

SEM studies on seed surface of some Asclepiadaceae with taxonomic significance

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The dorsal side of the seeds of *Asclepias curassavica* L., *Calotropis gigantea* (L.) R. Br., *Marsdenia tenacissima* W. & A., *Pergularia daemia* (Forsk.) Chio., *Tylophora dalzellii* HK.f. and *T. indica* (Burm.F.) Merr. were observed under SEM. The seed surface of *Asclepias*, *Calotropis* and *Pergularia* is trichomatous. In *Marsdenia*, the seed surface shows a reticulate pattern and *Tylophora* possesses a simple foveolate pattern or irregular projections on the seed surface. A taxonomic key is proposed using the morphological and SEM observations on the seeds.

Key-words - Asclepiadaceae, coma, SEM, seed surface, taxonomy.

INTRODUCTION

The study of surface features of plant organs using SEM and its application in various branches of botany are revealed by several authors and a review of this subject has appeared elsewhere (Lane, 1985). The literature survey shows that a good amount of micromorphological features has been worked out on fruits and seeds for the identification of taxa (Cole & Bhenke, 1975; Lersten, 1981; Kushk & Vaughan, 1985, 1986a,b; Menon & Dave, 1988; Kuriachen & Dave, 1989). It seems to have been of little interest in recent years in the seeds of the family Asclepiadaceae (Corner, 1976). The seeds of Asclepiadaceae are found to have been studied very little for their morphological or anatomical features (Moore, 1946; Pearson, 1948).

In Asclepiadaceae the fruit is a follicle. The seeds borne on the marginal placenta are comose and are dispersed by a 'parachute mechanism'. In the present paper the morphological and scanning electron microscopic features of 6 Asclepiadaceae seeds, viz., *Asclepias curassavica* L., *Calotropis gigantea* (L.) R.Br., *Marsdenia tenacissima* W. & A., *Pergularia daemia* (Forsk.) Chiov., *Tylophora dalzellii* HK. f. and *Tylophora indica* (Burm.f.) Merr. are described and the taxonomic significance of these is discussed.

MATERIAL AND METHOD

Mature dry seeds of *Asclepias curassavica* L., *Calotropis gigantea* (L.) R.Br., *Marsdenia tenacissima* W. & A., *Pergularia daemia* (Forsk.) Chivo., *Tylophora dalzellii* HK.f. and *T. indica* (Burm.f) Merr. were collected from different parts of Gujarat. The collected samples were directly photographed under Carl-Zeiss Tessovar for morphological features. For scanning electron microscopic studies fresh samples were mounted on aluminium stubs and coated with a thin conducted film of gold-palladium using SEM coating unit ES 100 (Poloron Equipment Ltd.). The coated samples were observed on Cambridge Stereoscan electron microscope at ATIRA, Ahmedabad.

RESULTS

1. *Asclepias curassavica* L.—The seeds are brown, 6-7 mm long and 3-4 mm broad, flat and ovate with narrow margins (Pl. 1, fig. 1). The coma is 18-25 mm long. The seed surface possesses a central longitudinal band of flattened trichomes on both sides (Pl. 1, fig. 2). The remaining part of the seed possesses large number of small protuberances (tuberculate) (Pl. 1, fig. 3) resembling to some extent with irregularly papillose type of Lersten (1981).

2. *Calotropis gigantea* (L.) R.Br.—The seeds are brown, 6-8 mm long and 4-5 mm broad, ovate, flattened and

narrowly margined (Pl. 1, fig. 4). The coma is 25-30 mm long. The seed surface is covered with a large number of conical and pointed trichomes (Pl. 1, fig. 5).

3. *Marsdenia tenacissima* W. & A.-The seeds are light brown, 10-12 mm long and 7-8 mm broad, flat, ovate, oblong in shape with narrow margins (Pl. 1, fig. 6). The coma is 35-38 mm long. The seed surface shows a reticulate pattern having a raised network of narrow and sharply angled lines and small foveolate (Pl. 1, fig. 7).

4. *Pergularia daemia* (Forsk.) Chiov.-The deep brown seeds are 7-8 mm long and 4-5 mm broad with an ovate and truncate apex and narrow margins. The rounded basal part of the seed is crenate (Pl. 1, fig. 8).-The coma is 25-30 mm long. The seed surface is densely covered with flat and appressed trichomes (Pl. 1, fig. 9).

5. *Tylophora dalzellii* HK.f.-The seeds are light brown in colour and are 8-9 mm long and 4-6 mm broad, ovate and flat (Pl. 1, fig. 10). The coma is 18-22 mm long. The seed surface possesses irregular projections interconnected by small finger-like processes (Pl. 1, fig. 11).

6. *T. indica* (Burm.f.) Merr.-The brown seeds are 7-9 mm long and 5-6 mm broad, flat and broadly ovate (Pl. 1, fig. 12). The coma is 18-20 mm long. The seed surface shows a simple foveolate pattern (Pl. 1, fig. 13).

DISCUSSION

The morphology and surface patterns of the seeds of different genera and species are valuable in ascertaining the systematic affinity of the tribe (Barthlott, 1981; Lersten, 1981; Kumar & Rangaswami, 1984; Kushk & Vaughan, 1985, 1986a, b). The surface study of the seeds of Asclepiadaceae also supports the above view. *Asclepias curassavica* can be distinguished from other genera by observing the median band of trichomes and tuberculate surface of the seed. In the other two trichomatous genera-studied *Calotropis* and *Pergularia* - the trichomes are present all over the seed surface. Though trichomes are present in these two genera, they are distinguished by the crenate basal margin of the latter. The seed surface of *Marsdenia* shows a reticulate pattern with small foveolae and is not found within any other genera studied. Even though the seeds of both species of *Tylophora* are somewhat similar in size and shape, they differ in their surface pattern. In *T. dalzellii* the surface possesses irregular projections or mounds interconnected by small finger-like processes,

while *T. indica* shows a regular simple foveolate pattern. The technical terms like tuberculate and reticulate are used for describing seed surface patterns after Stearn (1966) and foveolate and papillose after Lersten (1981).

The morphological and surface features of the seeds observed here can be used for proposing a taxonomic key as given below:

Key to genera

1. Seed surface atrichomatous :
 2. Seed surface has a reticulate pattern; seeds are more than 1 cm in length .. *Marsdenia*
 2. Seed surface is not reticulate, but possesses simple foveolate pattern or irregular projections; seeds are below 1 cm in length .. *Tylophora*
1. Seed surface trichomatous :
 3. Trichomes absent on the entire surface; but present as a median longitudinal band of trichomes .. *Asclepias*
 3. Trichomes present on the entire seed surface :
 4. Seeds possess basal crenate or dentate margin .. *Pergularia*
 4. Basal margin of the seed is not crenate or dentate .. *Calotropis*

Key to species

1. Seed surface possesses simple foveolate pattern .. *T. indica*
2. Seed surface is not simple foveolate, but possesses irregular projections interconnected by finger-like processes .. *T. dalzellii*

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PLATE I

1. Entire seed of *Asclepias curassavica*, X 5.
2. Flattened trichomes on the seed surface, X 539.
3. Tuberculate protuberances, X 1986.
4. Entire seed of *Calotropis gigantea*, X 3.
5. Seed surface showing conical and pointed trichomes, X 315.
6. Entire seed of *Marsdenia tenacissima*, X 4.
7. Seed surface showing reticulate pattern, X 1099.
8. Entire seed of *Pergularia daemia* with crenate basal part, X 1.
9. Flat and appressed trichomes on the seed surface, X 346.
10. Entire seed of *Tylophora dalzellii*, X 5.
11. Irregular projections on the seed surface, X 1400.
12. Entire seed of *T. indica*, X 5.
13. Seed surface showing scalariform appearance, X 1520.

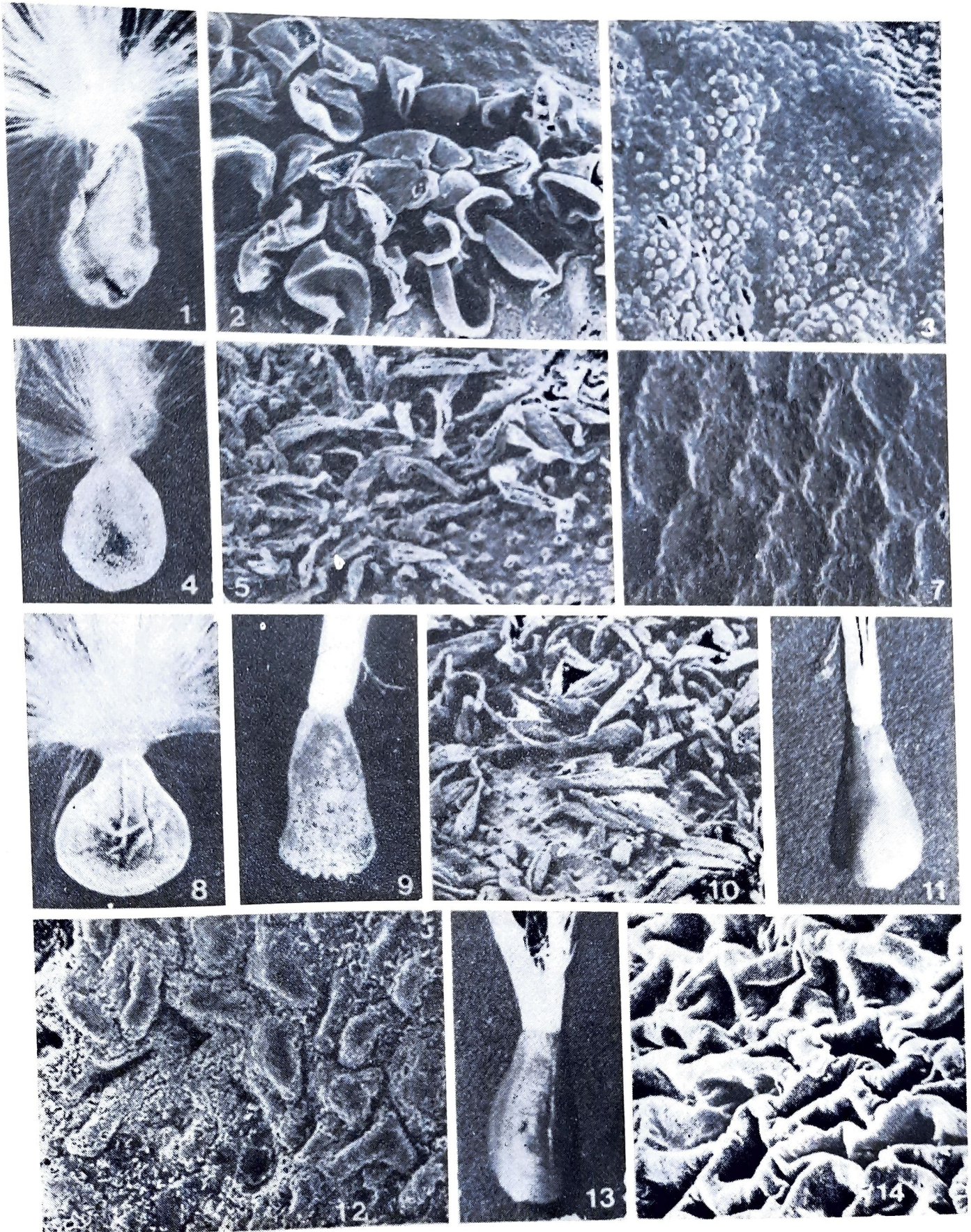


PLATE 1

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