Comparative LM and SEM studies of pollen in two varieties of Jatropha gossypiifolia

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COMPARATIVE LM & SEM STUDIES OF POLLEN IN TWO VARIETIES OF JATROPHA GOSSYPHILOLIA L. (EUPHORBLACEAE)

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ABSTRACT

Palynology of two Jatropha gossypiifolia varieties viz., J. gossypiifolia var. elegens and J. gossypiifolia var. gossypiifolia are described under LM and SEM. Omniperturate pollen with details of sporderm ornamentation are described. Based on exine ornamentation and several other characters it is suggested that the variety J. gossypiifolia, gossypiifolia be elevated to the rank of species.

Key Words: LM & SEM Jatropha gossypiifolia : two varieties.

INTRODUCTION

Euphorbiaceae is eurypalynous (Erdtman, 1952; Punt, 1987.), Bahadur et al., (1997) have recently made a comparative LM & SEM study of various Indian Jatrophas and brought to light the significance of various components of sporoderm ornamentation in relation to taxonomy of the genus. Erdtman (1952) first studied the pollen of Jatropha and proposed the “Crotonoid pattern”. Later, Miller and Webster (1962) investigated 11 species of Jatropha and Cnidoscolus and commented on the variation in croton pattern of exine. Bahadur et al., (1997) have described finer details of sporoderm sculpture of 9 taxa. Since the varietal aspects in relation to taxonomy were not studied hence this paper.

MATERIALS AND METHOD

Pollen grains of both the taxa under study were collected from wild plants in University campus and acetolysed following Erdtman (1952) and voucher slides and
herbarium specimens are stored in sporotheca collection and Herarium. SEM observations were made on acetolysed grains and sputter coated with gold and photographed with Phillips SEM installed at Central National Herbarium, Botanical Survey of India, Calcutta.

OBSERVATIONS AND DISCUSSIONS

The LM & SEM observations of pollen of both the *Jatropha gossypiifolia* varieties is provided as under:

LM Observations:
*Jatropha gossypiifolia* var. *gossypiifolia*:
- Pollen ± spheroidal, radially symmetrical. 55.5 μm in diam. inaperturate (omniaperturate), heavily sculptured with pilate/clavate processes aligend reticulately (hexagonal) to from a crotonoid pattern: crotonoid pattern lax. processes 2.3-3.0 μm long. heads + triangular, 1.5 um in diam., lumina fairly large. psilate. ectexine much thicker than endexine which is feebly developed.

SEM Observations:
*Jatropha gossypiifolia* var. *gossypiifolia*:
- Pollen ± spheroidal, inaperturate (omniaperturate), densely sculptured with clavate/pilate processes, aligned reticulately in a crotonoid pattern: processes confined to angles of faint brochi: crotonoid pattern lax. muri delimiting lumina faint. heads of clava/pila essentially triangular with prominently crenate margins. clava prominently striate. striae average. grooves broader or of same width as ridges: striae in radial pattern of heads of processes: lumina large. generally smooth. locally with 1-3 very small. free clava/pila (Plate 1, Fig. 1-2).

LM Observations:
*Jatropha gossypiifolia* var. *elegans*:
- Pollen ± spheroidal, radially symmetrical, 66 μm in diam., inaperturate (omniaperturate), heavily sculptured with pilate/clavate processes aligned reticulately (Penta or hexagonally) to form crotonoid pattern, processes 2.3 - 3.0 μm long. heads ± triangular, 2.3 μm in diam., lumina of moderate size 3.0 - 3.8 μm in diam., with a few much smaller free pila/clava, ectexine thicker than endexine which is feebly developed.

SEM Observations:
*Jatropha gossypiifolia* var. *elegans*:
- Pollen ± spheroidal, inaperturate (omniaperturate), densely sculptured with clavate/pilate processes, aligned reticulately in a crotonoid pattern; processes
Plate 1

Fig. 1 Scanning Electron Micrograph of the pollen of *J. gossypifolia* var. *gossypifolia* showing inaperturate processes and lax, crotonoid pattern.

Fig. 2 A portion of the above showing clearly crotonoid pattern; triangular prominently striate pila, 1–3 smaller pila in lumina.

Fig. 3 Scanning Electron Micrograph of the pollen of *J. gossypifolia* var. *elegans* showing inaperturate compact pilate processes and dense, crotonoid pattern.

Fig. 4 A portion of the above showing triangular prominently striate pila processes and dense crotonoid pattern.

(Magnification is show on micrographs as a bar.)
apparently confined to angles of faint brochi, crotonoid pattern dense with heads of clava/pila crowded, abutting on each other laterally; heads of processes triangular with crenate margins; clava promingly striate, striae 12-17 (average 13), ridges and grooves of same width, striae in a radial pattern around a central smooth area on clava/pila heads; lumina small, irregular, smooth with no free processes. (Plate 1, Fig. 3-4).

_J. gossypiifolia_ var. _elegans_ (Pohl.) Muell has been recorded as early on 1827 and described as _Adenorpium_ but later transferred by Klotzoch (1853) to _Jatropha_ and reduced to variety under _J. gossypiifolia_ by Mueller (1866). Cited by Rao and Raju (1994), they have stated, 'they have recognised 2 sympatrically growing yet unmistakably different varieties of _J. gossypiifolia_ var. _gossypiifolia_ and _J. gossypiifolia_ var. _elegans_ and commented for the need to review the entire botanical and phytochemical literature in India and recommended segregating them into two varieties on the basis of set of morphological characters.

In our studies on various aspects of _Jatropha_ species, we noted that _J. gossypiifolia_ var. _elegans_ to be more common than _J. gossypiifolia_ _gossypiifolia_, which grows in isolated patches and not at all pannictic as stated by Rao and Raju (1994); although crosses between them are fertile leading to formation of viable seeds (unpublished). Study of hybrid and in particular pollen characters would through useful information.

Apart from the distinct differences in sporoderm microcharacters, the two varieties differ in series of differences as follow; viz.

_J. gossypiifolia_ var. _elegans_: Plants with dark brown stem and dark purple leaves becoming green, flowers purplish, sepal with 8 glands, sepal tip devoid of gland, capsule hirsutulous, seeds light brown with black linear streaks, aril 8-10 lobed. Chemotaxonically, this variety has indoles and gallic acid and steroidal nucleus.

_J. gossypiifolia_ var. _gossypiifolia_: Plants with light green stem, leaves greenish from beginning, flowers light yellow, sepal with about 15 glands, sepal tip ending in gland, capsule densely hirsutulous, seed light brown with dark brown streaks, aril 15 lobed. Indoles and gallic acid are absent.

In view of the several palynomic microcharacters as well as other vegetative, floral and fruit characters pointed out above, the authors propose to elevate _J. gossypiifolia_ var. _gossypiifolia_ to the rank of species and this will be discussed elsewhere.

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