Ultrastructure of Pollengrains of some Medicinal Plants

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Abstract
Palynology is the distinct branch of biology deals with the dispersed microscopic tiny living and fossil entities including pollen grains, spores, algal and fungal fragments and others. An important aspect of Palynology is the Pollen morphology. The importance of palynology in taxonomic and phylogenetic consideration of plants is well known. The changes occurring through hybridization and years of cultivation are reflected in pollen morphology. In the present study pollen morphology of some medicinal plants like, *Catheranthus roseus, Momordica charentia, Butea monosperma, Syzygium cumini* has been worked out with the help of SEM (Scanning Electron Microscopy), which is one of the modern advent technique.

Keywords: Palynology, SEM, Exine, Pollen morphology

Introduction:

Palynology, in recent years, has attracted the attention of workers of different disciplines on the account of its numerous applications to problems of plant taxanomy, paleobotany, genetics, geology, medical and agricultural sciences. Palynology is the distinct branch of biology deals with the dispersed microscopic tiny living and fossil entities including pollen grains, spores, algal and fungal fragments and others. An important aspect of Palynology is the Pollen morphology. The importance of palynology in taxonomic and phylogenetic consideration of plants is well known. The changes occurring through hybridization and years of cultivation are reflected in pollen morphology. The scope and interest in the study of pollen morphology has widened with the advent of Scanning Electron Microscopy (SEM) (Iwano *et al*, 1999) and with regards to unipalynous taxa particularly the understanding o finer morphology is of fundamental importance. SEM gives correct understanding of exine surface as the electron photographs of the surface replica of exine provides the exact picture of the ornamentation pattern. (Ayyanger, 1970)

The variation in the pollen morphological characters helps in the classification of plant taxa and their assessment of their phylogenetic relationship (Agashe, 2006 and Faegri and Iversan, 1975) Morphology of pollen has been categorized into five groups of characters in the order of their phylogenetic importance viz. apertures, exine orientation, exine strata, size and shape. The aperture shows variations in number, position and character, The various combinations of which make a sporomorph(referring to taxa), definite entity. The exine ornamentation is comprised to projections, (spines etc) or depressions. The exine consists of stratified layers of which endoexine is homogenous while the ectoexine is heterogenous, consisting of a basel layer, a radical rods or columella, and the outer most roof or tegillum, bearing the projection or the depression i.e. the microstructure and the microsculpturing of the exine is of great importance. The sculpturing of the pollen grain is generally a fairly constant character and is as excellent means of requisition. The importance of electron microscope in gaining

knowledge on the fine structure of pollen walls is gaining day by day. In the present study pollen morphology of some medicinal plants like *Catheranthus roseus, Momordica charentia, Butea monosperma, Syzygium cumini* has been worked out by SEM.

Method:

For SEM studies the fresh pollen of medicinal plants under observations were collected in 70% ethyl alcohol at the time of anthesis. They were dried and put on the stubs directly. The stubs were then coated with gold-palladium (Au-Pd, thickness 100A) to avoid charging of electrons with the help of BIO-RAD polaram division, SEM coating system. The pollen grains were observed under SEM. The present work was carried out on Philips SEM 515 unit in SRS Division, NBSS and LUP, Nagpur. Observations and Result obtained are as follows.

Observations and Result:

Under Scanning Electron Microscope

(a) *Catharanthus roseus*:

Pollen grains are Trizonocolporate; more or less prolate; polar axis 4.8µm long; the equatorial diameter 3.68µm; length of colpus 3 µm; ora-lalongate; long axis of ora 1.6µm; exine irregularly pitted, exine stratification obscure (Figure 1).

(b) *Momordica charantia*:

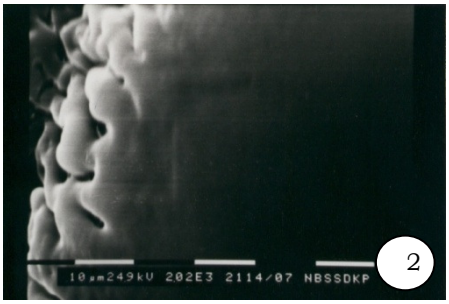
Pollen grains are Trizonocolporate; amb triangular, prolate spheroidal; polar diameter 6.8µm; equatorial diameter 3.44µm; length of colpus 5.2µm; ora-lolongate 1.6µm in length; sexine pattern reticulate muri raised above and amalgamated, lumini elongated, distantly place; lumina measures 0.8µm in length and 0.24µm breadth, length and thickness of muri is 1.6µm and 0.8µm respectively; sexine as thick as nexine (Figure 2, 3).

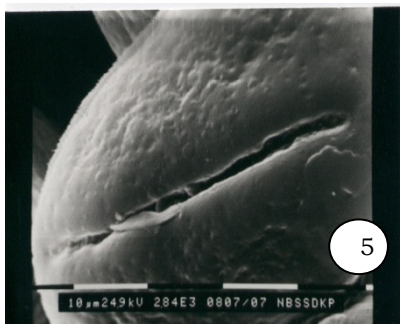
(c) *Butea monosperma*:

Pollen grains are Trizonocolporate; prolate spheroidal; polar diameter 4.5µm; equatorial diameter 3.24µm; length of colpus 3.24µm; ora-circular sculpturing granulate sexine as thick as nexine, Intectate (Figure 4).

(d) *Syzygium cumini*:

Pollen grains are Trizonosyncolporate; pollen Amb triangular, pollen diameter 10-17µm; endocolpium lalongate, colpus 20µm long; exine surface psilate; sexine almost as thick as nexine, intectate (Figure 5).





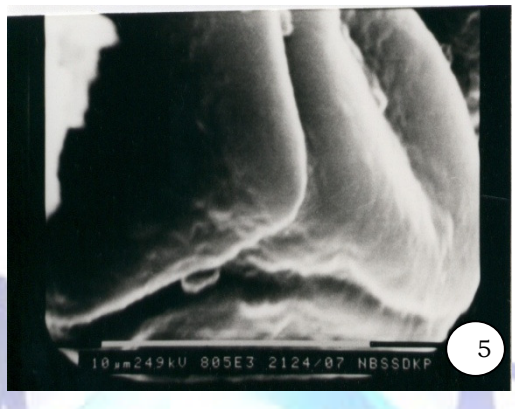


Figure. 1- Equatorial View *Catheranthus roseus pollen* (3000X)
Figure. 2- *Momordica. charantia pollen* (15000X)
Figure. 3- Equatorial view Showing Colporate structure of *Momordica charantia pollen* (3500X)
Figure. 4- Pollen wall showing aperture *Butea monosperma pollen* (1200X)
Figure. 5- Pollen enlarged *Syzygium Cumini pollen* (12000X)

Discussion:

Pollen grain is a highly reduced male gametophyte and is generally shed in a desiccated condition. It is comparatively simple haploid organ and can be easily collected and stored for considerable length of time without loss of viability (Saoji and Rudra, 1982). One of the conspicuous structural features of the pollen is the ornamentation of the exine. Pollen grains are rather uniform in their wall architecture. The importance of the pollen wall in bio-systematic has been realized since long.

In the present SEM studies of pollen under observation reveals the minutes details with different exine patterns. Pollen variations are almost a rule among cultivated plants and brief phenomenon has been put to effective use in the taxanomy of the plants of the group.

Conclusion:

These applied aspects of palynology have resolved themselves into a practical feasibility mainly because of the characteristic morphology of the exine which is considered dependable to reveal information on the evolution and interrelationship of plants. The cultivated plants alone provide examples of the uniqueness of the pollen walls and of the application of pollen morphology in plant taxanomy and evolution.

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