia* and *Piper longum* show subprolate condition. *Argyreia pilosa, Canavalia gladiata, Cassytha filiformis, Ipomaea hederifolia, Luffa cylindrica* and *Mucuna pruriens* show spheroidal condition. *Gloriosa superba, Asparagus racemosus, Celastrus paniculata* and *Tinospora cordifolia* have prolate condition. *Benincasa hispida* and *Cardiospermum helicacabum* have oblate condition.Where as *Bougainvilliaea spectabilis, Decalepis hamiltonii, Gymnema sylvestre, Holostemmma adakodien* and *Pergularia demia* have oblate spheroidal condition. In these pollen grains the sculpture of the pollen varies i.e. reticulate, echinate, micro reticulate, perforate, granulate, psilate, obscure and retipilate. *Gloriosa superba, Abrus precatorius, Bougainvilliaea spectabilis, Cardiospermum halicacabum, Celastrus paniculata, Luffa cylindrica, Momordica charantia* and *Mucuna pruriens* show reticulate. *Argyreia pilosa* and *Ipomaea hederifolia* show echinate. *Asparagus racemosus, Canavalia gladiata* and *Tinospora cordifolia* shows micro reticulate. *Benincasa hispida* has perforate. *Cassytha filiformis* shows granulate, *Clitoria ternatea*, *Dioscorea tomentosa* and *Piper longum* show psilate. *Decalepis hamiltonii, Holostemma adakodien* and *Pergularia demia* have obscure, *Gymnema sylvestre* shows retipilate.(Table-2).

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Table-2.Morphological characters of the climbers pollen taxa

Taxa name	Family	Symmetry	Shape	Polarity	Aperture	Sculpture
Abrus precatorius	Fabaceae	Radially	Sub prolate	Isopolar	Tricolporate	Reticulate
Argyreia pilosa	Convolvulaceae	Radially	Spheroidal	Isopolar	Polyporate	Echinate
Asparagus racemosus	Liliaceae	Radially	Prolate	Isopolar	Monosulcate	Micro reticulate
Benincasa hispida	Cucurbitaceae	Radially	Oblate	Isopolar	Tricolporate	Perforate
Bougainvilliaea spectabilis	Nyctaginaceae	Radially	Oblate spheroidal	Isopolar	Tricolpate	Reticulate
Canavalia gladiata	Fabaceae	Radially	Spheroidal	Isopolar	Tricolporate	Micro reticulate
Cardiospermum halicacabum	Sapindaceae	Irregular	Oblate	Hetero polar	Tricolpate	Reticulate
Cassytha filiformis	Lauraceae	Radially	Spheroidal	Isopolar	Tricolpate	Granulate
Celastrus paniculata	Celastraceae	Radially	Prolate	Isopolar	Trizono colporate	Reticulate
Clitorea ternatea	Fabaceae	Radially	Sub prolate	Isopolar	Tricolpate	Psilate
Decalepis hamiltonii	Periplocaceae	Radially	Oblate spheroidal	Isopolar	Pollinia	Obscure
Dioscorea tomentosa	Dioscoreaceae	Radially	Sub prolate	Isopolar	Dizonocolpate	Psilate
Gloriosa superba	Liliaceae	Radially	Prolate	Isopolar	Monocolpate	Reticulate
Gymnema sylvestre	Asclepiadaceae	Radially	Oblate spheroidal	Isopolar	Trizonoporate	Reticulate
Holostemma adakodien	Asclepiadaceae	Radially	Oblate spheroidal	Isopolar	Pollinia	Obscure
Ipomaea hederifolia	Convolvulaceae	Radially	Spheroidal	Isopolar	Polyporate	Echinate
Luffa cylindrica	Cucurbitaceae	Radially	Spheroidal	Isopolar	Trichotomosulcate	Reticulate
Momordica charantia	Cucurbitaceae	Radially	Sub prolate	Isopolar	Tricolporate	Reticulate
Mucuna pruriens	Fabaceae	Radially	Spheroidal	Isopolar	Tricolporate	Reticulate
Pergularia demia	Asclepiadaceae	Radially	Oblate spheroidal	Isopolar	Pollinia	Obscure
Piper longum	Piperaceae	Radially	Sub prolate	Isopolar	Monosulcate	Psilate
Tinospora cordifolia	Menispermaceae	Radially	Prolate	Isopolar	Tricolporate	Micro reticulate

The pollen of Tinospora cordifolia and Cardiospermum halicacabum which are the climbers were already recorded as nector source and pollen source for honey bees for more honey production from Adilabad district[2] (Ramakrishna.H and Swathi S.2013, [3]Swathi.S and Ramakrishna.H.2013.)

These climbers are useful ethnomedicinally and honey production and these pollen also show diversity in morphology which is taxonomically important

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