

POLLEN FLORA OF PAKISTAN - V. HALORAGACEAE

ANJUM PERVEEN AND M. QAISER

*Department of Botany,
University of Karachi, Karachi-75270, Pakistan*

Abstract

Pollen morphology of 2 species of the genus *Myriophyllum* L., from Pakistan belonging to the family Haloragaceae has been examined by light and scanning electron microscope. Pollen grains are generally radially symmetrical, isopolar sub-oblate to oblate, 4-zonocolpate, colpi short, elliptic. Tectum scabrat-punctate.

Introduction

Haloragaceae is a fairly small family comprising of 6 genera and about 120 species, cosmopolitan and found abundant in Australia (Willis, 1973; Mabberley, 1987). Takhtajan (1969) and Cronquist (1968, 1981) placed the family Haloragaceae along with Gunneraceae and Hippuradaceae in the order Haloragales. Thorne (1983) however, referred Haloragaceae in the order Cornales, whereas Dahlgren (1989) treated Haloragales as a monotypic order.

In Pakistan Haloragaceae is represented by a single genus *Myriophyllum* L., with 2 species (Ghazanfer, 1977). *Myriophyllum* L., is a small aquatic sub-merged and floating perennial herb, leaves alternate or opposite rarely whorled pinnatisect, exstipulate. Flowers solitary or in spikes, ovary inferior, 1-4 locular. Fruit drupe or berry.

Pollen morphology of the family Haloragaceae has been examined by Faegri & Iversen (1964), Engle (1978), Moore & Webb (1978), Cook (1988) and Moore *et al.*, (1991). Pollen morphology of *Myriophyllum* L., in relation to taxonomy have been studied by Praglowski (1970). Mathewes (1978) described pollen morphology of few species of the genus *Myriophyllum* L., from western Canada.

In the present paper pollen morphology of the genus *Myriophyllum* L., representing 2 species viz., *M. spicatum* L., and *M. verticillatum* L., have 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 distilled water were transferred on to a metallic stub using double sided cellulose tape and coated with gold in a sputtering chamber (Ionsputter JFC-1100) where

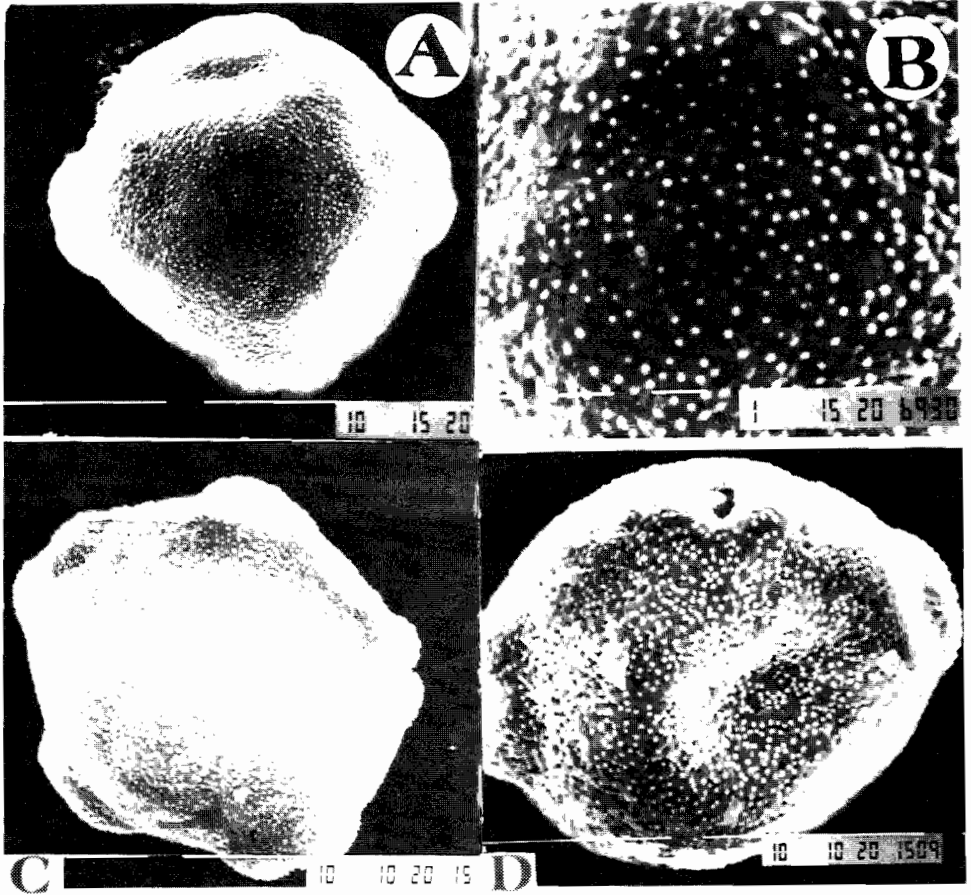


Fig. 1. Scanning Electron micrographs (SEM) of pollen grains. *Myriophyllum spicatum*: A. polar view; B. Exine pattern. *Myriophyllum verticillatum*: C. polar view; D. Equatorial view.

Scale bar A & C = 10 μ m; B & D = 1 μ m.

coating was restricted to 150A. S.E.M examination was carried out on a Jeol microscope JSM-T200. The measurements were based on 15-20 readings from each specimen. Polar axis (P) Equatorial diameter (E), colpi length, apocolpium, mesocolpium and exine thickness were measured.

The terminology used is in accordance with Erdtman (1952); Kremp (1965); Faegri & Iversen (1964) and Walker & Doyle (1975).

General pollen characters of the family Haloragaceae

Pollen grains generally radially symmetrical, isopolar sub-oblate to oblate, 3 - 5 - zonocolpate, equatorial view elliptic, polar view \pm circular, colpi short, aspidote, elliptic. Tectum scabrate - punctate.

Description of pollen type

Myriophyllum verticillatum-type (Fig. 1 A-D).

Pollen class: 3-5-colpate, zonoaperturate

P/E ratio: Transverse to sub-transverse.

Shape: sub-oblate oblate.

Apertures: Ectoapertures - colpus, small, elliptic, not sunken, colpi with aspides, end acute.

Exine: Sexine thicker than nexine.

Ornamentation: Tectum scabrate punctate, scabrae fine.

Outline: \pm circular in polar view, elliptic in equatorial view.

Measurements: Polar length (P) 16.25 (19.36 \pm 0.32) 22.25 μ m. equatorial diameter

(E) 21.6 (24.5 \pm 0.16) 27.5 μ m, colpus 1.43 (3.51 \pm 0.63) 5.0 μ m long.

Mesocolpium 15 (15.25 \pm 0.27) 17.5 μ m. Apocolpium 7.5 (8.35 \pm 0.14) 10 μ m.

Exine 1.25 (2.11 \pm 0.10) 2.5 μ m thick. P.A.I.0.59.

Species included: *Myriophyllum spicatum* and *M. verticillatum*

Key to the species

+ Pollen grains sub-oblate, equatorial diameter 21.5-24.3--*Myriophyllum verticillatum*

- Pollen grains oblate, equatorial diameter 25.15-27.5

----- *Myriophyllum spicatum*

Comment: Pollen grains of *Myriophyllum verticillatum* - type is readily distinguished by its short colpi (1.25-5 μ m in length). *Myriophyllum* L., is a stenopalynous taxon, the two species of this genus are fairly uniform in their pollen characters. However, equatorial diameter and shape of the grains are significantly important for delimiting the species (see key to the species). Similar type of the pollen in the genus *Myriophyllum* have also been reported by Moore & Webb (1978) and Moore *et al.*, (1991).

The pollen grains of closely related families i.e., Gunneraceae and Hippuridaceae are different from Haloragaceae, as both the families possess long colpate (colpoidate), non-aspoidate pollen (Erdtman, 1952).

The present findings favour Dahlgren's (1989) treatment who kept the family Haloragaceae in the separate monotypic order Haloragales. However, pollen grains of Haloragaceae closely resemble with that of Betulaceae (Erdtman, 1952).

Specimens examined *Myriophyllum verticillatum*: Thatta, Kalri lake, 10.4.87, Anjum Perveen s.n. (KUH); *M. spicatum*: Thatta, S.S. Naqvi s.n. (KUH).

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