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POLLEN FLORA OF PAKISTAN -XXXI. BETULACEAE

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Abstract

Pollen morphology of the family Betulaceae from Pakistan has been examined by light and scanning electron microscope. Pollen grains are generally 3-5-porate, oblate or sub-oblate with scabrate tectum.

Introduction

Betulaceae is a small family of 2 genera and about 95 species, distributed in the temperate and arctic regions of North and South America, Europe and Asia (Willis, 1973; Mabberley, 1987). In Pakistan it is represented by 2 genera viz., *Betula* & *Alnus* (Nasir, 1975). Cronquist (1981), Thorne (1983) and Dahlgren (1983) placed the family Betulaceae under the order Fagales with Fagaceae, whereas Takhtajan (1969, 1980) kept the family Betulaceae in the distinct monotypic order Betulales.

Pollen morphology of the family has been studied by Erdtman (1952, 1953); Faegri & Iversen (1964); Birks (1968); Cherevko (1969); Moore & Webb (1978). Leopold (1965) described pollen morphology of new species of the genus *Betula* from England. In the present paper, pollen morphology of two genera viz., *Alnus* and *Betula* of the family Betulaceae from Pakistan has been examined by light and scanning electron 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 (LM) and scanning electron microscopy (SEM) by the standard methods described by Erdtman (1952). For light microscopy, the pollen grains were mounted in unstained glycerine jelly and observations 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 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). Coating was restricted to 150A. The 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) and equatorial diameter (E), aperture size, 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).

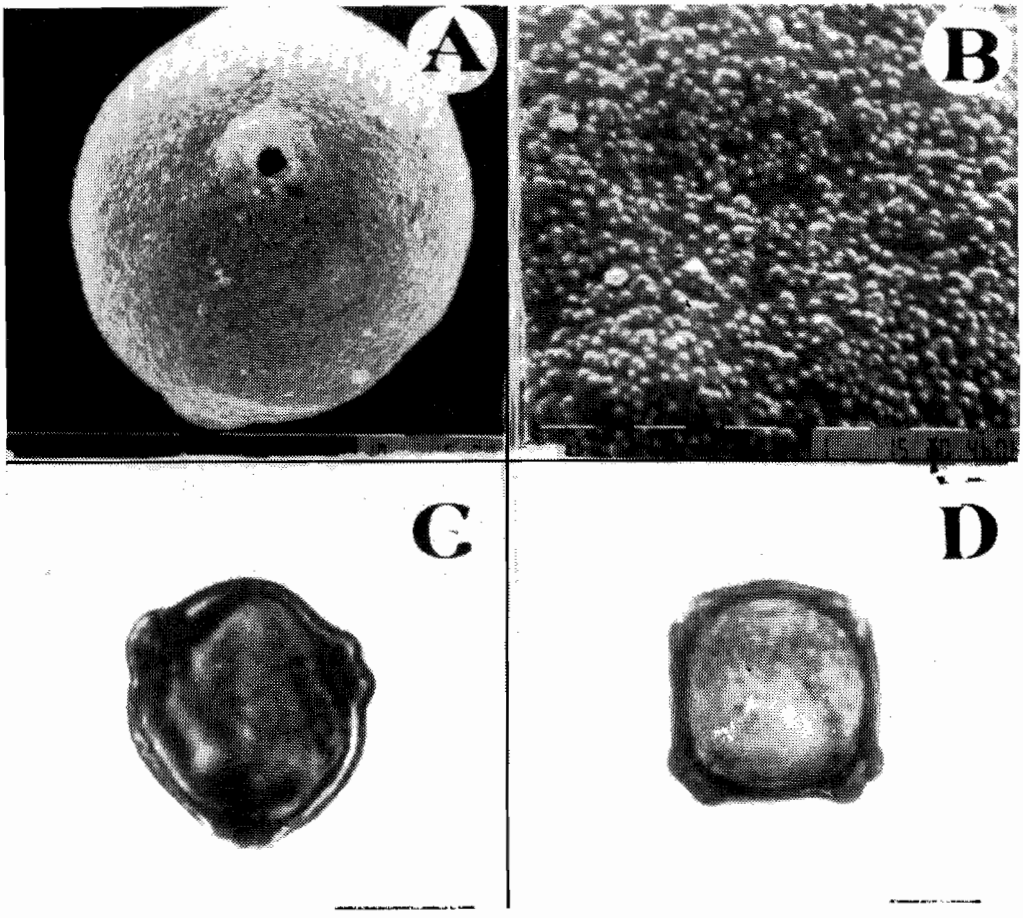

Fig. 1. Pollen of *Alnus nitida*: A & B = Scanning Electron micrographs: A, polar view; B, Exine pattern. C & D = Light micrographs (LM): C, Polar view (triporate pollen); D, Equatorial view (4-porate pollen) Scale bar = A, C & D = 10 μm; B = 1 μm

General pollen characters of the family Betulaceae

Pollen grains generally radially symmetrical, isopolar, generally 3-5 porate, oblate or sub-oblate with scabrate tectum.

Key to the pollen types

\+ Pollen grains oblate ---------- *Alnus nitida - type*
\- Pollen grains sub-oblate ---------- *Betula utilis - type*

Descriptions of pollen type

Alnus nitida (Spach) Endl. (Fig.1.A-D)
Pollen class: 3-5-porate, zonoaperturate.
P/E ratio: transverse.
Shape: Oblate.
Apertures: Pore circular distinct.
Exine: Sexine thinner than nexine.
Outline: ± rounded triangular in polar view and elliptic in equatorial view.
Ornamentation: Tectum scabrate.
Measurements: Size: Polar axis (16.25-) 20 ± 2.2 (-28.75) μm, and Equatorial diameter E(10-) 27.45 ± 104 (-30) μm. P/E ratio: 0.72 Pore (2.25-) 2.47 ± 0.71 (-2.51) μm in diameter. Mesoporium (10-) 15.62 ± 0.62 (17.5) μm. Apoporium (7.5-) 9.5 ± 0.51 (-12.5) μm. Exine (1.25-) 1.63 ± (-2.5) μm thick. P.A.I: 0.56.
Species included: *Alnus nitida* (Spach) Endl.
Betula utilis - type
Pollen class: 3-porate, zonoaperturate.
P/E ratio: Sub-transverse.
Shape: Sub-oblate.
Apertures: Pore circular distinct.
Exine: Sexine thinner than nexine.
Outline: ± rounded in polar view and elliptic in equatorial view.
Ornamentation: Tectum scabrate.
Measurements: Size: Polar axis (21.25-) 23 ± 2.0 (-24.75) μm, and
Equatorial diameter E(26-) 28.45 ± 1.11 (-29) μm. P/E ratio: 0.84 Pore (2.25-) 2.4 ± 0.41 (-2.51) μm in diameter. Mesoporium (24-) 25.62 ± 0.62 (26.4) μm. Apoporium (14-) 15.11 ± 0.51 (-16.5) μm. Exine (1.25-) 1.63 ± (-2.5) μm thick. P.A.I: 0.56.
Species included: *Betula utilis* D.Don
Comments:

Pollen grains of *Alnus nitida* - type is characterized by oblate, 4-5-zonoporate pollen with scabrate tectum. Similar type of pollen grains in the genus *Alnus* have also been reported by Erdtman (1952) and Moore & Webb (1978). *Betula utilis* - type, readily recognized by sub-oblate, tri-porate pollen. Both types are similar in pollen morphology, however they differ only in pollen shape, in *Alnus nitida* - type (*Alnus nitida* (Spach) Endl.), oblate shape pollen are present, whereas in *Betula utilis* - type (*Betula utilis* D.Don) sub-oblate pollen are found. The pollen grains of closely related family i.e., Fagaceae are different from Betulaceae since Fagaceae have colporate pollen (Erdtman, 1952).

The present findings support the placement of Betulaceae in a separate monotypic order Betulales by Takhtajan (1969, 1980).

Specimens examined: *Alnus nitida*: Garhi Habibullah Barkaum check post, S.B. Akhtar s.n.(KUH); c. 54 km from sost, on way to Khunjerab pass ± 2900, S.I Ali, W. Sugany, Tahir Ali & Gike 3377 (KUH).*Betula utilis*: c. 53 km from sost, on way to Khunjerab pass, ± 3500m, S.I.Ali, W.Sugang, Tahir Ali & Gike 3333 (KUH).

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