

POLLEN FLORA OF PAKISTAN - VI. SALVADORACEAE

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Abstract

Pollen morphology of the family Salvadoraceae has been examined from Pakistan by light and scanning electron microscope. Pollen grains are generally radially symmetrical, isopolar, 3-zonocolporate rarely 4-zonocolporate, prolate-spheroidal to sub-prolate. Tectum reticulate. Pollen morphology of the family is significantly helpful for delimiting the species.

Introduction

Salvadoraceae is a small family comprising of 3 genera and 12 species which is distributed mainly in the tropical and subtropical Asia and Africa (Willis, 1973; Mebberley, 1987). In Pakistan it is represented by a single genus i.e., *Salvadora* with 2 species (Qureshi, 1972).

Pollen morphology of the family Salvadoraceae has been studied by Erdtman (1952); Lobreau-Callen (1969); Huang (1972) and Maheswari Devi (1972). There are no previous reports available on the pollen grains of the family Salvadoraceae from Pakistan. In the present paper pollen morphology of the family Salvadoraceae has been examined by light and scanning microscope.

Materials and Methods

Pollen samples were obtained from Karachi University Herbarium (KUH) or collected from the field. The pollen grains were prepared for light and scanning microscopy by the standard methods described by Erdtman (1952). For light microscopy, the pollen grains were mounted in unstained glycerine jelly and observations were made with a Nikon Type-2 microscope under (E40,0.65) and oil immersion (E100,1.25) using 10x eye piece. For SEM studies pollen grains suspended in a drop of water were 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) coating was restricted to 150A for 6 minutes. S.E.M examination was carried out on a Jeol microscope JSM-T200. The measurements were based on 15-20 readings from each specimen. Pollen diameter, polar axis (P) and equatorial diameter (E), colpi length, apocolpium, mesocolpium and exine thickness were measured.

The terminology used is in accordance with Erdtman (1952); Faegri & Iversen (1964) and Walker & Doyle (1975).

General pollen characters of family Salvadoraceae

Pollen grains generally radially symmetrical, isopolar mostly prolate-spheroidal to sub-prolate, trizonocolporate rarely 4-zonocolporate. Equatorial view elliptic, polar

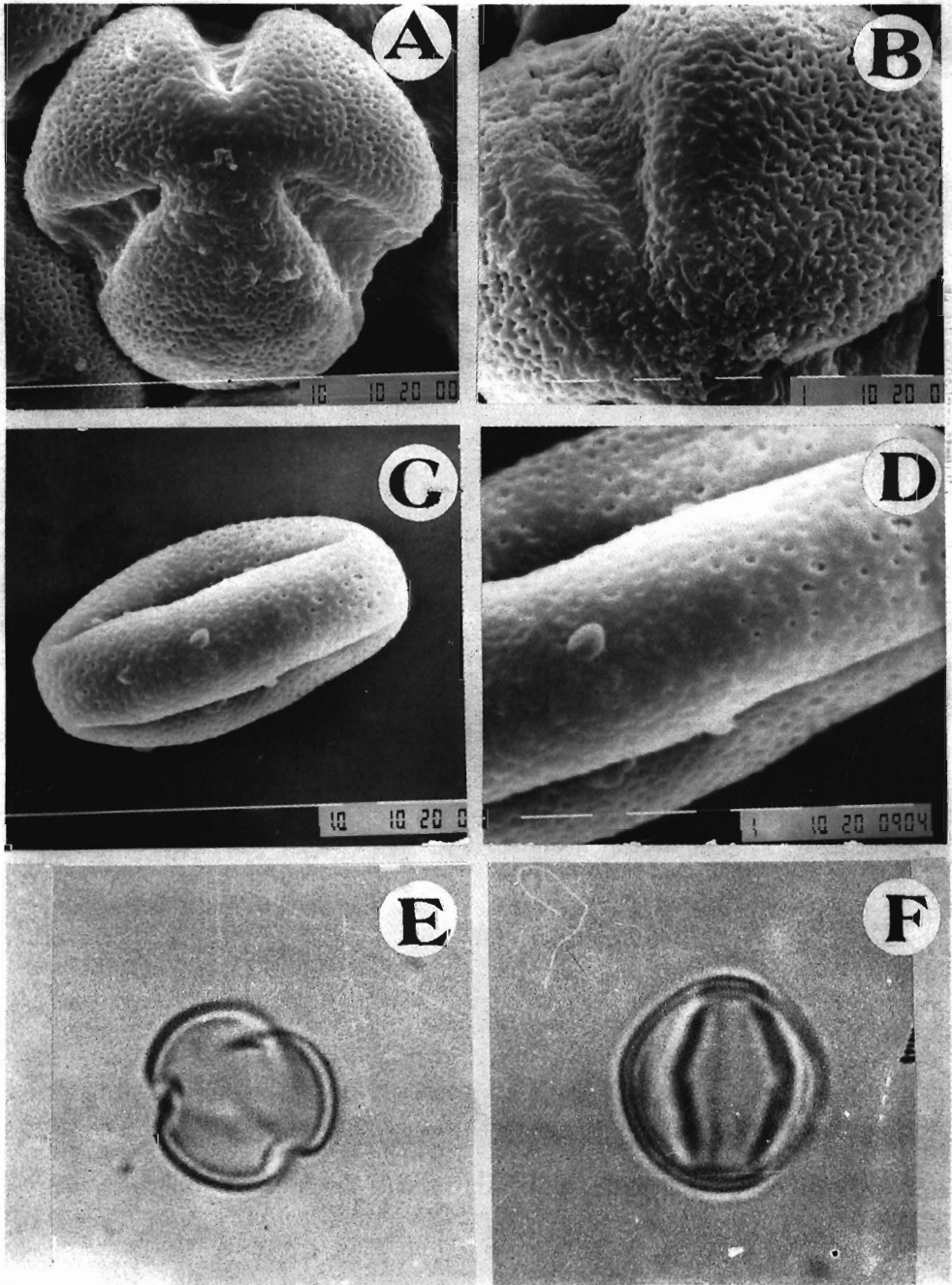


Fig. 1A-F. Scanning Electron micrographs (SEM) of pollen grains A-D; Light micrographs (LM) of pollen grains E & F. *Salvadora oleoides*; A) polar view; B) Exine pattern. *S. persica*: C) Equatorial view; D) Exine pattern; E) polar view; F) Equatorial view. Scale bar A & C = 10 μ m; B & D = 1 μ m; E & F = 20 μ m.

view trilobed, colpi long, broad, acute ends, colpal membrane sub-psilate, ora distinct la-longate. Tectum reticulate with regular or irregular pattern of muri.

Description of pollen type:

Salvadora oleoides-type (Fig.1 A - E).

Pollen class: 3-zonocolporate, rarely 4-zonocolporate.

P/E ratio: semi-erect to sub-erect.

Shape: Sub-prolate to prolate - spheroidal.

Apertures: Ectoapertures - colpus usually long, broad, ends acute, margins distinct, colpal membrane densely granulated. Endoaperture - medium, circular slightly la-longate.

Exine: Sexine thicker at the polar regions than at the equator.

Ornamentation: Tectum reticulate, \pm regular or irregular pattern of muri.

Outline: Equatorial view - elliptic, polar view trilobed to triangular.

Measurements: Polar length (P) $8.41 (12.6 \pm 0.32) 15.41$ μm . Equatorial diameter (E) $8.41 (11.8 \pm 0.16) 12.6$ μm , colpus $7.01 (10.39 \pm 0.63) 14.4$ μm long. Apocolpium $1.81 (2.42 \pm 0.76) 2.81$ μm . Mesocolpium $5.61 (7.35 \pm 0.27) 9.81$ μm . Exine $0.28 (1.12 \pm 0.12) 1.41$. P/E ratio: (1.07 - 1.16).

Species included: *Salvadora oleoides* Decne., and *S. persica* L.

Key to the Species

- + Pollen grains prolate-spheroidal, colpi $11.21 - 14.4$ μm long
----- *Salvadora persica*
- Pollen grains sub-prolate, colpi $7.01 - 9.81$ μm long
----- *Salvadora oleoides*

Comments

Pollen grains of *Salvadora oleoides* - type are characterized by 3-zonocolporate rarely 4-zonocolporate pollen with reticulate tectum.

Salvadora L., is a stenopalynous genus. Trizonocolporate grains in the family Salvadoraceae (*Azima*, *Dobera* and *Salvadora*) have also been reported by Erdtman (1952) and Maheswari Devi (1972). However, the genus shows considerable variation in shape and colpi length which are helpful for delimiting the species (see key to the species).

Pollen grains of closely related family Celastraceae are more or less similar to Salvadoraceae as both the families have colporate pollen with reticulate tectum (Erdtman, 1952; Maheswari Devi, 1972; Lobreau-Callen, 1977). However, in Celastraceae striate - rugulate tectum is also found (Erdtman, 1952; Lobreau-Callen, 1977). The placement of Salvadoraceae within the order Celastrales by Cronquist (1981) and Takhtajan (1969) therefore seems to be justified.

Specimen examined:

Salvadora oleoides Decne. Pakistan: Karachi, Manghopir, 20.10.1968, Sultan - ul - Abedin s.n. (KUH); Nazimabad, 6.3.1968, Noorjhan Bushra s.n. (KUH); Rest house Lasbella, 24.3.1990, A. Ghafoor & Steve Goodman 4868 (KUH).

Salvadora persica L. Pakistan: Karachi, Memon Goth, 17.11.1986, Anjum Perveen 213 (KUH); Naskot on way to Diplo, 23.1.70. S.I.Ali, S.A.Farooqi & Sultan-ul-Abedin 4321 (KUH).

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References

- Carlquist, S. 1992. Wood anatomy of sympetalous dicotyledon families: a summary, with comments on systematic relationships and evolution of the woody habit. *Ann. Mo. Bot. Gard.*, 79: 303-332.
- Cronquist, A. 1981. *The Intergrated System of Classification of Flowering Plants*. Columbia Univ. Press, New York.
- Dahlgren, R. 1975. A system of classification of the angiosperms to be used to demonstrate the distribution of characters. *Bot. Not.*, 128: 119-147
- Dahlgren, R. 1977. *Plant systematics and Evolution*, Suppl., 1:253-283.
- Dahlgren, R. 1980. A revised system of classification of angiosperms. *Bot. J. Linn. Soc.*, 80: 91-124
- Dahlgren, G. 1989. The last Dahlgrenogram, a system of classification of the dicotyledons. In: *Plant Taxonomy, Phytogeography and Related Subjects: The Davis and Hedge Festschrift*. (Ed.) Kit-Tan. Edinburgh University Press. Edinburgh.
- Diniz, F. 1972. Panorama actual da Palinologia, Alguns aspectos morfológicos.- *Bolm. Soc. Port, Cienc. nat., Lisboa*, 14: 121-135.
- Erdtman, G. 1952. *Pollen Morphology and Plant Taxonomy. Angiosperm*. Almqvist and Wiksell, Stockholm.
- Fægri, K. and J. Iversen 1964. *Text Book of Pollen Analysis*. 2ed., Munksgaard, Copenhagen.
- Huang, T.C. 1972. *Pollen Flora of Taiwan*. National Taiwan Univ., Botany Dept. Press, 297pp.
- Lobreau-Callen, D. 1969. Les limites de l' order des Celastrales a press le. *Pollen et spores*, 11: 499-555.
- Lobreau-Callen, D. 1975. Deux genres de Celastraceae Cass L., et Maytenus Mol. revus a la lumiere de la palynologia *Adansonia*, 15: 215-223.
- Lobreau-Callen, D. 1977. Les limites des l' order des Celastrales d' apre's le pollen. *Pollen et Spores*, 11: 499-55.
- Mabberley, D. J. 1987. *A Plant Book*. University Press Cambridge.
- Maheswari Devi, H. 1972. Salvadoraceae - A study of its embryology and systematics. *J. India Bot. Soc.*, 52-56.
- Qureshi, S. 1972. Salvadoraceae. In: *Flora of Pakistan* 29, (Eds.) E. Nasir & S.I. Ali, Karachi.
- Takhtajan, A. 1969. *Flowering plants (Origin and dispersal)*. Oliver & Boyd, Edinburgh.
- Thorne, R. F. 1983. Proposed new realignments in the angiosperms. *Nordic J. Bot.*, 3: 85-117.
- Walker, J. W. and J. A. Doyle. 1975. The bases of Angiosperm Phylogeny: palynology. *Ann. Mo. Bot. Gard.*, 62: 664-723.
- Willis, J. C. 1973. *A Dictionary of the Flowering Plants and Ferns*. University Press, Cambridge.