



## LM and SEM Studies on Fresh and Exposed Pollen Grains of *Bombax ceiba* Linn.

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### Abstract:

Effects of air pollution on fresh and exposed pollen grain of *Bombax ceiba* L. were studied in area of Nagpur. In order to study the impact of air pollution, pollen grains were subjected to LM and SEM (light and scanning electron microscopic studies). LM studies revealed that fresh pollen grains were tricolporate, with reticulate ornamentation and thick exine pattern, reticulate. According to polar view, pollen shape is more or less triangular in shape. Whereas in exposed pollen grains, shrinkage in its size and breakage of exine was noticed. SEM studies of exposed pollen shown some particulate matter was attached to its surface. The studies have discussed the structural changes in pollen characteristics of *Bombax ceiba* under the influence of air pollution.

**Keywords:** Pollen morphology, LM, SEM, Air pollution

### Introduction:

Now-a-days air pollution is one of the major problems. Harmful emission from various types of industries and gaseous pollutant released in the atmosphere by it are not only harmful for human health but also affects plants in many ways.

It has been reported that air pollution changes both the structure and development of anthers, leading to an increased number of deformed pollen grains as compared to control samples. Apertures were closed and microspores of exine sculpturing were found to be bigger and more fragile. Airborne particle materials adhere to the pollen surface, causing the collapse and degradation of the exine surface, and shrinkage and abnormality of pollen (Majd and Mohamadi, 1992; Emberlin, 1998; Parui *et al.*, 1998; Pelter, 1998).

*B.ceiba* Linn. belonging to the family Bombacaceae is a large, deciduous tree growing on the roadside of Nagpur. It flowers from January to March. The trunk and branches are covered with stout, hard, conical prickles when young, provided with well developed buttresses.

The flowers are large, numerous, fascicled near branch ends, ebracteate, actinomorphic, reddish. Calyx is leathery, cup -shaped and persistent, the petals are fleshy; the stamens are numerous, forming 5- bundles; the level of the stigma is higher than the level of the anther, the stigma is digitate. Flowers usually appear when the trees are leafless, before production of leaves (Bhattarcharya and Mondal, 2000).

The present study was undertaken to reveal the pollen morphological variations using LM and SEM so as to understand palynological characteristics within fresh and exposed pollen grains of *Bombax ceiba* in order to study the air pollution effects.





## Material and Methods:

**Pollen morphology: LM studies-** Light microscopic studies were carried out by acetolysis method (Erdtman, 1952). The fresh pollen material just before anthesis were collected and placed in the test tube, crushed with glass rod in 70% alcohol, then filtered, centrifuged and decanted and subjected to further procedure of Acetolysis. Slides were thus prepared using glycerine jelly and observed under microscope to study morphological characters.

**SEM Studies:** Scanning Electron Microscopy of pollen grains of fresh and exposed area carried out at VNIT, Nagpur. Dry pollen powder was used. The pollen powder of both the area was collected in butter paper and kept in petri-plate. Pollen grains were mounted on Gold-palladium (200-300Å thick) stub using double sided cello tape and then subjected to scanning; the magnification was between 400 X and 7000 X.

## Result and Discussion:

LM and SEM studies were performed and morphology of pollen grains was studied (Figure. 1-4). *Bombax ceiba* pollen grains were found to be tricolporate, euoblate, triangular, interapertural corner rounded, colpi apices acute, finely granulated, thick exine. Pollen grains in polluted area have shown distortion in size, breakage of exine. Exposed *Bombax ceiba* pollen grains have shown some deposition on the surface, exine reticulation is not clearly seen and seems to be damaged. Some particulate matter is also seen to be attached to the exine surface in SEM studies (Figure.2 and 4).

Pollen grains and fungal spores are the most predominant allergen in the air (Kalkar and Patil, 1994; Kalkar *et. al.*, 1998). The morphological studies of the pollen are very important. It is also applicable in genetic study, forensic science in individual species, community and climate change study (Aftab and Perveen, 2006).

Some reports are available on pollen morphology of Bombacaceae by several workers (Erdtman, 1952; Chaudhari, 1965; Sharma, 1970; Nilsson and Robyns, 1986; Mokhtar, 1991).

Pollen grains represent the male reproductive unit and hence plays key role in reproduction and growth of plants. The objective of present study was to assess the air pollution effects through palynological studies. The present study focus light on impact of air pollution on pollen grains and found the structural changes due to pollution, which in turn will harm its metabolic processes.



(1)



(2)

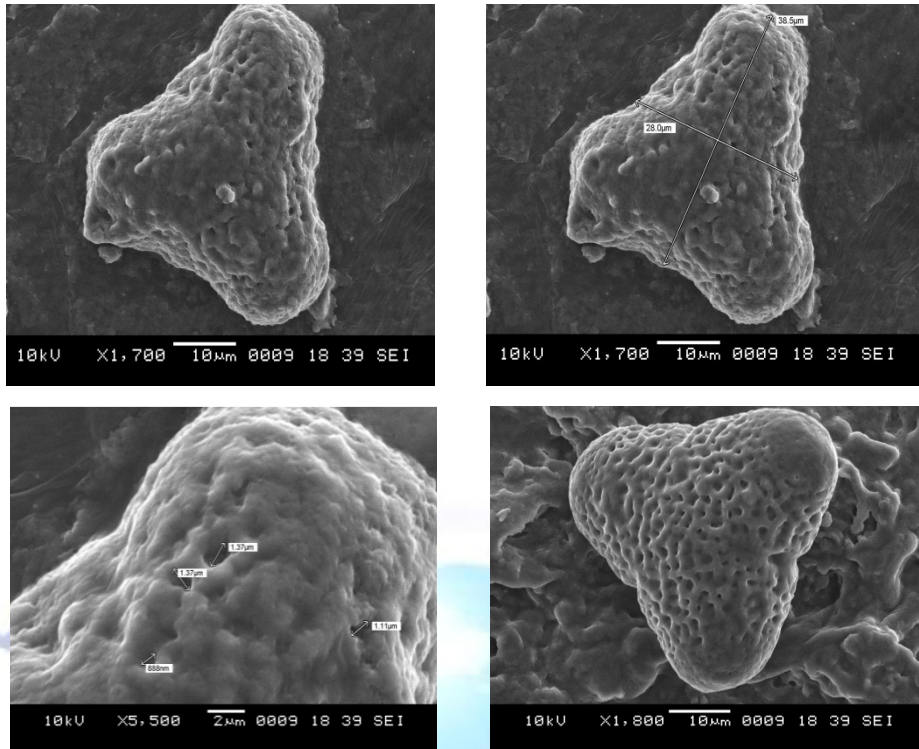




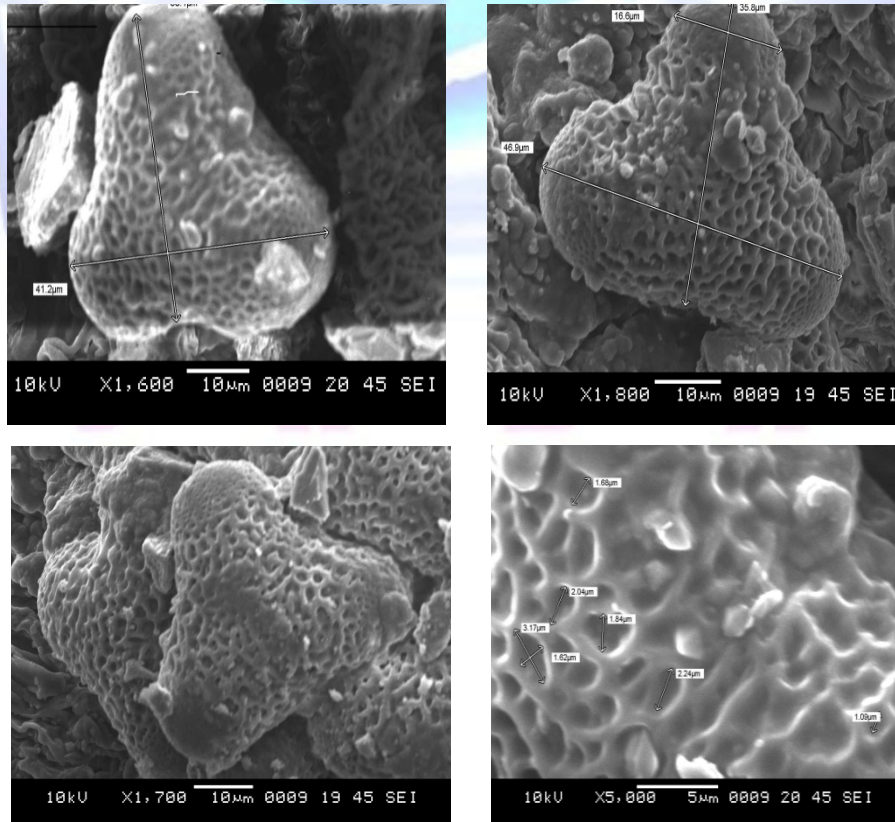


**Figure. 1-** LM- Fresh pollen grains of *Bombax ceiba*

**Figure. 2-** LM- Exposed pollen grains of *Bombax ceiba*



**Figure. 3-** SEM-Fresh pollen grains of *Bombax ceiba*



**Figure. 4-** SEM-Exposed pollen grains of *Bombax ceiba*



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