*Pak. J. Bot.*, 41(2): 491-494, 2009.

# POLLEN FLORA OF PAKISTAN-MALVACEAE: DOMBEYOIDEAE-LXII

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**Abstract**

Pollen morphology of 2 species of the subfamily Dombeyoideae from Pakistan has been examined by light and scanning electron microscope. Pollen grains are usually radially symmetrical, isopolar, triporate and sub-oblate to spheroidal. Sexine thinner than nexine. Tectum echinate. On the basis of polar length two distinct pollen types viz., *Melhania denhamii*-type and *Melhania futteyporensis*-type are recognized.

## Introduction

The circumscription of the Malvaceae is very controversial. The traditional Malvaceae *sensu stricto* comprises of a very homogeneous and cladistically monophyletic group. Another major circumscription, Malvaceae *sensu lato*, has been recently defined according to which some closely related families like Sterculiaceae, Tiliaceae, Bombacaceae and Malvaceae have been merged into an expanded family Malvaceae s.l. by Judd & Manchester (1997), Bayer *et al*., (1999) and Bayer & Kubitzki (2003). The large and expended family Malvaceae is divided into 9 subfamilies, viz., Byttnerioideae, Grewioideae, Helicteroideae, Sterculideae, Brownlowioideae, Dombeyoideae, Malvoideae, Bombacoideae and Tilioideae. The genera formerly included in *Sterculiaceae* are now distributed in subfamilies, Byttnerioideae, Helicteroideae, Sterculideae and Dombeyoideae of the *Malvaceae* s.l. In the present investigation recent classification of Bayer *et al*., (1999) is adapted. The subfamily Dombeyoideae is represented by 20 genera and nearly 350 species in Madagascar, Mascarenes, Africa, S. Asia, Philippines and St. Helena (Bayer & Kubitzki, 2003). The only wild genus of the subfamily i.e., *Melhania* with two species occur in Pakistan. However, there are a number of other genera belonging to the family known from cultivation only from the area under consideration. As far as pollen morphology of the subfamily is concerned number of workers described the pollen of subfamily Dombeyoideae while studying the Sterculiaceae pollen. Such as pollen morphology of the tribe Dombeyeae has been examined by Erdtman (1952), pollen morphology of some Australian Sterculiaceae has been examined by Litchfield (1966). Moore *et al.*, (1991) examined the pollen morphology of some genera of the family Sterculiaceae. Pollen morphology of the family Sterculiaeae has also been examined by Cristobal (1968), Robyns *et al*., (1977) and Moore & Webb (1978). There are no reports on pollen morphology of the subfamily Dombeyoideae from Pakistan. Present investigations are based on the pollen morphology of 2 species of the subfamily Dombeyoideae by light and scanning electron microscope.

## Materials and Methods

Polleniferous material was 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 were directly transferred with a fine pipette to a metallic stub using double sided cello tape and coated with gold in a sputtering chamber (Ion-sputter JFC-1100). Coating was restricted to 150 A. The SEM examination was carried out on a Jeol microscope JSM-2. The measurements are based on 15-20 readings from each specimen. Polar axis (P) and equatorial diameter (E), aperture size, apoporium, mesoporium 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 subfamily Dombeyoideae:** Pollen grains are usually radially symmetrical, isopolar, triporate, sub-oblate to spheroidal. Sexine thinner than nexine. Tectum echinate. On the basis of polar length two distinct pollen types viz., *Melhania denhamii*-type and *Melhania futteyporensis*-type are recognized.

### Key to the pollen types

+ Pollen 35-55 um in length……..… *Melhania denhamii*-type
- Pollen 68-86 um in length ….…….... *Melhania futteyporensis*-type

**Pollen type:** ***Melhania denhamii*** R. Br. (Fig. 1)
**Pollen class:** Triporate
**P/E ratio:** 0.82.
**Shape:** Sub-oblate
**Apertures:** More or less circular.
**Exine:** Sexine thinner than nexine.
**Ornamentation:** Tectum echinate, medium reticulate-rugulate, spines uniformly distributed with indistinct perforated base, slightly recurved at the apices.
**Measurements: Size:** Polar axis P(35.91-) 43.07 ± 2.07 (-55.64) μm and equatorial diameter E(46.67-) 52.41 ± 1.14 (-57.44) μm, ± circular (6.89-) 7.26 ± 0.09 (-7.89) μm in diameter, C.V. 3.89, with annulus. Mesoporium (32.31-) 42.36 ± 1.83 (-53.85) μm. Apoporium (14.36-) 18.84 ± 1.71 (-21.54) μm. Exine (3.23-) 3.59 ± 0.09 (-3.95) μm thick, sexine thinner than nexine. Tectum echinate, medium reticulate-rugulate spines uniformly distributed with indistinct perforated base, slightly recurved at the apices with acute tips, (5.38-) 6.58 ± 0.30 (-7.18) μm long.
**Species included:** *Melhania denhamii* R. Br.
**Pollen type:** ***Melhania futteyporensis*** Munro ex Masters (Fig. 1).
Pollen class: Triporate
**P/E ratio:** 1.00
**Shape:** Spheroidal

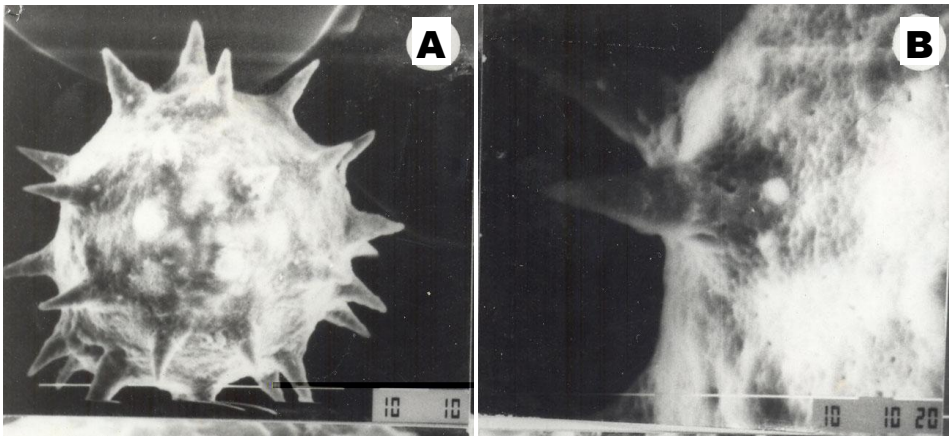


Fig. 1. Scanning Electron micrographs of pollen grains. *Melhania futteyporensis:* A, Pollen grain, B, Exine pattern. Scale bar=10 μm

**Apertures:** More or less circular.
**Exine:** Sexine thinner than nexine.
**Ornamentation:** Tectum echinate, medium reticulate, spines uniformly distributed with indistinct perforated base, slightly recurved at the apices.
**Measurements: Size:** Polar axis P(68.21-) 77.7 ± 5.07 (-86.16) μm and equatorial diameter E(75.3-) 52.41 ± 1.9 (-78.9) μm, pore ± circular (7.89-) 9. 69 ± 1.09 (-10.77) μm in diameter, with annulus. Mesoporium (32.31-) 42.36 ± 1.83 (-53.85) μm. Apoporium c. 10 μm. Exine (3.59-) 4.10 ± 1.09 (-5.38) μm thick, sexine thinner than nexine. Tectum echinate, medium reticulate, spines uniformly distributed, with indistinct perforated base, slightly recurved at the apices with acute tips, (12.5-) 17.21 ± 0.30 (-17.95) μm long.
**Species included:** *Melhania futteyporensis* Munro ex Masters.

## Discussion

Dombeyoideae is a more or less stenopalynous subfamily. Pollen grains generally triporate, spheroidal-sub-oblate with echinate tetum. However, it shows some variation in their polar length. Present investigations are based on 2 species, representing a single genus i.e., *Melhania*. On the basis of polar length two distinct pollen types are recognized viz., *Melhania denhamii*-type and *Melhania futteyporensis*-type. *Melhania denhamii*-type is delimited by having 35-55 μm length of pollen whereas, in *Melhania futteyporensis*-type pollen grains have 68-89 um in polar length. Erdtman (1952) divided the family Sterculiaceae into eight pollen types viz., Eriolaeneae, Fremontodendreae, Dombeyeae, Hermannieae, Byttnerieae, Lasiopetaleae, Helictertereae and Sterculieae.
Perveen *et al*., (2004) and Perveen & Qaiser (2007) studied pollen morphology of the three sub-families of Malvaceae: Grewioideae, Tilioideae and Brownlowioideae (s.lato.) and divided these subfamilies into several pollen types. Present pollen data supports the recent treatment of Bayer *et al*., (1999) because family Malvaceae (s.str.) is also characterized by having porate pollen with echinate tectum (Perveen *et al*., 1994).

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(Received for publication 2 January 2009)