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ANTHER TYPES OF THE MONOCOTS WITHIN FLORA OF KARACHI, PAKISTAN

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Abstract

Seventy-two monocot species distributed in 10 families were examined for their anther types based on mode of dehiscence by light and scanning electron microscopy. Latrorse anthers were found in 68 species, 3 species dehisce their anthers extrorsely while only one species showed poricidal dehiscence irrespective of primitive or advance taxa.

Introduction

Anther dehiscence is the opening of anther sacs to release the pollen grains. There are various schools of thought for the dehiscence of anthers such as Buchman (1983) opined that anther sacs open when the stomium of anther ruptures, the locule wall turns back and pollen grains are exposed. However, in many aquatic plants the development of stomium is absent and the anther wall ruptures regularly (Swamy & Krishnamurthy, 1980). Dehiscence may also be related to the mechanical forces of endothecium (D'Arcy, 1996; Saad *et al.*, 2007). Besides, this there are a number of features of the stamen such as open stomata, a weakly developed cuticle, a prominent intercellular space system and xylem lacunae some or all of these may also play a role in anther dehiscence (Schmid, 1976). Based on the mode of dehiscence of anthers there are four anther types such as longitudinal, transverse, poricidal and valvular. Longitudinal type is further divided into extrorse, introrse and latrorse subtypes (Radford *et al.*, 1974). Very few reports are available on anthers of monocots (Buchmann, 1983; Endress, 1996). Present study was carried out to provide the informations on anther types of monocots from Karachi region based on their mode of dehiscence.

Materials and Methods

Anthers of 72 species belonging to the 10 monocot families were studied. Mature flowers prior and after anther dehiscence were collected from different localities within the vicinity of Karachi such as Karachi University Campus, Malir, Manghopir and Clifton. However, in case of nonavailability of fresh material herbarium specimens were also studied (Table1).

Anthers were observed for their mode of dehiscence under stereo (Nikon XXI Model) and scanning electron microscopes (JSM-6380 A). For scanning electron microscopy, anthers were mounted on a metallic stub with the help of double adhesive tape and coated with gold for a period of 6 minutes in sputtering chamber and observed in SEM. In most of the cases 2 plants / species and 10 anthers / plant were studied.

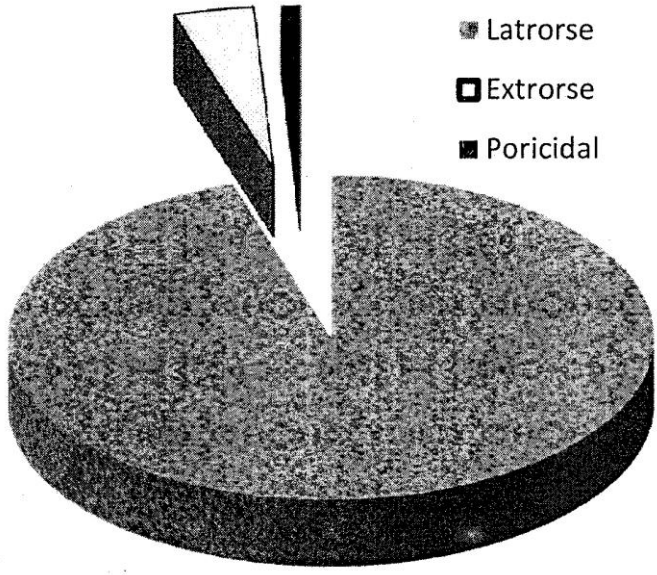

Fig. 1. Pie Chart showing the percentage of anther types of the monocotyledonous taxa.

Results and Discussion

Monocotyledonous flora of Karachi exhibits latrorse, extrorse and poricidal types of anther dehiscence (Table 1; Figs. 2-5). Amongst all of the studied taxa 95% taxa have latrorse type and 4% taxa show extrorse dehiscence while only 1% taxa dehisced their anthers by apical pores (Fig. 1). Out of 10 families, Commelinaceae, Hydrocharitaceae and Typhaceae have extrorse type of anthers while in the families Asparagaceae, Asphodelaceae, Cyperaceae, Juncaceae, Palmae and Potamogetonaceae latrorse anthers were observed. Poaceae is the only family where all taxa having latrorse dehiscence except in the *Dichanthium annulatum* (Forssk.) Stapf (Fig. 2A) which has poricidal anthers. Similarly Buchmann (1983) also observed some monocot families with atleast one taxon in which anther dehiscing by pores or apical slits. For the anther types generally it is believed that extrorse anthers are more common in primitive monocots and rare in advanced groups but present findings do not support this contention as the extrorse anthers are observed in Commelinaceae and Typhaceae from which Commelinaceae is most basal family and Typhaceae is advanced one. These findings are also in agreement to those of Endress (1993) where on one side extrorse condition was found in advanced groups like Alismatids and Araceae while introrse anthers were observed in *Acorus* which is considered to be the most primitive monocot. Therefore, from the foregoing discussion one can conclude that latrorse type of dehiscence is most common within monocots of Karachi and secondly anther types are scattered irrespective of advance and primitive taxa.

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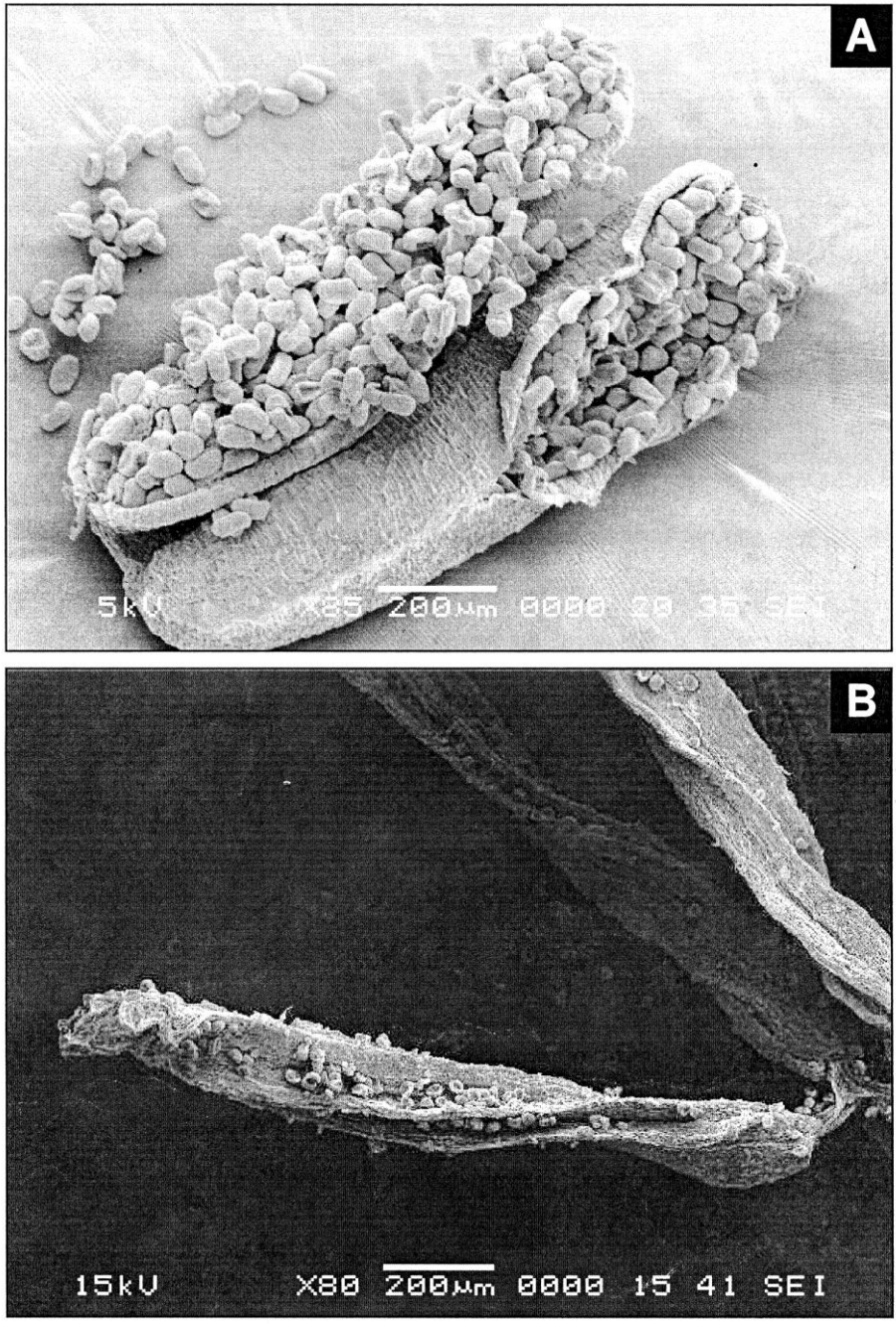

Fig. 2. Scanning electron micrographs of anther types. Extrorse: A. *Commelina albescens*; B. *Typha domingensis* (Scale bar: A, B = 200 µm).

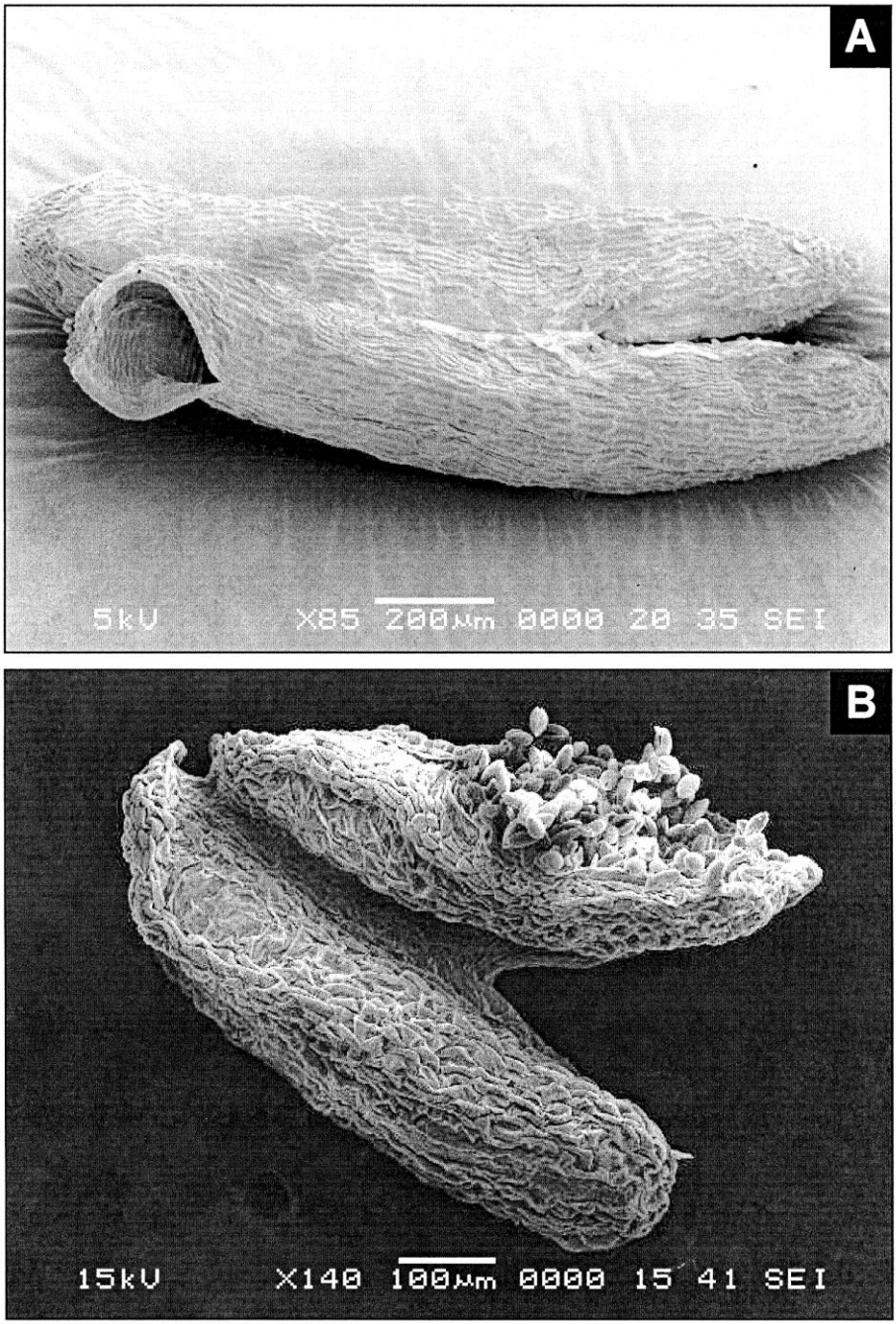

Fig. 3. Scanning electron micrographs of anther types. Poricidal: A. *Dichanthium annulatum*; Latrorse: B. *Asparagus dumosus* (Scale bar: A = 200 um; B =100 µm).

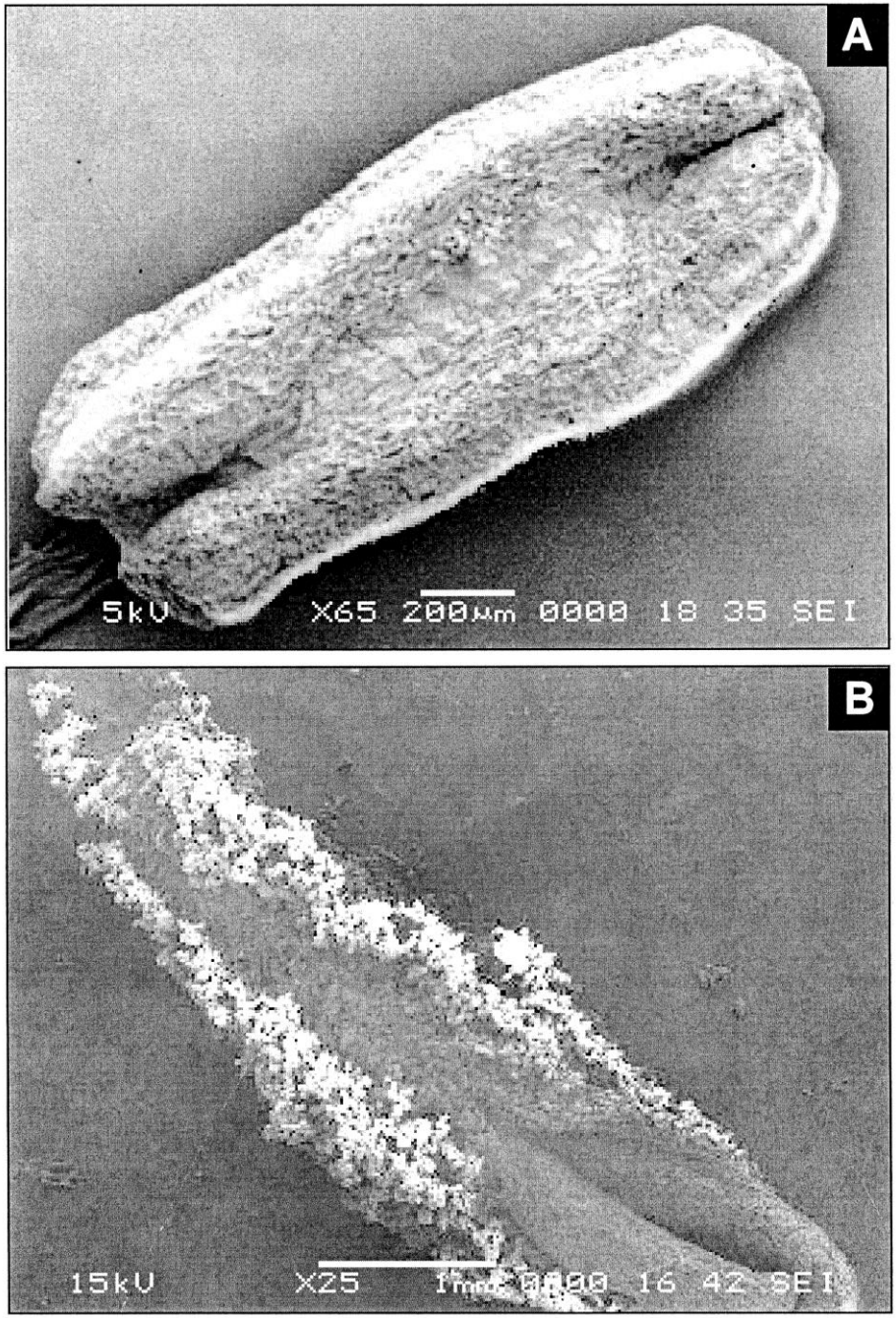

Fig. 4. Scanning electron micrographs of anther types. Latrorse: A. *Aloe vera*; B. *Phoenix dactylifera* (Scale bar: A = 200 µm; B = 1mm).

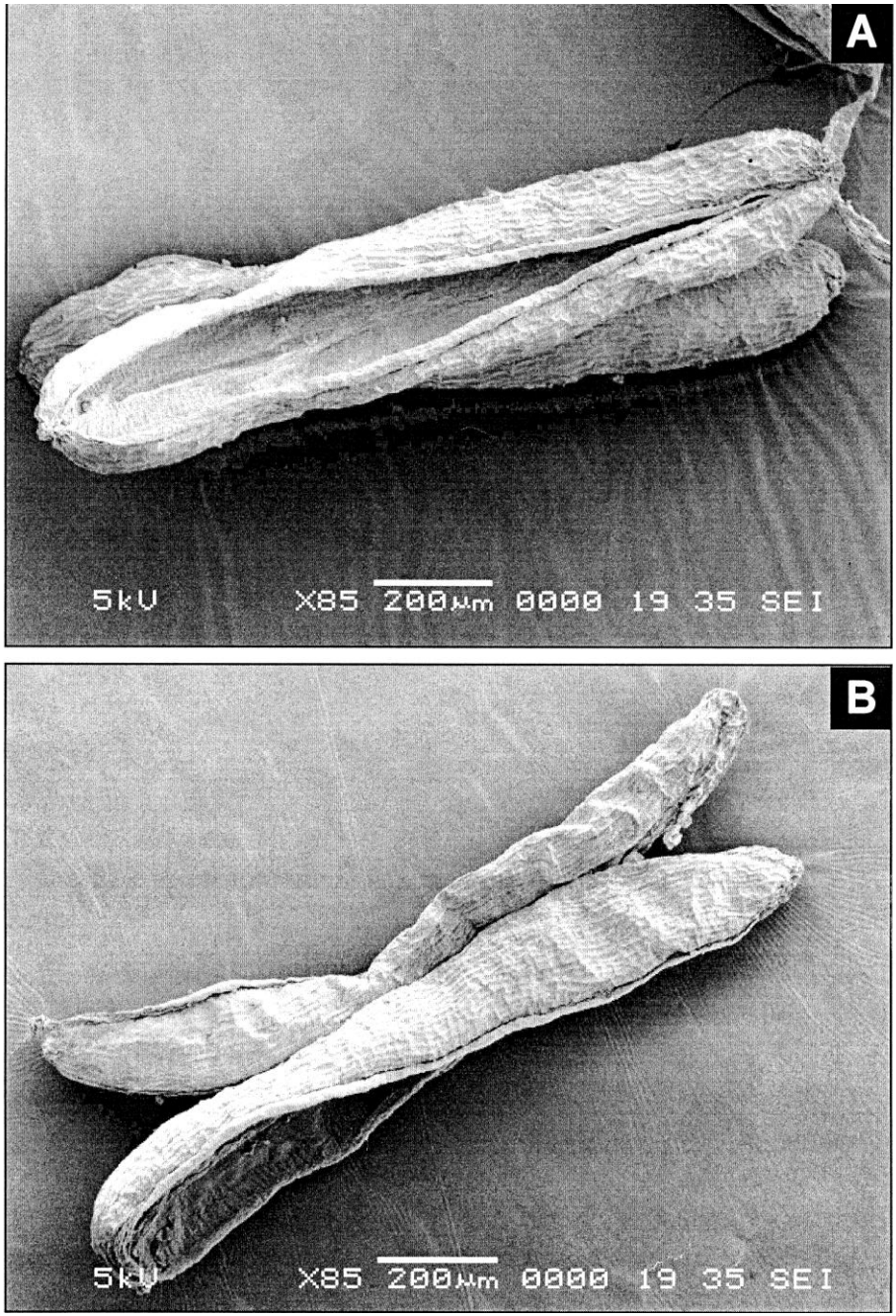

Fig. 5. Scanning electron micrographs of anther types. Latrorse: A. *Cynodon dactylon*; B. *Eleusine indica* (Scale bar: A, B = 200 µm).

References

Buchmann, S.L. 1983. Buzz pollination in Angiosperms, pp.73-113 in *Hand book of Experimental Pollination Biology*, (Eds.): C.E. Jones & R.J. Little. Scientific Academic Editions. NewYork.

D'Arcy, W.G. 1996. Anthers and stamens and what they do. In: *The Anther (Form, function and phylogeny*). (Eds.): W.G. D'Arcy & R.C. Keating. Cambridge University Press, Cambridge.

Endress, P.K. 1993. Major evolutionary traits of monocots flower p.5 in *Monocotyledons*, (Eds.): P. Wilkin, S. Mayo & P. Rudall. Royal Botanic Garden.

Endress, P.K. 1996.Diversity and evolutionary trends in angiosperm anthers. In: *The Anther (Form, function and phylogeny*). (Eds.): W. G. D'Arcy & R.C. Keating. Cambridge University Press, Cambridge.

Islam, M.S., R. Abid and M. Qaiser. 2008. Anther types of Dicots within Flora of Karachi, Pakistan. *Pak. J. Bot*., 40(1): 33-41.

Radford, A.E., W.C. Dickison, J.R. Massey and C. Ritchi Bell. 1974. *Vascular Plant Systematics*. Harper & Row Publisher, New York.

Schmid , R.1976.Filament histology and anther dehiscence. *Bot. J. Linn Soc.,* 73: 303-315.

Swamy, B.G.L. and K.V. Krishnamurthy. 1980. From flower to fruit: *Embryology of flowering plants.* Tata Mc Graw-Hill Publishing Company Limited. New Delhi.

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