

## Pollen Flora of Pakistan - XXVIII: *Resedaceae*

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**Abstract:** The pollen morphology of 4 species belonging to the 3 genera of the family *Resedaceae* was investigated using a light microscope and scanning microscope. Pollen grains usually radially symmetrical, isopolar, sub-prolate, rarely prolates pteroidal, tricolpate or tricolporate. Tectum reticulate. However, apertural type and pollen shape are the most significant pollen characters for delimiting the genera. On the basis of apertural types 2 distinct pollen types are recognized, namely, I: Tricolpate-type and II: Tricolporate-type.

**Key Words:** *Resedaceae*, Pollen morphology, Pakistan, Flora

### Introduction

*Resedaceae* is a family represented 6 genera and c. 70 species found mostly in dry habitats in Africa, S. Europe, the Middle East, Central Asia to S.E. Asia and Eastern U.S.A. (Willis, 1973; Mabberley, 1987). It is represented in Pakistan by 3 genera and 8 species (Nasir, 1975).

The pollen morphology of the family *Resedaceae* has been examined by Allen (1937), Erdtman (1952), Kuprianova & Alyoshina (1972), Hodges (1974), Rao & Leong (1974), Arbo (1974), Moore & Webb (1978) and Mitra & Mitra (1976). The present pollen data are based on 3 genera represented by 4 species, by scanning and light microscopes.

### Materials and Methods

Pollen materials 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 glycerine jelly and observations were made with a Nikon Type-2 microscope, (E40, 0.65) and oil immersion (E100, 1.25), using a 10x eye piece. 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 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 length, equatorial diameter, colpi length and exine thickness were measured.

In general, the terminology of Erdtman (1952), Kremp (1965), Faegri & Iversen (1964), and Walker & Doyle (1976) was followed.

### Observations

General pollen characters of the family *Resedaceae*

Pollen grains usually radially symmetrical, isopolar, tricolporate to tricolpate, trilobed, sexine thinner than nexine. Tectum reticulate or rugulate-reticulate.

#### Key to the genera

1. + Pollen grains tricolporate . . . . . 2
  - Pollen grains tricolpate . . . . . *Ochradenus*
2. + Pollen grains prolate-spheroidal, tectum rugulate - reticulate . . . . . *Reseda*
  - Pollen grains sub-prolate, tectum medium reticulate . . . . . *Oligomeris*

*Description of Pollen grains*

*Ochradenus* Boiss.

Species included: *Ochradenus aucheri* Boiss.,

*Ochradenus baccatus* Delile.(Fig. 1 A & B).

Pollen grains subprolate, 3 - colp(or)ate, trilobed, size: Polar axis P(20.1-)  $20.8 \pm 1.14$  (-25)  $\mu\text{m}$ , and Equatorial diameter E(13.75-)  $15.82 \pm 2.53$  (-18)  $\mu\text{m}$ . P/E ratio: 1.31, colpi (17.5-)  $18.66 \pm 0.35$  (-22.5)  $\mu\text{m}$  long. Mesocolpium (4.0-)  $10.37 \pm 3.74$  (-12.5)  $\mu\text{m}$ . Apocolpium c. 1.25  $\mu\text{m}$ . Exine (2.25-)  $2.53 \pm 0.04$  (-2.75)  $\mu\text{m}$  thick,

sexine thinner than nexine. Tectum medium reticulate, with irregular pattern of muri, 0.08-0.83  $\mu\text{m}$  in diameter. P.A.I.: 0.65.

*Ochradenus baccatus* Delile. (Fig. 1 C-G).

Pollen grains sub-prolate, tricolpate, trilobed, colpi (15.4-)  $18.0 + 0.44$  (-19.6)  $\mu\text{m}$  long, size: Polar axis P(18.2-)  $20.2 + 0.32$  (-22.6)  $\mu\text{m}$ , and equatorial diameter E(14-)  $16.45 + 0.35$  (-16.8)  $\mu\text{m}$ . P/E ratio: 1.22 colp membrane psilate. Mesocolpium (9.8-)  $11.5 + 0.28$  (-12.6)  $\mu\text{m}$ . Apocolpium (0.56-)  $2.12 + 0.65$  (-3.59)  $\mu\text{m}$ .

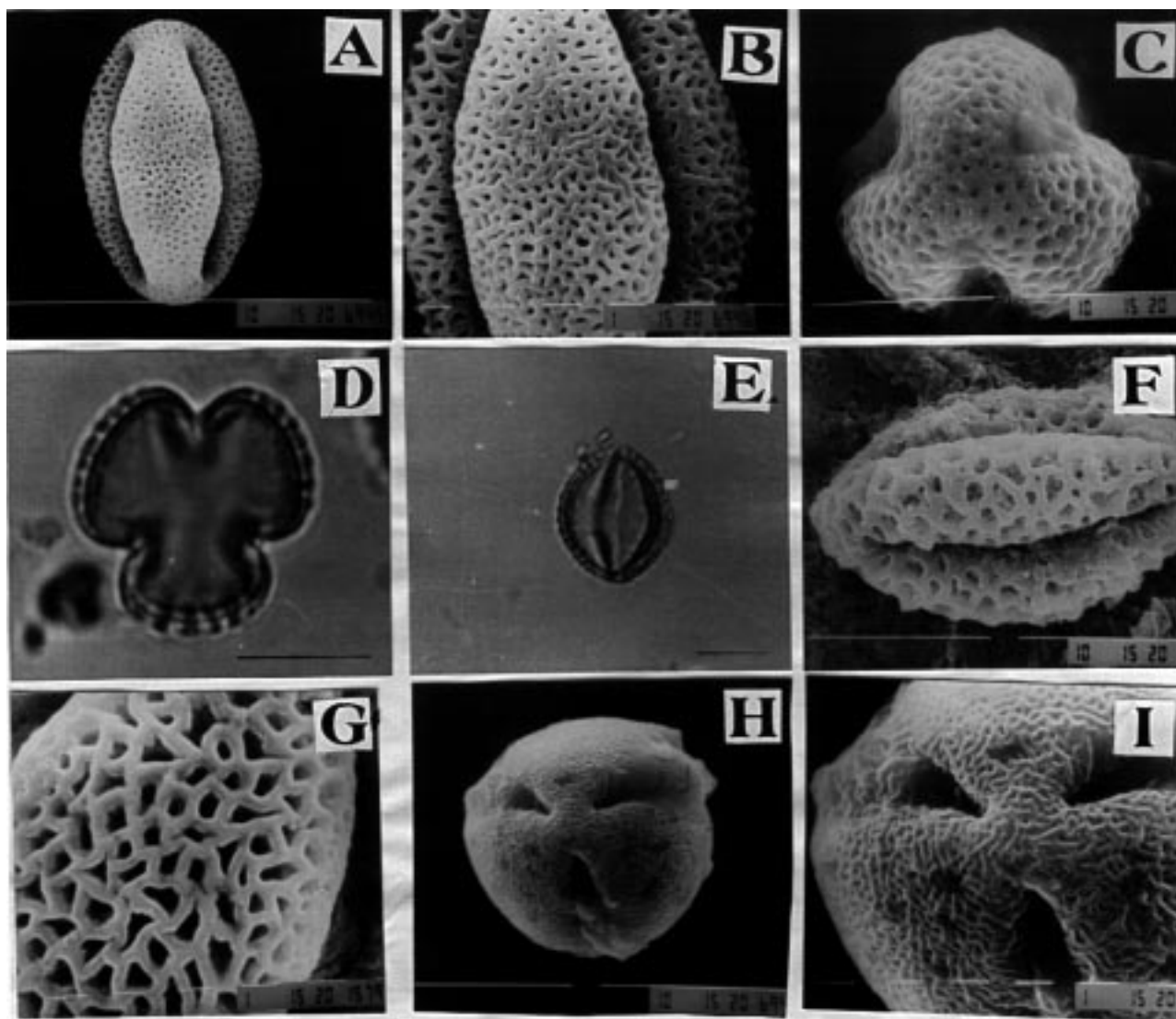


Figure 1. Scanning Electron micrographs of pollen grains [A-C; F-I]; Light micrographs [D & E]. *Ochradenus aucheri*: A, Equatorial view; B, Exine pattern. *Ochradenus baccatus*: C & D Polar view; E & F, Equatorial view; G, Exine pattern. *Reseda pruinosa*: H, Polar view; I, Exine pattern. Scale bar = A, C-F & H = 10; B, G & I = 1  $\mu\text{m}$ .

Exine (1.4-) 1.56 + 0.067 (-2.1)  $\mu\text{m}$  thick, sexine heterobacculate, thicker than nexine. Tectum coarsely reticulate, with  $\pm$  irregular muri, lumina gradually reducing in size and becoming circular towards apocolpial region, at mesocolpium 0.4-0.7  $\mu\text{m}$ , at apocolpium 0.2-0.40  $\mu\text{m}$  in diameter. P.A.I.: 0.69.

#### Key to the species

+ Tectum coarsely reticulate.....*Ochradenus baccatus*

- Tectum medium reticulate.....*Ochradenus aucheri*

*Oligomeris* Camb.

Species included *Oligomeris linifolia* (Vah.) Macbride

*Oligomeris linifolia* (Vah.) Macbride

Pollen grains subprolate, 3-colporate, trilobed, colpi (17.5-) 20.141  $\pm$  0.34 (-22.5)  $\mu\text{m}$  long, size: Polar axis P(22.5-) 23.14  $\pm$  0.28 (-25.25)  $\mu\text{m}$ , and Equatorial diameter E(15.11-) 17.72  $\pm$  0.48(-20.11)  $\mu\text{m}$ . P/E ratio: 1.30, colpal membrane subsilate. Mesocolpium c. 12.5  $\mu\text{m}$ . Apocolpium (1.25-) 1.95  $\pm$  0.16 (-2.25)  $\mu\text{m}$ . Exine c. 2.25  $\mu\text{m}$  thick. Tectum medium reticulate, with  $\pm$  irregular pattern of muri, 0.03-1.0  $\mu\text{m}$  in diameter. P.A.I.: 0.70.

Reseda Species included: *Reseda pruinosa* Delile

*Reseda pruinosa* Delile (Fig. 1 H & I).

Pollen grains prolate-spheroidal, 3-colporate, trilobed, size: Polar axis P(18-) 19.69  $\pm$  0.38 (-22.7)  $\mu\text{m}$ , and Equatorial diameter E(16.25-) 18.32  $\pm$  0.43 (-21.25)  $\mu\text{m}$ . P/E ratio: 1.07. Colpi (12.5-) 16.32  $\pm$  0.54 (-20.21)  $\mu\text{m}$  long, colpal membrane subsilate. Mesocolpium (12.5-) 13.14  $\pm$  0.28 (-15.11)  $\mu\text{m}$ . Apocolpium (0.25-) 1.55  $\pm$  0.17 (-2.5)  $\mu\text{m}$ . Exine (1.25) 2.31  $\pm$  0.07 (-2.5)  $\mu\text{m}$  thick, sexine thinner than nexine. Tectum rugulate-reticulate. P.A.I.: 0.71.

#### Discussion

The palynology of the family *Resedaceae* is quite heterogenous, although the present pollen data is based

on 4 species representing 3 genera. But the family shows great pollen diversity. Apertural type, shape and exine ornamentation are the important pollen characters. Pollen grains usually radially symmetrical, isopolar, prolate-spheroidal or sub-prolate, tricolporate or tricolpate, colpal membrane finely-coarsely granulate. Tectum reticulate or reticulate-rugulate (Qaiser & Perveen, 1997). However, the pollen morphology of the family is significantly useful at the generic level (see key to the genera). On the basis of pollen shape, 2 distinct pollen types are recognized, namely, I: Tricolpate-type is easily distinguished by its tricolpate pollen. A single genus i.e., *Ochradenus* Delile, representing two species, is included in this pollen type. The pollen morphology of these species is fairly uniform. However, the exine pattern shows little variation, which is helpful for delimiting the species such as, in *Ochradenus aucheri* Boiss., medium reticulate, and *Ochradenus baccatus* Delile, coarsely reticulate tectum is found (See key to the species).

II: Tricolporate-type: In this type, two genera are included, each representing a single species, i.e., *Oligomeris* (*Oligomeris linifolia* (Vahl) Macbride and *Reseda* L., (*Reseda pruinosa* Delile). Although these genera are similar in apertural type, they show significant variation in their exine pattern and pollen shape as in *Oligomeris linifolia* (Vahl) Macbride, pollen grains are sub-prolate and tectum is medium reticulate, whereas in *Reseda pruinosa* Delile, pollen is prolate-spheroidal and tectum is rugulate-reticulate (see key to the genera).

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