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Journal of Advanced Scientific Research

Available online through http://www.sciensage.info/jasr

ISSN
0976-9595
Research Article

POLLINIA MORPHOLOGY OF SOME PLANTS OF ASCLEPIADACEAE IN LOWER COASTAL PLAIN OF WEST BENGAL: A SYSTEMATIC APPROACH

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ABSTRACT

The morphological diversity of pollinia of 8 plants belong to Asclepiadaceae were examined under LM in corresponds to their size (length, breadth), shape of pollinia sac, translator and corpusculum as well as colour and translator attachment to the pollinia sac. The investigated plants were *Calotropis gigantea(L.) Dryand, Calotropis procera (Aiton) W. T. Aiton, Dregea volubilis (L.f.) Benth. Ex Hook. f., Gymnema sylvestreR. Br., Hemidesmus indicus (L.) R.Br., Hoya obscura (Major), Pergularia daemia(Forssk.) Chiov., Tylophora indica R.Br.* Out of the 8 plants there are largest pollinia sac (length-1485µm, breadth-576 µm), translator (length-408, breadth-74), corpusculum(length-594, breadth-259) in *Calotropis gigantea* and smallest pollinia sac (length- 153 µm, breadth- 77 µm), translator (length-79 µm, breadth-23 µm), corpusculum (length- 109 µm, breadth-55 µm) in *Gymnema sylvestris*. As a unit of flower Pollinia as well as pollen are an important tool to arrange and identify plant taxa.

Keywords: *Pollinia, Asclepiadaceae, Coastal area.*

1. INTRODUCTION

Asclepiadaceae is a family of advanced position in dicot plant systematics. The family consists of about 180 genera and 2900 species [1-4]. In latin term Asclepiadaceae have special name-Milkweed family. The family is also divided into three sub-families Periplocoideae, Secamonoideae and Asclepiadiodeae [5-8].

The plants belongs to the family are perennial or sometimes annual herbs, shrubs, climber or tree distributed through worldwide mainly in tropics and subtropics. Most of the plant contains milky latex. Like the monocot family Orchidaceae, Asclepiadaceae comprises some remarkable characters like pollen containing sac like definite structure the pollinia and the flower gynostegium with five united petal [9]. The pollinia contain three parts- pollinia sac, translator and corpusculum. These three parts are variable in size, (length, breadth), shape in each genus as well as species [10].

There are many pollinia morphological report under both LM and SEM by many researchers. Earlier some workers described pollinia structure of some species of *Secamone* Sp. Pollinia describe morphologically in some species of Pakisthan [1]. The pollinia apparatus morphology examined and observed of some species of Asclepiadaceae under LM and SEM [8, 11,12].

In this study Pollen morphology of Asclepiadaceae was observed and summarized for comparative analysis.

2. MATERIALS & METHODS

Plant materials were collected from different area of Purba Medinipur, West Bengal. The collected taxa were *Calotropis gigantea* (L.) Dryand, *Calotropis procera* (Aiton) W.T.Aiton, *Dregea volubilis* (L. f.) Benth. ex Hook. f., *Gymnema sylvestre*R. Br., *Hemidesmus indicus*(L.) R. Br. *Hoya obscura* (Major), *Pergularia daemia* (Forssk.) Chiov., *Tylophora indica* R.Br. R. The pollinia samples were prepared and mounted in unstained glycerin jelly, lastly observed under Light Microscope (Magnus MLX- Model No. 13A315).

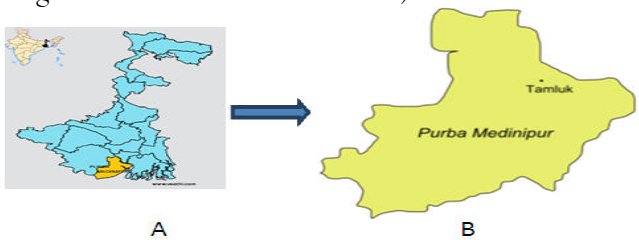


Fig.1: A and B- Study area

3. RESULT AND DISCUSSION

3.1. *Calotropis gigantea*(L.) Dryand

Description: Pollen units- Polyads. Length, breadth of pollinium sac, translator, Corpusculum is 1485µm,

576µm, 408µm, 74µm, 594µm, 259µm. Shape of pollinium sac, translator, Corpusculum is club, cylindrical, ellips. Corpusculum bilobed. Translator attachment with the corpusculum subterminal. Colour canary yellow.

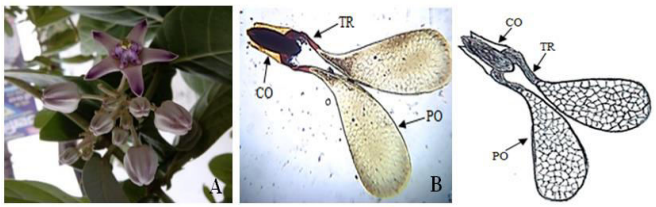


Fig.2: A) *Calotropis gigantea*(L.) Dryand B) Pollinia morphology (TR- Translator, CO- Corpusculum, PO- Pollinium Sac).×40

3.2. *Calotropis procera*(Aiton) W.T.Aiton

Description: Pollen units- Polyads. Length, breadth of pollinium sac, translator, Corpusculum is 1445µm, 554µm, 335µm, 48µm, 520µm, 149µm. Shape of pollinium sac, translator, Corpusculum is club, cylindrical, ellips. Corpusculum bilobed. Translator attachment with the corpusculum subterminal. Colour canary yellow.

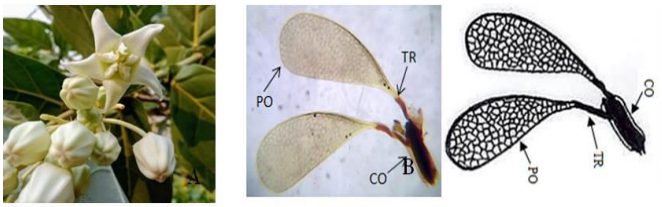


Fig.3: A) *Calotropis procera* (Aiton) W.T.Aiton. plant B) Pollinia morphology (TR- Translator, CO- Corpusculum, PO- Pollinium Sac). ×40

3.3. *Dregea volubilis*(L. f.) Benth. ex Hook. f.

Description: Pollen units- Polyads. Length, breadth of pollinium sac, translator, Corpusculum is 553µm, 197µm, 82µm, 27µm, 273µm, 68µm. Shape of pollinium sac, translator, Corpusculum is oval, club, angular. Corpusculum bilobed. Translator attachment with the corpusculum terminal. Colour sulphur yellow.

Fig. 4: A) *Dregea volubilis* (L. f.) Benth. ex Hook. f. plant B) Pollinia morphology (TR- Translator, CO- Corpusculum, PO- Pollinium Sac) ×100.

3.4. *Gymnema sylvestre*R. Br.

Description: Pollen units is Polyads. Length, breadth of pollinium sac, translator, Corpusculum is 153µm, 77µm, 79µm, 23µm, 109µm, 55µm. Shape of pollinium sac, translator, Corpusculum is oval, club, oval. Corpusculum bilobed. Translator attachment with the corpusculum- terminal. Colour whitish yellow.

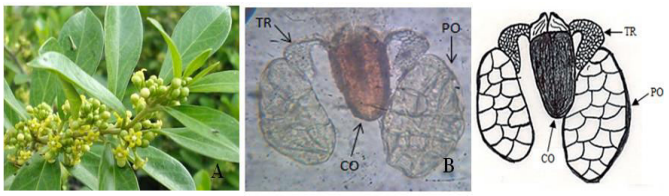


Fig.5: A) *Gymnema sylvestre*R. Br. plant B) Pollinia morphology (TR- Translator, CO- Corpusculum, PO- Pollinium Sac). ×40

3.5. *Hemidesmus indicus*(L.) R.Br.

Description: Pollen units-Polyads. Length, breadth of pollinium sac, translator, Corpusculum is 328µm, 164µm, 24µm, 37µm, 164µm, 150µm. Shape of pollinium sac, translator, Corpusculum is oval, flatten, round. Corpusculum bilobed. Translator attachment with the corpusculum subterminal. Colour brownish-yellow.

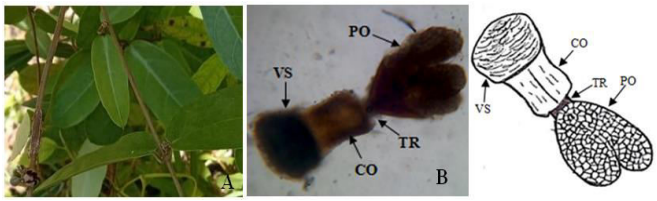


Fig. 6: A) *Hemidesmus indicus* (L.) R.Br.plant B) Pollinia morphology (TR- Translator, CO- Corpusculum, PO- Pollinium Sac, VS-Viscidium). ×100

3.6. *Hoya obscura* (Major)

Description: Pollen units is Polyads. Length, breadth of pollinium sac, translator, Corpusculum is 487µm, 196µm, 136µm, 41µm, 96µm, 55µm. Shape of pollinium sac, translator, Corpusculum is oval,club, dumble. Corpusculum bilobed. Translator attachment with the corpusculum subterminal. Colour orange yellow.

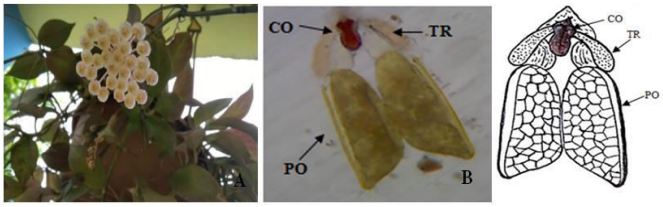


Fig. 7: A) *Hoya obscura* (Major) plant B) Pollinia morphology (TR- Translator, CO- Corpusculum, PO- Pollinium Sac). ×100.

3.7. *Pergularia daemia*(Forssk.) Chiov.

Description: Pollen units is Polyads. Length, breadth of pollinium sac, translator, Corpusculum is 634µm, 231µm, 109µm, 27µm, 232µm, 109µm. Shape of pollinium sac,translator, Corpusculum is club, angular. Corpusculum bilobed. Translator attachment with the corpusculum terminal. Colour canary yellow.

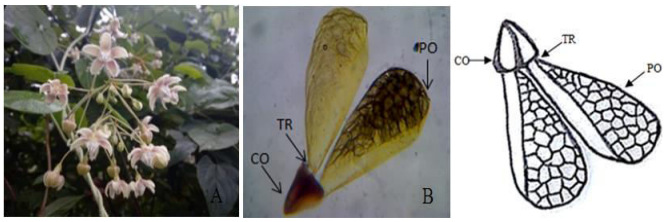


Fig. 8: A) *Pergularia daemia* (Forssk.) Chiov. Plant. B) Pollinia morphology (TR- Translator, CO- Corpusculum, PO- Pollinium Sac).×100

3.8. *Tylophora indica* R.Br.

Description: Pollen units- Polyads. Length, breadth of pollinium sac, translator, Corpusculum is 244µm, 217µm, 85µm, 31µm, 95µm, 55µm. Shape of pollinium sac, translator, Corpusculum is globular, cylindrical, round. Corpusculum bilobed. Translator attachment with corpusculum terminal. Colour canary yellow.

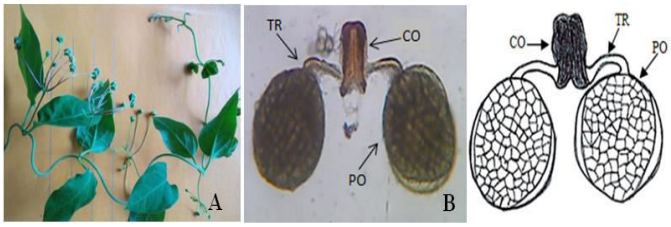


Fig.9: A) *Tylophora indica* R.Br. plant B) Pollinia morphology (TR- Translator, CO- Corpusculum, PO- Pollinium Sac).×100

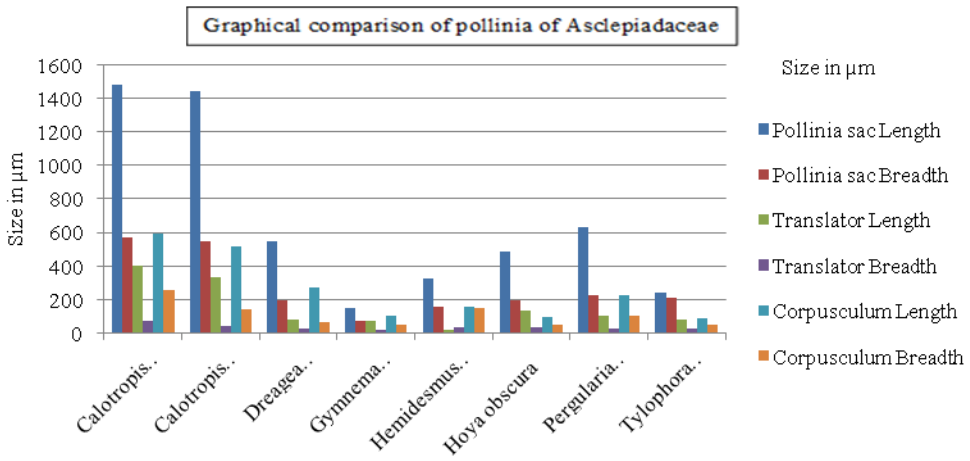
Pollinia are greatly variable in their size, shape of pollinia sac, translator, and corpusculum as well as colour and translator attachment to the corpusculum (table 1). There are polyads types of pollen unit in all the investigated taxa but differ in many aspects. A Palyno-taxonomic key is also prepared for the identification of studied taxa.

Table 1: Colour and Shape of different parts of pollinia

Name of the plant	Colour of pollinia	Lobe of Corpusculum	Shape of corpusculum	Shape of translator	Shape of pollinia sac	Caudicle attachment with the corpusculum
Calotropis gigantea	Canary yellow	Bilobed	Ellips	Cylindrical	Club	Subterminal
Calotropis procera	Canary yellow	Bilobed	Ellips	Cylindrical	Club	Subterminal
Dragea volubilis	Sulphur yellow	Bilobed	Angular	Club	Oval	Subterminal
Gymnema sylvestre	Whiteish yellow	Bilobed	Oval	Club	Oval	Terminal
Hemidesmus indicus	Brownish yellow	Bilobed	Round	Flatten	Oval	Subterminal
Hoya obscura	Orange yellow	Bilobed	Dumble	Club	Oval	Subterminal
Perguleria daemia	Canary yellow	Bilobed	anglular	Club	Club	Terminal
Tylophora indica	Canary yellow	Bilobed	Rounded	Cylindrical	Globular	Terminal

Table 2: Numerical data

Name of the plant	Pollen units	Objective (X)	Length of translator (µm)	Breadth of translator (µm)	Length of Corpusculum (µm)	Breadth of Corpusculum (µm)	Length of pollinia sac (µm)	Breadth of pollinia sac (µm)
Calotropis gigantea	Polyads	40X	408	74	594	259	1485	576
Calotropis procera	Polyads	40X	335	48	520	149	1445	554
Dragea volubilis	Polyads	100X	82	27	273	68	553	197
Gymnema sylvestre	Polyads	40X	79	23	109	55	153	77
Hemidesmus indicus	Polyads	100X	24	37	164	150	328	164
Hoya obscura	Polyads	100X	136	41	96	55	487	196
Perguleria daemia	Polyads	100X	109	27	232	109	634	231
Tylophora indica	Polyads	100X	85	31	95	55	244	217



Palyno-taxonomic Key of pollinia of Asclepiadaceae:

Pollen units Polyads.

@ Corpusculum bilobed.

$ Translator attachment with the corpusculum terminal.

+ Translator club.

*Corpusculum angular, pollinia sac club, pollinia sac length 634 µm, breadth 231 µm, translator length 109 µm, breadth 27 µm, corpusculum length 232 µm, breadth 109 µm (*Pergularia daemia*).

*Corpusculum oval, polynia sac oval, pollinia sac length153 µm, breadth 77 µm, translator length 79 µm, breadth 23 µm, corpusculum length109 µm, Breadth 55 µm (*Gymnema sylvestre*).

+ Translator cylindrical.

*Corpusculum rounded, pollinia sac globular, pollinia sac length 244 µm, breadth 217 µm, translator length 85 µm, breadth 31 µm, corpusculum length 95 µm, breadth 55 µm (*Tylophora indica*).

$Translator attachment with the corpusculum Subterminal.

+ Pollinia sac club.

* Translator cylindrical, corpusculum ellips.

% Pollinia sac length1485 µm, breadth 576 µm, translator length 408 µm, breadth 74 µm, corpusculum length 594 µm, breadth 259 µm (*Calotropis gigantea*).

% Pollinia sac length1445 µm, breadth 554 µm, translator length 335 µm, breadth 48 µm, corpusculum length 520 µm, breadth 149 µm (*Calotropis procera*).

+ Pollinia sac oval.

* Translator club.

% Corpusculum angular, pollinia sac length 553 µm, breadth 197 µm,

translator length 82 µm, breadth 27 µm, corpusculum length 273 µm, breadth 68 µm (*Dragea volubilis*).

% Corpusculum dumble, pollinia sac length 487 µm, breadth 196 µm,

translator length136 µm, breadth 41 µm, corpusculum length 96 µm, breadth 55 µm (*Hoya obscura*).

* Translator flatten.

% Corpusculum round, pollinia sac length 328 µm, breadth 164 µm, translator length 24 µm, breadth 37 µm, corpusculum length 164 µm, breadth 150 µm (*Hemidesmus indicus*).

4. DISCUSSION

The Asclepiadaceae are a family characterized by the great variation in size and shape of pollinia morphology. The pollinia types mainly vary from genus to genus and to species also. The investigation shows largest pollinia mainly pollinia sac (l-1485µm, b-576 µm), translator(l-408 µm, b-74 µm), corpusculum (l-594 µm, b-259 µm) in *Calotropis gigantea* and smallest pollinia mainly pollinia sac (l- 153 µm, b- 77 µm), translator (l-79 µm, b-23 µm),corpusculum (l- 109 µm, b-55 µm) in *Gymnema sylvestre*. The shape of pollinia sac, translator and caudicleis like club, oval, globular; cylindrical, club, flatten; ellips, angular, oval, round, dumble. There are so many colour in pollinia. Lobes of corpusculum and pollen unit are same in all the investigated taxa.

Attachment or position of caudicle and translator to the pollinia is an important character for the evaluation of morphological versatility of pollinia of various genera of Asclepiadaceae. The translator attachment is not observed in Periplocoideae because this mechanism is achieved by adhesion during flowering maturation. During earlier development, the pollinial attachment to translator observed in Secamondeae and Asclepiadoideae [13].

5. CONCLUSION

The morphological characters of pollinia of Asclepiadaceae are greatly variable. They are variable in their size, shape and many other features. In this perspect we works as mainly differentiate the pollinia morphology of the different plants belongs the same family Asclepiadaceae. These morphological variations deliver to prepare a key of pollen chamber of Asclepiadaceae in palyno-taxonomic aspects and in the systematic plant future.

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