

POLLEN FLORA OF PAKISTAN -XXXIII. MENISPERMACEAE

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Abstract

Pollen morphology of 4 species of the family Menispermaceae from Pakistan has been examined by light and scanning electron microscope. Pollen grains usually radially symmetrical, isopolar subprolate, rarely oblate-spheroidal, colpate or colpporate. Sexine thinner or thicker than nexine. Tectum reticulate or reticulate - rugulate. On the basis of aperture types two distinct pollen types are recognized viz., *Cocculus pendulus* - type and *Tinospora malabarica* -- type.

Introduction

Menispermaceae is mainly tropical and subtropical family of about 65 genera and 350 species (Willis, 1973; Mabberley, 1987). In Pakistan it is represented by 4 genera and 5 species (Siddiqui, 1974). It is closely related to Lardzabalaceae.

Erdtman (1952) studied pollen of *Anamirta* and *Cocculus* by light microscope. Pollen morphology of the family Menispermaceae has been examined by Thanikaimoni (1968). Ferguson (1978) examined the pollen morphology of tribe Coscinieae of Menispermaceae in relation to its taxonomy. Qaiser & Perveen (1997) while studying pollen flora of Pakistan provided some palynological information of the family Menispermaceae. Pollen morphology of the family has also been studied by Mitroiu (1970), Muller (1970), Wilkinson (1978), Ferguson (1975), Ferguson & Hideux (1975) and Moore & Webb (1978). There is no comprehensive report on the pollen morphology of the family Menispermaceae from Pakistan. Present investigation is based on the pollen morphology of 4 species representing three genera of the family Menispermaceae by light and scanning electron microscope.

Materials and Methods

Pollen samples were obtained from Karachi University Herbarium (KUH) or 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) by the standard methods described by Erdtman (1952). For light microscopy, the pollen grains were mounted in unstained glycerin 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 was 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 15A°. The S.E.M examination was carried out on a Jeol microscope JSM-T200. The measurements are based on 15-20 readings from each specimen. Pollen diameter, polar axis (P) and equatorial diameter (E), aperture size, apocolpium, mesocolpium and exine thickness were measured (Table I).

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

Table 1. General pollen character of taxa studied in the family Menispermaceae.

S. No.	Name of taxa	Polar length in μm	Equatorial diameter μm	P/E ratio	Shape	Colpus length μm	Exine thickness μm	Tectum
1.	<i>Cissampelos pareira</i>	17.5	15.5	1.16	Sub-prolate	17.0	1.25	Coarsely reticulate
2.	<i>Cocculus hirsutus</i>	13.5 - 15.12	10.5 - 13.01	1.15	Sub-prolate	10.1 - 12.5	1.51 - 2.11	Reticulate- regulate
3.	<i>Cocculus pendulus</i>	14.5 - 18.21	11.9 - 15.41	1.22	Sub-prolate	12.6 - 14.11	1.26 - 1.41	Reticulate
4.	<i>Tinospora malabarica</i>	10 - 15	12.5 - 15.5	0.98	Oblate- spheroidal	7.75 - 10	1 - 2.2	Coarsely reticulate

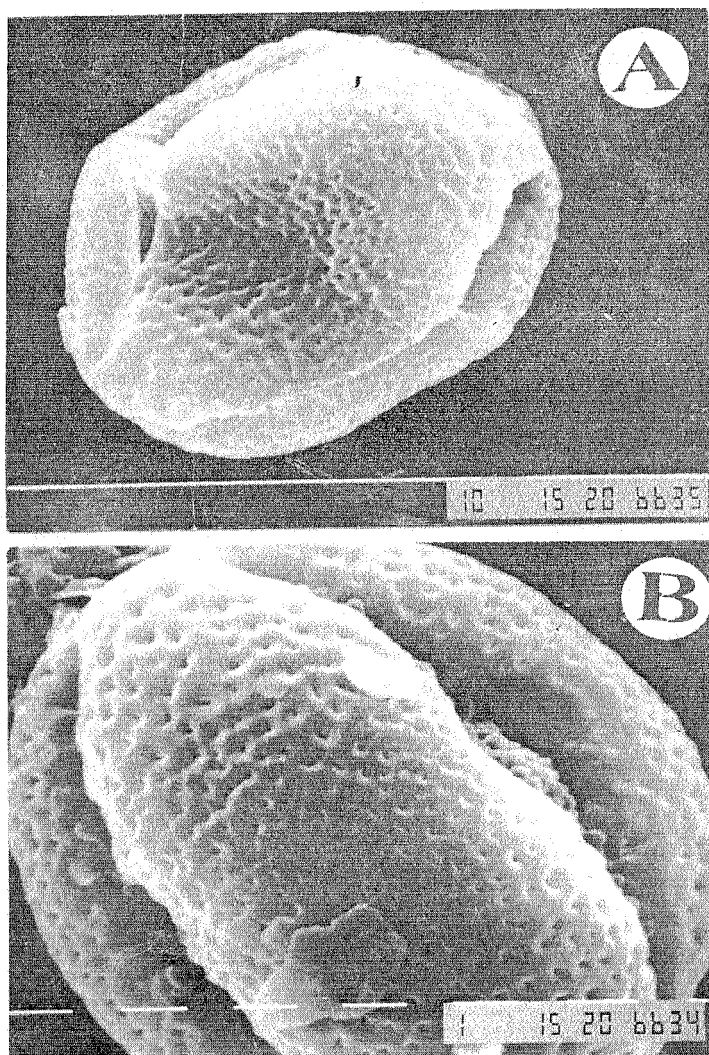


Fig. 1. Scanning Electron Micrographs of Pollen grains.
Cocculus pendulus: A, Equatorial view. B, Exine pattern.
 Scale bar = A = 10 μ m; B= 1 μ m.

General pollen characters of the family Menispermaceae

Pollen grains usually radially symmetrical, isopolar, sub-prolate, rarely oblate-spheroidal, tricolpate or tricolporate, sexine thinner or thicker than nexine. Tectum reticulate or reticulate-rugulate. On the basis of apertural types, 2 distinct pollen types viz., *Cocculus pendulus* - type and *Tinospora malabarica*- type are recognized.

Pollen type: *Cocculus pendulus* -type (Fig. 1A & B)

Pollen class: Tricolporate.

P/E ratio: 1.15-1.22

Shape: Sub-prolate.

Apertures: Colpus long sunken with acute ends. Ora small circular.

Exine: Sexine thicker than nexine.

Ornamentation: Reticulate or reticulate-rugulate.

Measurements: Size: Polar axis P(13.23-) 14.69 ± 0.86 (-15.12) μm , C.V. 4.61 and equatorial diameter E(10.51-) 12.40 ± 0.28 (-13.01), trilobed, with apertures on the angles of the outline of the grain in polar view, colpi (12.61-) 13.21 ± 0.25 (-14.11) μm long, C.V. 5.69. Mesocolpium (7.01-) 8.17 ± 0.22 (-9.41) μm , C.V. 8.93. Apocolpium (1.41-) 1.54 ± 0.14 (-2.12) μm , C.V. 20.31. Exine (1.26-) 1.35 ± 0.02 (-1.41) μm thick, C.V. 4.96, sexine thicker than nexine. Tectum reticulate.

Species included: *Cocculus pendulus* (L.) Diels, *C. hirsutus* (J.R & G.Frost) Diels

Key to the species

- + Pollen grains reticulate *Cocculus pendulus*
 - Pollen grains reticulate-rugulate *Cocculus hirsutus*

Pollen type: *Tinospora malabarica* -type

Pollen class: Tricolpate.

P/E ratio: 0.98-1.16

Shape: Oblate-spheroidal or sub-prolate.

Apertures: Colpus long sunken with acute ends.

Exine: Sexine thicker than nexine.

Ornamentation: Coarsely reticulate.

Measurements: Size: Polar axis P(10-) 15.44 ± 0.86 (-17.12) μm , C.V. 4.61, and equatorial diameter E(12.51-) 14.60 ± 0.28 (-15.51) μm , trilobed, with apertures on the angles of the outline of the grain in polar view, colpi (7.75-) 13.75 ± 0.25 (-17.11) μm long, C.V. 5.69. Mesocolpium (12.5-) 13.11 ± 0.22 (-15.8) μm , C.V. 8.93. Apocolpium c. 2.5. Exine (1.26-) 1.65 ± 0.02 (-2.25) μm thick, C.V. 4.96, sexine thicker than nexine. Tectum coarsely reticulate.

Species included: *Cissampelos pareira* L., *Tinospora malabarica* Miers.

Key to the species

- + Pollen grains sub-prolate *Cissampelos pareira*
 - Pollen grains oblate-spheroidal *Tinospora malabarica*

Discussion

Menispermaceae is an eurypalynous family. Pollen grains are generally sub-prolate, rarely oblate-spheroidal, tricolpate - trocolporate with reticulate or reticulate - rugulate tectum. On the basis of apertural types 2 distinct pollen types are recognized viz., *Cocculus pendulus* -- type and *Tinospora malabarica* - type. The *Cocculus pendulus* - type is characterized by its sub-prolate shape pollen, with reticulate or reticulate - rugulate tectum, while the *Tinospora malabarica*- type is readily distinguished by its coarsely reticulate tectum. This type is represented by two genera, each representing a

single species i.e., *Tinospora malabarica* and *Cissampelos pareira*, these species are further divided on the basis of pollen shape (see key to the species). In *Cocculus pendulus* - type 2 species are included. However, these species are similar in pollen shape but their is little variation in their tectum which is significantly helpful at the specific level. In *Cocculus pendulus* reticulate tectum, while in *C. hirsutus* tectum is reticulate – rugulate (See key to the species).

The pollen grains in Menispermaceae are similar to Berberidaceae and Lardizabalaceae, while in the families like Hernandiaceae, Myristicaceae, Ranunculaceae etc., pollen are different (Erdtman, 1952).

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