

Pollen Flora of Pakistan -XXVII *Nyctaginaceae*

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Abstract: The pollen morphology of eight species belonging to two genera, i.e., *Boerhavia* L., and *Commicarpus* Standley, of the family *Nyctaginaceae*, was studied by light microscope and scanning microscope. The family has uniform pollen characters. Pollen grains mostly spheroidal, pantoporate, \pm circular, pores small or large, non-operculate, pore plate \pm scabrate-spinulose. Tectum tubuliferous spinulose.

Key Words: *Nyctaginaceae*, Pollen morphology and Pakistan Flora

Introduction

Nyctaginaceae is a family of 30 genera and c. 290 species, distributed in the tropical and subtropical parts of both hemispheres, especially in America (Willis, 1973; Mabberely, 1987).

It is represented in Pakistan by five genera and c. 11 species (Nasir, 1974).

Nowicke (1975) examined the pollen morphology of the tribe Mirabileae. Nowicke and Skvarala (1977, 1979) and Skvarala (1976), while studying the pollen of the order *Centrospermae* also studied some members of the family *Nyctaginaceae*. Kannabiran (1973) examined the pollen morphology of *Boerhavia punarnava* Saha & Krish.

Pollen grains of the family *Nyctaginaceae* have also been studied by Erdtman (1952), Buxbaum (1961), Behnke (1969), Sahay (1969), Rao & Leong (1974), Moore and Webb (1978) and Qaiser and Perveen (1997).

Materials and Methods

This study is based on polliniferous material of eight species 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 glycerine jelly and observations were made with a Nikon Type-2 microscope, under (E40, 0.65) and oil immersion (E100, 1.25), using 10x eyepiece. For SEM studies, pollen grains were suspended in a drop of water and directly transferred with a fine pipette to a metallic stub using double-sided adhesive tape and coated with gold in a sputtering chamber (Ion-sputter JFC-1100). Coating was restricted to 150A. The SEM examination was carried out on a Jeol microscope JSM-T200. The measurements were based on 15-20 readings from each specimen. Pollen diameter, pore diameter and exine thickness were measured.

The terminology of pollen grains mainly follows that of Erdtman (1952), Faegri and Iversen (1964), Kremp (1965), Moore and Webb (1978) and Walker and Doyle (1976).

Observations

General pollen characters of the family *Nyctaginaceae*

Pollen grains radially symmetrical, apolar, spheroidal, pantoporate, sexine thicker or thinner than nexine. Tectum tubuliferous and spinulose.

Species included: *Boerhavia diffusa* L., *Boerhavia procumbens* Banks ex Roxb., *Boerhavia repens* L., *Boerhavia rubicunda* Steud., *Commicarpus helenae* (Roem. & Schultes) Meikle, *Commicarpus boissieri*

(Heimerl) Cufod., *Commicarpus stenocarpus* (Chiov.) Cufod.

Boerhavia diffusa L.

Size: (50-) 56.44 ± 0.79 (-62.5) μm in diameter.

Spheroidal, pantoporate, pore \pm circular, (2.5-) 5.02 ± 0.31 (-7.5) μm in diameter, pore plate spinulose. Exine (4.25-) 5.0 ± 0.04 (-5.25) μm thick, sexine thicker than nexine. Tectum tubuliferous and spinulose, spinules 2.22-3.33 μm long.

Boerhavia procumbens Banks ex Roxb. (Figs. 1 A & B).

Size: (53.85-) 67.65 ± 2.23 (-75.39) μm in diameter.

Oblate-spheroidal, pantoporate, Pores 6-10, \pm circular, sunken, (3.23-) 3.64 ± 0.07 (-3.94) μm in diameter. Pore plate granulate with 1-2 spinules. Exine (2.87-) 6.71 ± 0.43 (-7.53) μm thick, sexine thinner than nexine. Tectum tubuliferous and spinulose, spinules (1.79-) 2.33 ± 0.17 (-3.23) μm long.

Boerhavia rubicunda Steud. (Fig. 1 C).

Size: (42.5-) 49.39 ± 1.13 (-55) μm in diameter.

Oblate-spheroidal, pantoporate, pore \pm circular, 6.3 μm in diameter. Exine (2.75-) 4.67 ± 0.32 (-5) μm thick, sexine thinner than nexine. Tectum tubuliferous and spinulose, spinules 1.15-2.31 μm long.

Boerhavia repens L. (Fig. 1D).

Size: (61.03-) 84.50 ± 5.05 (-100.5) μm .

Oblate-spheroidal, pantoporate, pores (7-10), \pm circular, sunken, (3.23-) 3.59 ± 0.14 (-3.94) μm in diameter. Pore plate with roughed base. Exine (3.59-) 5.83 ± 0.85 (-7.18) μm thick, sexine thinner than nexine. Tectum tubuliferous and spinulose, spinules (3.23-) 3.47 ± 0.11 (-3.59) μm long.

Commicarpus boissieri (Heimerl) Cufod. (Figs. 1 E, F & G).

Size: (53.76-) 59.05 ± 0.77 (-63.84) μm in diameter.

Oblate-spheroidal, pantoporate, pores 6-8, circular, sunken (3.94-) 4.42 ± 0.47 (-5.38) μm in diameter. Pore plate granulated spinulose, with 0-1 μm long spinules. Exine (3.59 -) 3.66 ± 0.04 (-3.74) μm thick. Sexine as thick as nexine. Tectum tubuliferous and

spinulose, spinules (0.35-) 2.07 ± 0.27 (-3.231) μm long.

Commicarpus helenae (Roem. & Schultes) Meikle (Figs. 1 H & I).

Size: (50-) 56.6 ± 0.90 (-60) μm in diameter.

Spheroidal, pantoporate, pore \pm circular, (2.5-) 4.37 ± 0.21 (-5.1) μm in diameter. Exine (3.75-) 4.90 ± 0.09 (-5.01) μm thick, sexine thicker than nexine. Tectum tubuliferous and spinulose spinules 1.11-2.22 μm long.

Commicarpus stenocarpus (Chiov.) Cufod.

Size: (65-) 67.91 ± 1.62 (-75) μm in diameter.

Spheroidal, pantoporate, pore \pm circular, pore c. 5 μm in diameter. Exine c. 5 μm thick, sexine thicker than nexine. Tectum tubuliferous and spinulose, spinules 0.23-2.14 μm long.

Discussion

The pollen morphology of the family *Nyctaginaceae* is \pm homogenous in nature (Erdtman, 1952). All the examined species have similar pollen characters. Pollen grains generally spheroidal, pantoporate with tubuliferous-spinulose tectum (Nowicke and Skvarla, 1977, 1979). Heimerl (1934) divided the family *Nyctaginaceae* into five tribes, viz., *Nyctagineae* (*Mirabileae*), *Pisonieae*, *Colignonieae*, *Boldoeae* and *Leucastereae*. The present species belong to the tribe *Nyctaginiaceae*: subtribe *Nyctagineae*. Nowicke (1975) reported a similar type of pollen in the subtribe *Nyctagineae*. However, she also reported pantocolpate and tricolpate pollen in the subtribe *Abroniinae* and subtribe *Bougainvilleinae* of the tribe *Nyctaginiaceae*, respectively. It is difficult to construct the key to the species because of the overlapping of the characters. However, the present palynological data favours Heimerl's (1934) tribal classification.

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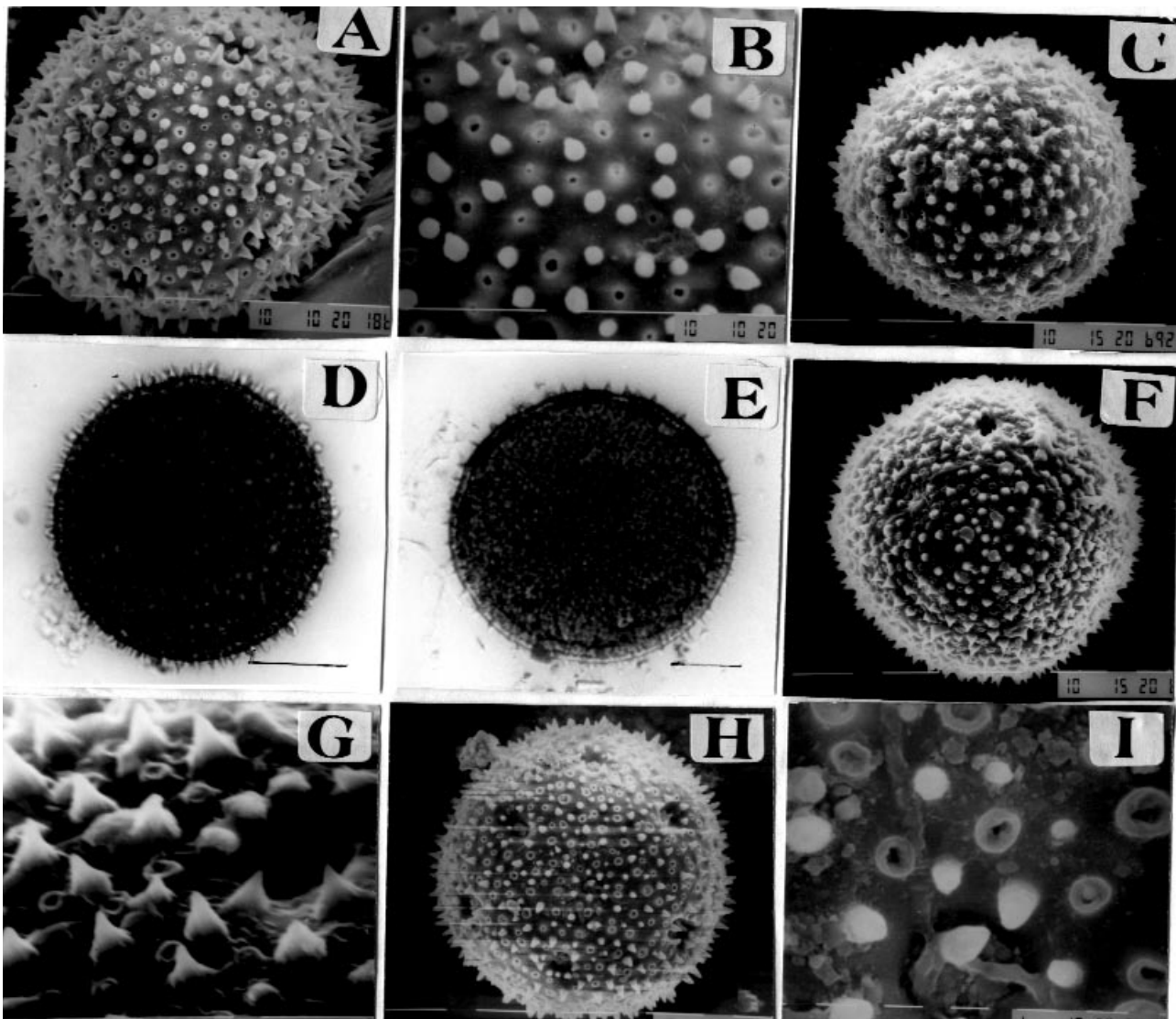


Fig. 1. A-C: F-I: Scanning Electron D & F: Light micrographs of pollen grains. *Boerhavia procumbens*: A, Pollen grain; B, Exine pattern. *Boerhavia rubicunda*: C, Pollen grain. *Boerhavia repens*: D, Pollen grain. *Commicarpus boissieri*: E & F, Pollen grain; G, Exine pattern, *Commicarpus helenae*: H, Pollen grain; I, Exine pattern.

Scale bar = A-F & I = 10; H = 1 μ m.

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