

## Palyno-Morphological Characteristics of Gymnosperm Flora of Pakistan and Its Taxonomic Implications with Light Microscope and Scanning Electron Microscopy Methods

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**Abstract :** The present study is intended to assess gymnosperms pollen flora of Pakistan using Light Microscope (LM) and Scanning Electron Microscopy (SEM) for its taxonomic significance in identification of gymnosperms. Pollens of 35 gymnosperm species (12 genera and five families) were collected from its various distributional sites of gymnosperms in Pakistan. LM and SEM were used to investigate different palyno-morphological characteristics. Five pollen types (i.e., Inaperturate, Monolete, Monoporate, Vesiculate-bisaccate, and Polypplicate) were observed. In equatorial view seven types of pollens were observed, in which ten species were sub-angular, nine species were triangular, six species were perprolate, three species were rhomboidal, three species were semi-angular, two species were rectangular and two species were prolate. While five types of pollen were observed in polar view, in which ten species were spheroidal, nine species were angular, eight were interlobate, six species were circular, and two species were elliptic. Eighteen species have rugulate and 17 species has faveolate ornamentation. Eighteen species have verrucate and 17 have gemmate type sculpturing. The data was analysed through cluster analysis. The study showed that these palyno-morphological features have significance value in classification and identification of gymnosperms. Based on these different palyno-morphological features, a taxonomic key was proposed for the accurate and fast identifications of gymnosperms from Pakistan.

**Keywords :** gymnosperms, palynology, Pakistan, taxonomy

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