

PALYNOLOGICAL STUDY OF THE GENUS *TRAGOPOGON* FROM PAKISTAN

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Abstract

Pollen morphology of two different species, *Tragopogon dubius* and *T. gracilis*, belonging to family Asteraceae was studied based on specimens collected within Pakistan. Characters like grain, shape of pollen grain, equatorial view, polar view, equatorial diameter (E), polar diameter (P), P/E ratio, length of colpus, exine surface, exine thickness, inter poral distance, inter spinal distance, inter spinal outline, length of spines, number of spines between colpi in each species were recorded for comparison.

At species level, micromorphological differences and distribution of surface pattern, shape and size of pollen have been found to exist. The pollen grains are consistently echinate, trizonocolporate but in *Tragopogon dubius* these are tetrazonocolporate. Maximum equatorial view, polar view, equatorial diameter (E), polar diameter (P), P/E ratio, length of colpus, exine surface, exine thickness, inter poral distance, inter spinal distance, inter spinal outline had been observed in *Tragopogon gracilis* but length of spines is maximum in *Tragopogon dubius*. The study demonstrates potential of pollen studies in distinguishing some taxonomic groups in the Asteraceae.

Introduction

Pollen morphology of the Lactuceae (Cichorieae) is probably the more distinctive tribe in the family Asteraceae. The ligulate corolla, milky sap and echinolophate pollen form a unique combination of characters which can be readily distinguished from the rest. This tribe consists of about 70 genera and 2300 species (Tomb, 1977). Stebbins (1953) proposed a natural system of classification for this tribe using geographical distribution, pollen morphology and chromosomal data in addition to traditional morphological characters. This method produced eight subtribes viz. Scolyminae, Cichorinae, Microseridinae, Stephanomeriinae, Dendroseiidinae, Scorzonarinae, Leontodontinae and Crepidinae. Jeffrey (1966) revised Stebbin's classification recognizing the importance of microcharacters like length of collector hairs on the style, shape of hair on stigmatic surfaces and pubescence on the corolla tube and divided this tribe into five groups, eleven subgroups, and 23 series.

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Many workers regard pollen grains of Lactuceae as "Liguliflorae-type" (Faegri and Iversen, 1975; Moore and Webb, 1978) in contrast to "Tubiliflorae-type". Wodehouse (1928, 1935) examined a large number of taxa of this tribe primarily in an effort to formulate phylogenetic trends within the tribe. The studies led to the characterization of several echinolphate patterns common in the Lactuceae.

Pausinger (1951) divided the tribe into two main types based on pollen characters. The *Leontodon* type was characterized by possessing poral lacunae and *Tragopogon* type by lacking poral lacunae and the abporal ones leading to form long lacunae. While working on comparative pollen morphology of *Sonchus*, Boulos (1960) found that this genus was closely related to *Launaea*. Tomb *et al.*, (1974) studied pollen morphology of Stephanomeriinae and showed that pollen grains of most of the tribe were echinolphate or tricolporate were almost the same Number and shape of lacunae demonstrated strikingly different exine stratification in several genera. Feuer (1974) examined the pollen grains of Microseridinae which in contrast to stephanomeriinae, were predominantly echinolphate. Skvarla *et al.* (1977) summarized pollen structure in the Asteraceae where two major pollen types were categorized viz. Anthemoid and helianthoid with various subtypes. Taxonomic, evolutionary and functional studies of the Asteraceae pollen grains on the basis of ultrastructure and sculpture were made by Bolick (1978), who noted two basic exine patterns: The caveate helianthoid and non-caveate Anthemoid. El Ghazaly (1980) studied the pollen grains of 35 species of the subtribe Hypochoeridinae. Regarding the sub-tribe Scorzonerinae with reference to its taxonomic significance, Blackmore (1982) recorded seven pollen types which could be distinguished by a key constructed on the basis of the number and arrangements of the lacunae of the grains. Blackmore (1984) further dealt with pollen morphology of a large number of taxa of the tribe Lactuceae and recognized seven distinct pollen types which were further subdivided into smaller groups on the basis of distinguishing characters.

According to Clark *et al.* (1980) pollen grains of *Astereae* have been characterized as basically helianthoid, spherical or slightly flattened, tricolporate, and uniformly echinate, having internal foramina, with varying proportions of abnormalities in size and colpus number (Wodehouse, 1930, 1935). However, in conjunction with systematic studies of *Haplopappus* and related genera in the subtribe Solidaginae, we have found a few cases of significant variation in pollen size, spine length, and number of spine rows between colpi. These characters indicate a potential for utilizing pollen characters in at least some systematic studies in the *Astereae*.