Pak. J. Bot., 40(6): 2247-2249, 2008.

POLLEN FLORA OF PAKISTAN -LX. ARISTOLOCHIACEAE

ANJUM PERVEEN AND MUHAMMAD QAISER*

Department of Botany, University of Karachi, Karachi -75270, Pakistan
**Federal Urdu University of Arts, Science and Technology, Karachi, Pakistan.*

Abstract

Pollen morphology of 2 species of the family Aristolochiaceae from Pakistan has been examined by light and scanning electron microscope. Pollen grains are usually radially symmetrical, apolar non-aperturate, spheroidal. Sexine thinner than nexine. Tectum rugulate–fossulate or densely rugulate.

Introduction

Aristolochiaceae is a small family of about 7 genera and 450 species (Mabberley, 1987) occurring mainly in tropical and temperate America, Asia, Africa and Europe. In Pakistan, it is represented by one genus and 3 species (Jafri, 1974). Plants usually shrubs, or lianas, or herbs (mostly woody vines); bearing essential oils, leaves alternate exstipulate, and often palmately veined. Inflorescence racemes or cymes, flower bisexual, calyx may be 3- or 4-lobed (or irregularly 1-3 lobed). Corolla usually absent, rarely 3 vestigial petals. Fruit many seeded capsule. Family of little economic importance however, many species of *Asarum* and *Aristolochia* are cultivated as ornamentals.

Pollen morphology of the family has been studied by Erdtman (1952), Faegri & Iversen (1964), Nair (1962), Rao & Shukla (1975), Moore & Webb (1978), Straka (1978) and Thankaimoni *et al*., (1979). There are no reports on pollen morphology of the family Aristolochiaceae from Pakistan. Present investigations are based on the pollen morphology of 2 species 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) by the standard methods described by Erdtman (1952) and scanning microscopy (SEM). 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 were suspended in a drop of water and 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 S.E.M 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) and exine thickness were measured.

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

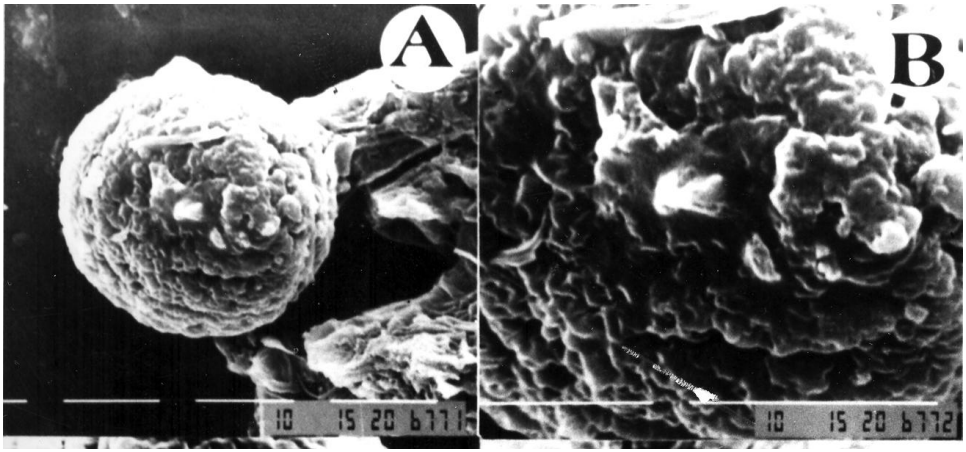

Fig. 1. Scanning Electron micrographs of pollen grains. *Aristolochia bracteolata*: A, Pollen grains, B, Exine pattern. Scale bar = 10 µm.

General pollen characters of the family Aristolochiaceae

Pollen grains are usually radially symmetrical, apolar, non-aperturate, spheroidal. Sexine thinner than nexine. Tectum rugulate–fossulate or densely rugulate.

Key to the species

+ Pollen diameter 35-43 µm ……..……..…….. *Aristolochia punjabensis*
- Pollen diameter 46-61 µm ……..*Aristolochia bracteolate*

Description of pollen type (Fig. 1 A & B)
Pollen class: Non-aperturate
P/E ratio: 1.00
Shape: Spheroidal
Apertures: Non-aperturate
Exine: Sexine thinner than nexine.
Ornamentation: Rugulate-fosulate or densely rugulate.
Measurements: Size: Pollen diameter E = 35 (28 ± 2.1) 61 µm. Exine 0.66-3.02 µm thick, sexine thinner than nexine. Tectum rugulate-fosulate or densely rugulate.
Species included: *Aristolochia bracteolata* Lamk., and *Aristolochia punjabensis* Lace.

Discussion

Aristolochiaceae is a stenopalynous family. However, little variation in exine pattern has been observed. The genus *Aristolochia* is charcherized by having non-aperturate pollen with rugulate or densely rugulate tectum. However, Erdtman (1952) reported 1-2 sulcoidate pollen in the family Aristolochiaceae. Walker (1974) also reported considerable diversity in the exine sculpturing in the genus *Aristolochia* ranging from coarsely reticulate to spinulate or even subpsilate or scabrate. Two species of this genus

easily delimited on the basis of exine pattern and pollen diameter such as *Aristolochia punjabensis* tectum is densely rugulate and diameter 35-43 µm whereas in *A. bracteolata* tectum is rugulate-fossulate and pollen diameter is 46-61 µm.

Aristolochiaceae is traditionally placed in the subclass Magnoliidae and to be related to woody members of the subclass such as Annonaceae; however, the first morphological cladistic analyses of basal angiosperms supported relationships of the family with other predominantly herbaceous magnoliids (Piperales, Nymphaeales, Lactoridaceae) and the monocots (Chevallier, 1996). Simiarly, phylogenetic analysis also supported the close relationships of Aristolochiaceae with the paleoherbs like Lactoridaceae, Piperales, monocots, as well as Magnoliales, Laurales, and Chloranthaceae. Palynologically also the family Aristolochiaceae is more closely related to Magnoliaceae and other members of the Magnoliidae (Kelly & Gonzalez, 2003).

References

Chevallier. A. 1996. *The Encyclopedia of Medicinal Plants*. London: Dorling Kindersley Chronica Botanica Co., Waltham, Massachusettes.

Erdtman, G. 1952. *Pollen Morphology and Plant Taxonomy. Angiosperms* Alimquist and Wiksell

Faegri, K. and J. Iversen. 1964. *Text book of Pollen Analysis*. Munksgaard. Copenhagen.

Jafri, S.M.H. 1974. Aristolochiaceae. In: *Flora of Pakistan*. (Eds.): E. Nasir and S.I. Ali, 73: 1-43.

Kelly, L.M. and C. Favio González. 2003. Phylogenetic relationships in Aristolochiaceae. *Systematic Botany*: 28(2): 236-249.

Kremp, G.O.W. 1965. *Encyclopaedia of Pollen Morphology*, Univ. Arizona Press, Tuscon, U.S.A.

Mabberley, D. I. 1987. *The Plant Book.* Camb. Univ. Press, Cambridge, New York.

Moore, P.D. and J.A. Webb. 1978. *An Illustrated Guide to Pollen Analysis*. Hodder and Stoughton, London.

Nair, P.K.K. 1962. Pollen grains of Indian plants. *II. Bull.Gard. Lucknow*, No. 60: 6-9.

Rao, A.S. and P. Shukla. 1975. *Pollen Flora of upper Gangetic plain*. *Today & Tomorrow*. Printers & Publisher New Dehli. 130 p.

Straka H. 1978. Palynologia madagassiea et. Mascarenia Fam. 62-64. *Pollen et Pores*, 2: 160-166.

Thankaimoni, G. and F. Roland Heydacker. 1979. Pollen morphology of Primitive angiosperms. Some neglected aspects. *Proc. IV. Int. Palynol. Conf. Lucknow*, 1976, 1: 542-546.

Walker, J.W. and J.A. Doyle. 1975. The basis of Angiosperm phylogeny: Palynology. *Ann. Mo. Bot. Gard.* 62: 666-723.

Walker, J.W. 1974. Evolution of exine structure in the pollen of primitive Angiosperms. *Amer. J. Bot*., 61: 891-902.

(Received for publication 3 January 2008)