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Pollen Flora of Pakistan -XX. Molluginaceae

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Abstract: The pollen morphology of 3 species belonging to the 2 genera of the *Molluginaceae* family were investigated using light microscopy and scanning microscopy. It was found to be stenopalynous in nature. The pollen grains are usually radially symmetrical, isopolar, oblate-spheroidal to prolate-spheroidal or sub-prolate, tricolpate. The tectum is scabrate-punctate. On the basis of the shape of the pollen, 2 distinct pollen types were identified, viz., *Glinus lotoides* type and *Mollugo cerviana* -type.

Key Words: Pollen morphology, Molluginaceae and Pakistan Flora

Pakistan'ın Polen Florası -XX. *Molluginaceae*

Özet: *Molluginaceae* familyasından 2 cinsine ait 3 türün polen morfoloji ışık mikroskobu ve taramalı elektron mikroskobu kullanılarak incelenmiştir. Familya stenopalinoz özelliktedir. Polenler genellikle radyal simetrik, izopolar, oblat-sferoid ile prolat-sferoid ya da sub-prolat ve trikolpatır. Tektum skabrat-punktattır. Polen şeklinde dayanarak 2 polen tipi ayırd edilmiştir. *Glinus lotoides*-tip ve *Mollugo cervina*-tip.

Anahtar Sözcükler: Polen morfolojisi, *Molluginaceae* ve Pakistan Florası.

Introduction

Molluginaceae is a small family with 2 genera and 32 species distributed in tropical and subtropical regions [1, 2]. In Pakistan, it is represented by 2 genera and 4 species [3].

Previously, the family was often included in the *Aizoaceae* family. However, it differs from *Aizoaceae* by having an exclusively herbaceous habit, (almost) free sepals and a superior ovary. The pollen morphology of the *Molluginaceae* family has been examined by Erdman [4]; Buxbaum [5]; Behnke [6]; Sharma [7]; Vishne-Mitter [8]; Nowicke [9]; Skvarla & Nowicke [10]; Nowicke & Skvarla [11, 12]; and Moore & Webb [13]. The embrology of *Glinus lotoides* was examined by Narayan & Lodha [14]. A detailed pollen morphology of the *Molluginaceae* was described by Mitroiu [15]. The present paper gives an account of the pollen morphology of 3 species belonging to 2 genera, *Glinus* L. and *Mollugo* L., from Pakistan.

Materials and Methods

Pollen samples were obtained from Karachi University Herbarium (KUH) and collected from the field. The list of voucher specimens is deposited in KUH. The pollen grains were prepared for light (LM) and scanning microscopy (SEM) according to the standard methods described by Erdtman [4]. For light microscopy, the pollen grains were mounted in unstained glycerine jelly and observations were made with a Nikon Type-2 microscope with (E40, 0.65) oil immersion (E100, 1.25), using a 10 eye piece. For SEM studies, the pollen grains were suspended in a drop of water, directly transferred with a fine pipette to a metallic stub using double-sided cellotape, and coated with gold in a sputtering chamber (Ion-sputter JFC-1100). The coating was restricted to 150A. The S.E.M examination was carried out with a Jeol microscope JSM-T200. The measurements were based on 15-20 readings from each specimen. Polar length (P), equatorial diameter (E), colpi length, apocolpium, mesocolpium and exine thickness were measured (Table 1).

The terminology used is in accordance with Erdtman [4]; Kremp [16]; Faegri & Iversen [17] and Walker & Doyle [18].

Observations

General pollen characters of the family Molluginaceae

Pollen grains usually radially symmetrical, isopolar, oblate - spheroidal to prolate-spheroidal to sub-prolate, tricolpate, trilobed, colpi long, with tapering ends, colpal membrane finely - coarsely granulate. Sexine slightly thicker than nexine.

Tectum scabrate-spinulose.

Pollen type - I; *Glinus lotoides* - type (fig. 1 A-D).

Pollen class: Tricolpate, tri-zonoaperturate.

P/E ratio: semierect.

Shape: Sub - prolate.

Apertures: Ectoaperture-colpus long, narrow, not sunken. Colpal membrane densely granulated.

Exine: Sexine as thick as nexine or slightly thicker than nexine. Tectum scabrate.

Outline: ±trilobed in polar view and elliptic in equatorial view.

Ornamentation: Tectum scabrate.

Measurements: Polar axis P(30.5-) 31.7±0.59 (-32.3) µm, and equatorial diameter E(25.1-) 25.21±0.03 (25.5) µm. P/E ratio: 1.25. Colpi (17.9-) 24.27±2.25(28.7) µm long. Mesocolpium (17.9-) 20.5±0.94 (-25.13) µm. Apocolpium (1.79-) 2.69±0.89 (-3.6) µm. Exine (1.43-) 1.64±0.10 (-2.15) µm thick. P.A.I. 0.81.

Species included: *Glinus lotoides* L.

Pollen type - II: *Mollugo cerviana* - type

Pollen class: Tricolpate, tri-zonoaperturate.

P/E ratio: subtransverse to sub-erect.

Shape: Oblate - spheroidal to prolate-spheroidal.

Apertures: Ectoaperture - colpus long, narrow, not sunken. Colpal membrane granulated.

Exine: Sexine slightly thicker than nexine.

Outline: rounded - triangular in polar view and elliptic in equatorial view.

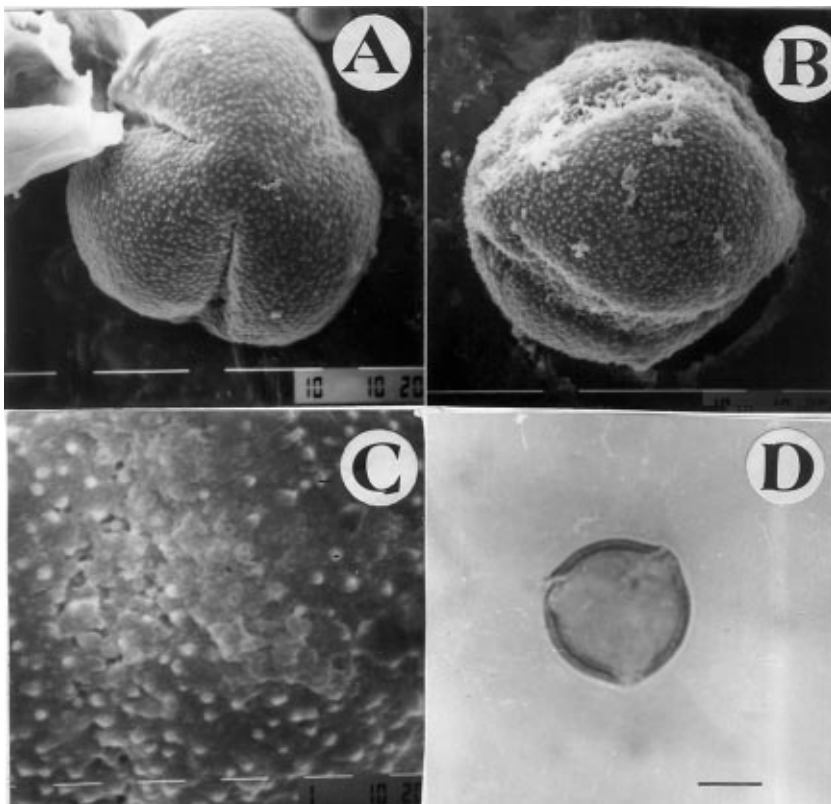


Figure 1. Scanning electron micrographs of the pollen grains. *Glinus lotoides*: A, Polar view; B, Equatorial view; C, Exine pattern; Polar view (LM). Scale bar= A, B & D 10 µm. C= 1 µm.

Ornamentation: Tectum spinulose - scabrate.

Measurements: Polar length P(18-) 20.11±0.09 (-22.25) µm, and equatorial diameter E(17.2-) 19.69±0.28 (-22.5) µm. P/E ratio: 1.02. Colpi (12.5-) 16.25±1.24 (-15) µm long. Mesocolpium c. 12.5-17.5 µm. Apocolpium 2.5-8.25 µm. Exine (1.25-) 1.72±0.1 (-2.25) µm thick.

Species included:

Mollugo pentaphylla L., *Mollugo cerviana* (L.) Ser.

Key to the species

- Tectum scabrate*Mollugo pentaphylla*
- Tectum spinulose *Mollugo cerviana*

Conclusion

Molluginaceae is a stenopalynous family [4]. The pollen grains are usually radially symmetrical, isopolar, oblate-spheroidal to prolate-spheroidal or sub-prolate, tricolpate, and the colpal membrane is finely-coarsely granulate. The tectum is scabrate-spinulose. The pollen morphology of the family is very helpful at the generic and the specific level. On the basis of the pollen shape, 2 distinct pollen types were identified, viz., the *Glinus lotoides* type and *Mollugo cerviana* -type. Pollen type-I:

Glinus lotoides is readily distinguished by its sub-prolate pollen shape. A single species, *Glinus lotoides* L. is included in this type [4]. Pollen type-II; *Mollugo cerviana* is characterized by oblate-spheroidal to prolate-spheroidal shaped pollen. A single genus represented by two species is included in this pollen type. The pollen morphology of the species is fairly uniform. However, these species show a little variation in the exine pattern. In *Mollugo cerviana* (L.) Ser., a scabrate tectum is found, whereas in *Mollugo pentaphylla* L., a spinulose tectum is found. Nowicke & Skvarla (1979) also reported similar types of grains in the genus *Mollugo* L. The present pollen data also confirm the close relationships between the *Molluginaceae* and *Aizoaceae*. Both families have tricolpate pollen with a scabrate to spinulose tectum [4, 9-12].

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