

STUDIES ON THE POLLEN MORPHOLOGY OF THE GENUS *ARABIDOPSIS* (BRASSICACEAE) FROM PAKISTAN

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Abstract

Pollen morphology of 8 species of the genus *Arabidopsis* (Brassicaceae) from Pakistan has been examined by light microscopy. Pollen grains are usually prolate to subprolate with 3-4 colpi, syncolpate and reticulate tectum. However the species show variation in length of colpi and thickness of exine.

Introduction

Brassicaceae is a cosmopolitan family. It is represented by 350 genera and 3000 species primarily of the temperate region and cooler climate. In Pakistan it is represented by 92 genera and 250 species (Jafri, 1973). The genus *Arabidopsis* comprises of 15 species of which it is represented by 10 species in Pakistan whereas *A. taraxifolia* and *A. russelliana* are endemic to Pakistan and Karakorum region.

The pollen morphology of the family Brassicaceae has been examined by Fischer (1890), Erdtman (1966), Selling (1947) and Sharma & Nair (1973). In the present study pollen morphology of 8 species of the genus *Arabidopsis* has been examined by light microscopy to provide a detailed account of the pollen morphology of the genus *Arabidopsis* from Pakistan.

Materials and Methods

The palynological investigation are based on the herbarium material obtained from the Karachi University Herbarium (KUH). The pollen slides were prepared by the acetolysis method as suggested by Erdtman (1966). Measurements of about 10 grains of each species were taken and photographs made on Kodak Pantomix 16 Din rolls under oil immersion. The terminology used for pollen description has been used according to Erdtman (1952), Faegri & Iversen (1964) and Walker & Doyle (1976).

Measurements for polar axis (P), equatorial diameter (E), Colpi length, apocolpium, mesocolpium and exine thickness were made for each sample by light microscope (Figs. 1-8).

General pollen characters of the genus *Arabidopsis*

Pollen class - colpate:

P/E: Ratio 19-20 μm , 13-21 μm .

Shape: Sub-prolate-prolate.

Aperture: Apocolpate aperture and syncolpate colpi variation in length very long to very short.

- Fig. 1. Pollen grain of *Arabidopsis stricta*. Polar view.
Fig. 2. Pollen grain of *Arabidopsis pumila* var. *griffithiana*. Polar view.
Fig. 3. Pollen grain of *Arabidopsis taraxacifolia*. Polar view.

- Fig. 4. Pollen grain of *Arabidopsis wallichii*. A. Polar view, B. Equatorial view.

Fig. 5. Pollen grain of *Arabidopsis thaliana*. A. Polar view, B. Equatorial view.

Fig. 6. Pollen grain of *Arabidopsis mollissima*. A. Polar view syncolpate, B. Equatorial view.

Fig. 7. Pollen grain of *Arabidopsis pumila*. A. Polar view, B. Equatorial view.

Fig. 8. Pollen grain of *Arabidopsis lasiocarpa*. A. Polar view, B. Equatorial view.

Exine: Sexine as thick as nexine or sexine thicker than nexine, tenu marginate, tectum reticulate.

Outline: Intersubangular oval, 3 lobed.

Measurement: Polar axis 19-20 μm , equatorial diameter 13-21 μm . Colpi 12.1x1.1 μm - 24.1 x 2.2 μm . Mesocolpium 11-17 μm in diameter, apocolpium 2.2-5.5 μm in diameter. Details of the species have been summarized in Table 1.

Key to the species

- | | | |
|-----|--|--|
| 1 + | Pollen grain syncolpate | <i>A. mollissima</i> |
| - | Pollen grain apocolpate | 2 |
| 2 + | Pollen grain prolate | 3 |
| - | Pollen grain subprolate | 4 |
| 3 + | Colpi 20 μm long | <i>A. wallichii</i> |
| - | Colpi 16 μm long | <i>A. taraxacifolia</i> |
| 4 + | Colpi 24.2 μm long | <i>A. thaliana</i> |
| - | Colpi 12-16.5 μm long | 5 |
| 5 + | Mesocolpia 11 μm | <i>A. pumila</i> |
| - | Mesocolpia 15.4 μm | <i>A. lasiocarpa</i> |
| 6 + | Polar length of pollen grain 15-22 μm | <i>A. stricta</i> |
| - | Polar length of pollen grain 21-32 μm | <i>A. pumila</i> var. <i>graffithana</i> |

Comments

The genus *Arabidopsis* is characterized by tricolpate, tetracolpate, syncolpate with reticulated tectum. Eight species viz., *Arabidopsis lasiocarpa*, *A. mollissima*, *A. pumila*, *A. pumila* var. *graffithiana*, *A. stricta*, *A. taraxacifolia*, *A. thaliana* and *A. wallichii* have been examined. Palynology is significantly helpful at specific level. These species are divided into two groups i.e., prolate and subprolate.

Table 1. Summary of the pollen morphological data of the genus *Arabidopsis*.

Species	P (µm)	E (µm)	Shape	No. of Aperture	Apocolpium	Mesocolpium (µm)	Length of colpi (µm)	Exine thickness (µm)
<i>A. lasiocarpa</i>	18(21)23	13(16)19	Sub-Pr.	3	Absent	15.4	16.5x2.2	2.2
<i>A. mollissima</i>	18(20)24	13(14)16	Pr.	3	Syncolpate	13.2	18.0x2.3	2.2
<i>A. pumila</i>	18(20)21	14(16)20	Sub-Pr.	3	2.2	11	19x2.2	2.2
<i>A. pumila</i> var. <i>graffithiana</i>	21(23)32	17(16)19	Sub-Pr.	3	5.5	17	12x1.1	3
<i>A. stricta</i>	15(19)22	11(13)14	Pr.	3	2.2	11	15.4x1.1	1.1-2.2
<i>A. taraxacifolia</i>	20(24)28	14(15)17	Pr.	3	2.2	12.1	16.5x2.2	2.2
<i>A. thaliana</i>	24(28)36	17(21)28	Sub-Pr.	3-4	4.4	16.5	24.2x2.2	4.4
<i>A. wallichii</i>	22(26)26	13(16)20	Pr.	3	2.2	13.2	20x2.2	3.3

Key to abbreviations: P= Polar length; E= Equatorial diameter; Pr= Prolate; Subpr= Subprolate.

In group-I, 4 species viz., *A. mollissima*, *A. stricta*, *A. taraxacifolia* and *A. wallichii* are included which have prolate pollens whereas in the group-II, remaining species viz., *Arabidopsis lasiocarpa*, *A. pumila*, *A. pumila* var. *graffithiana* and *A. thaliana* are included which have subprolate shape pollen. These species are further divided on the basis of colpi, length mesocolpia and exine thickness etc., (see key to the species).

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