



PALYNOLOGICAL STUDIES IN SOME JATROPHA SPECIES

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ABSTRACT

Pollen morphology of *Jatropha curcas* L and *Jatropha multifida* L (Euphorbiaceae) has been critically analyzed using Light and Scanning Electron Microscopes. Both the taxa are economically important. *Jatropha curcas* yield biodiesel and the leaves of this taxon are used for rearing eri silkworm. *Jatropha multifida* is a well known ornamental plant, often cultivated in parks for its characteristic dissected leaves and brightly coloured inflorescence. Pollen grains in these two species are spherical, radially symmetrical and heavily sculptured with clavate processes. Pollens are omniaperturate with crotonoid ornamentation.

KEY WORDS: *Jatropha*, Pollen morphology.

INTRODUCTION

The genus *Jatropha* is a shrub comprising around 175 species. They distributed in tropical climatic conditions. In India 12 species are found to occur (Hooker, 1878), out of which 11 species are found in Southern India. (Cooke, 1903; Gamble, 1967). All most all species are economically important. Often, they are cultivated for biodiesel (*Jatropha curcas* L) and ornamental purpose (*Jatropha multifida* L, *Jatropha podagrica* Hook. and *Jatropha pandurifolia* Andr.). Among these species *J. curcas* is most valuable one. It is an edge plant and yields biodiesel. Many species of *Jatropha* serve as multipurpose plants. Though the enormous importance is found with *Jatropha* species, the biosystematic study has not been worked out. In the present investigation, phenotypic characteristic features coupled with pollen morphological data have been assessed in two species of *Jatropha* namely, *J. curcas* and *J. multifida*.

MATERIALS AND METHODS

Phenotypic characteristics were scored following the standard yard stick (Radford *et al.*, 1974). Acetolysis method was followed for palynological studies (Erdtman, 1952; Agashe, 2006). Scanning Electron Microscope studies were carried out by adopting the procedure proposed by Falc (1980). Pollen grains with good clarity were micro photographed.

RESULT***Jatropha curcas* (Figs. 1 & 2)**

It is a large shrub which can grow up to 4.5 meters (8-15 feet) tall. It has a smooth grey bark which exudes whitish watery latex when cut. The leaves are dark green, alternate, simple, ovate to slightly lobed with 3-5 indentations. Flowers are yellow to green in colour, borne in axils of the leaves. The average cap diameter of the flower is 7-11 mm. The average petal length is 6-9 mm & the average sepal length is 4-7 mm. The number of stamens is 10 and the number of styles and locules is 3.

Fruit is a small capsule, round in shape. The fruits are green and fleshy when immature, becoming dark brown when ripe and splitting to release 2 or 3 black seeds each about 2 cm long. Seeds are carunculate.

Pollen grains of this taxon are oblate, spherical, omniaperturate, heavily sculptured with clavate structures, which aligned reticulately to form a crotonoid pattern. Exine is usually covered with globular structures. Average size of the pollen grain is found to be 38 μm x 39.26 μm (Figs 3 & 4).

***Jatropha multifida* (Figs. 5 & 6)**

It is also a small shrub, 3-7 feet tall. The leaves are dark green, alternate, simple, palmately cut into 9-11 deep narrow lobes and can be large up to 1 foot across. The flowers are small. The small yellow petals with scarlet centers resemble a piece of coral. The flowers are borne in small, loose clusters in the axils of the leaves. The average cap diameter of the flowers is 11-16mm. The average petal length is 6-9 mm and the average sepal length is 2-3mm. The number of stamens is 8 and the number of styles and locules is 3. The fruit is yellow in colour, usually 3 angled capsules slightly over an inch long. The capsule does not open on its own unlike some of the other *Jatropha* species. Each capsule contains 3 seeds. The pollen grains of this taxon are also round, radially symmetrical, inaperturate, with characteristic crotonoid pattern. The average size of the pollens is 35.23 μm x 36.65 μm (Figs. 7 & 8).

DISCUSSION

The taxa studied revealed significant differences in respect of leaf morphology, flower colour, number of stamens, presence of hairs, etc. Leaves are palmately lobed and glabrescent in *J. curcas*. On the other hand, leaves are highly dissected in *J. multifida*. Usually 10 stamens are found in *J. curcas*, where as *J. multifida* reveals the presence of 8 stamens in each male flower. Flower colour is also different. Yellowish green petals are seen in *J. curcas*, where as magenta red coloured petals are found in

J. multifida. These morphological characters are specific to each taxon.

Palynological data supports the homogenous assemblage of the *Jatropha* species studied. Pollen grains are spheroidal and omniaperturate (inaperturate). Exine is densely clothed with globular structures. The present observations are in conformity with the reports of the earlier workers (Thanikaimoni et al., 1984; Bahadur Bir et al., 2000).

Erdtman (1969 & 1971) first studied the pollen of *Jatropha* and proposed the “Crotonoid pattern”. Later, several workers investigated various Indian *Jatropha* and brought to light the significance of various components of

sporoderm ornamentation in relation to taxonomy of the genus (Rao and Raju, 1994; Miller and Webster, 1962; Punt, 1962; Bir Bahadur *et al.*, 1997). Present palynological investigations on *J. curcas* and *J. multifida* also unraveled the spherical, radially symmetrical, omniaperturate, densely sculptured with clavate/ Pilate processes, aligned reticulately to form crotonoid pattern nature of pollen. These pollen grain features are unique and found only in the genus *Jatropha*. Crotonoid pattern could be considered as a diagnostic characteristic feature to identify the *Jatropha* species among the host plants of Eri Silkworm *Samia cynthia ricini* Boisduval.



Fig 1 : *Jatropha curcas* plant

Fig 2 : *Jatropha curcas* twig with inflorescence

Fig 3 : Acetolysed pollen grain of *Jatropha curcas* (LM)

Fig 4 : SEM photograph of pollen grain of *Jatropha curcas*

Fig 5 : *Jatropha multifida* plant

Fig 6 : *Jatropha multifida* twig with inflorescence

Fig 7 : Acetolysed pollen grain of *Jatropha multifida* (LM)

Fig 8 : SEM photograph of pollen grain of *Jatropha multifida*

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