

## POLLEN AND PAPILLAE DIMORPHISM IN *PENTAS LANCEOLATA* COLOUR VARIANTS

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Pollen grain and stigmatic papillae morphology in three colour variants of *Pentas* collected from various localities of Thiruvananthapuram was studied by scanning electron microscope. Pollen and papillae dimorphism was observed in all the three colour variants. The thrum morphs showed the presence of 4-zonocolporate pollen whereas the pin morphs produced 3-zonocolporate pollen. The presence of a centrally placed ring like structure on the aperture is another distinguishing feature of thrum pollen which is a new report. The stigmatic papillae showed a significant difference in length between the morphs, and between the colour variants as well.

**Keywords :** Dimorphism; Pollen; Papillae; Pin; Thrum.

### Introduction

*Pentas lanceolata* is a beautiful garden ornamental plant which produces attractive flowers. The species includes both monomorphic and heteromorphic forms. The heteromorphic plants of *P. lanceolata* exhibit distyly producing pin and thrum flowers on different plants. The pin morph bears long style and short stamens, whereas the thrum form bears short style and long stamens. The monomorphic forms are all pin types.

### Materials and Methods

Three heteromorphic colour variants of *P. lanceolata* were used in the present study.

*Pentas lanceolata* var white- This heterostylous variety is characterized by white flowers produced in corymbose clusters. A very good percentage of pollen fertility and fruit set were observed in both the floral morphs.

*Pentas lanceolata* var lilac - This variety is characterized by lilac flowers produced in clusters of pin and thrum morphs and showed a very high percentage of pollen fertility and fruit set.

*P. lanceolata* var magenta - This distyly plant produced deep magenta coloured flowers. Pollen fertility and seed set were less compared to the other two colour variants. For scanning electron microscopy, the anthers and pistils of both the morphs from the three colour variants were fixed separately in 4% glutaraldehyde in phosphate buffer at pH 7.0 for 24 h at 4°C. After fixation, the materials were thoroughly washed in buffer solution to remove all traces of the fixative. These were dehydrated in a graded series of alcohol in quick succession. They were then subjected to critical point drying using CO<sub>2</sub>. The dried specimens

were mounted on aluminium stubs with the help of double adhesive tape and silver paint adhesive. These were coated with gold palladium mixture for 10 min. and subjected to SEM and relevant photographs were taken.

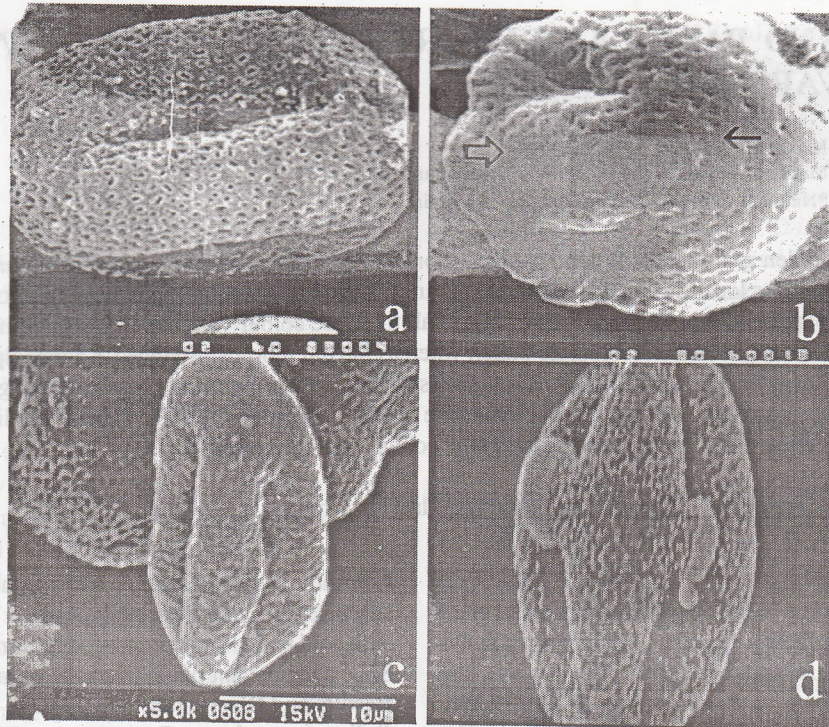
### Results and Discussion

*Pollen dimorphism* - Both the morphs exhibited pollen polymorphism with a diameter varying from 16.9 to 24.32 µm in thrum and 16.33 to 21.04 µm in pin (Fig 3 a to f). The pollen grains were 3-zonocolporate in pin and 4-zonocolporate in thrum.

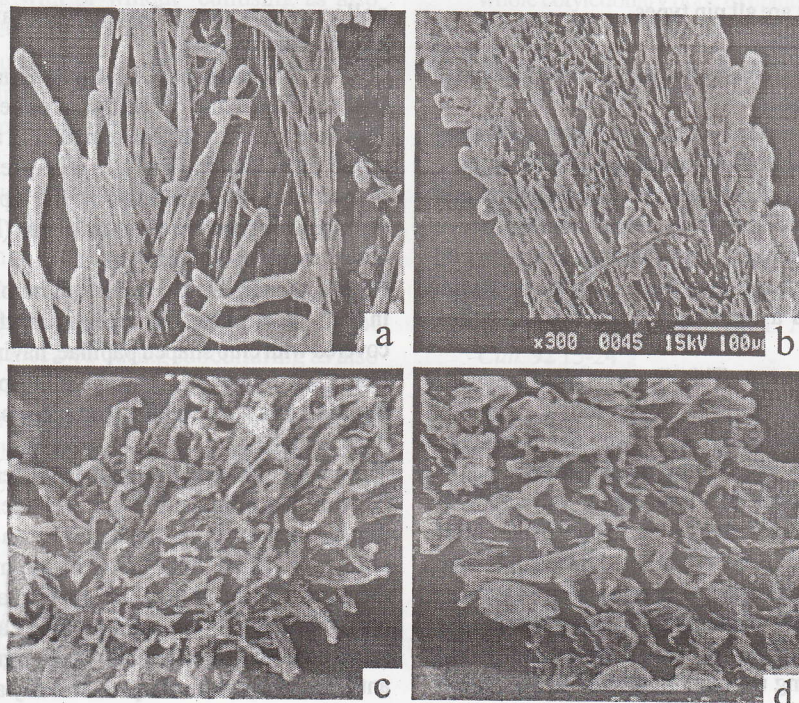
The exine of pin pollen was uniformly reticulate (Fig 1a). The exine of the thrum pollen was found to be foveolate at the equatorial region with a scrobiculate area at the polar region (Fig 1b). The presence of centrally placed ring like structure at the aperture is another distinguishing feature of thrum pollen (Fig 1d), which was absent in pin pollen (Fig 1c)

*Papillae dimorphism* - Papillate dimorphism was observed in both the morphs. The receptive surface of stigma was covered with club shaped papillae, having a length varying from 80.9 µm to 151.3 µm in pin morph. The papillae on thrum stigma were smaller than those on pin with a length of 16.9 to 24.32 µm.

The papillae showed a significant difference in length not between the morphs, but also between colour variants. The papillae on pin stigma showed a narrow base and swollen tip while those on thrum stigma were broader at the base. The thrum papillae showed approximately one third the length of pin papillae. (Fig.2a - d). The papillae stood erect in virgin unpollinated stigmas on the day of anthesis, whereas it collapsed one day after pollination in



**Fig.1.** (a to d) SEM - Exine of pollen; (a) Pin (x600) Uniformly reticulate (b) Thrum (x800) Foveolate at the equatorial region and scrobiculate at the polar region (c) Pin (x500) (d) Thrum (x500) with centrally placed ring like structure at the aperture.



**Fig.2.** (a to d) Pappillae dimorphism in *Pentas lanceolata*

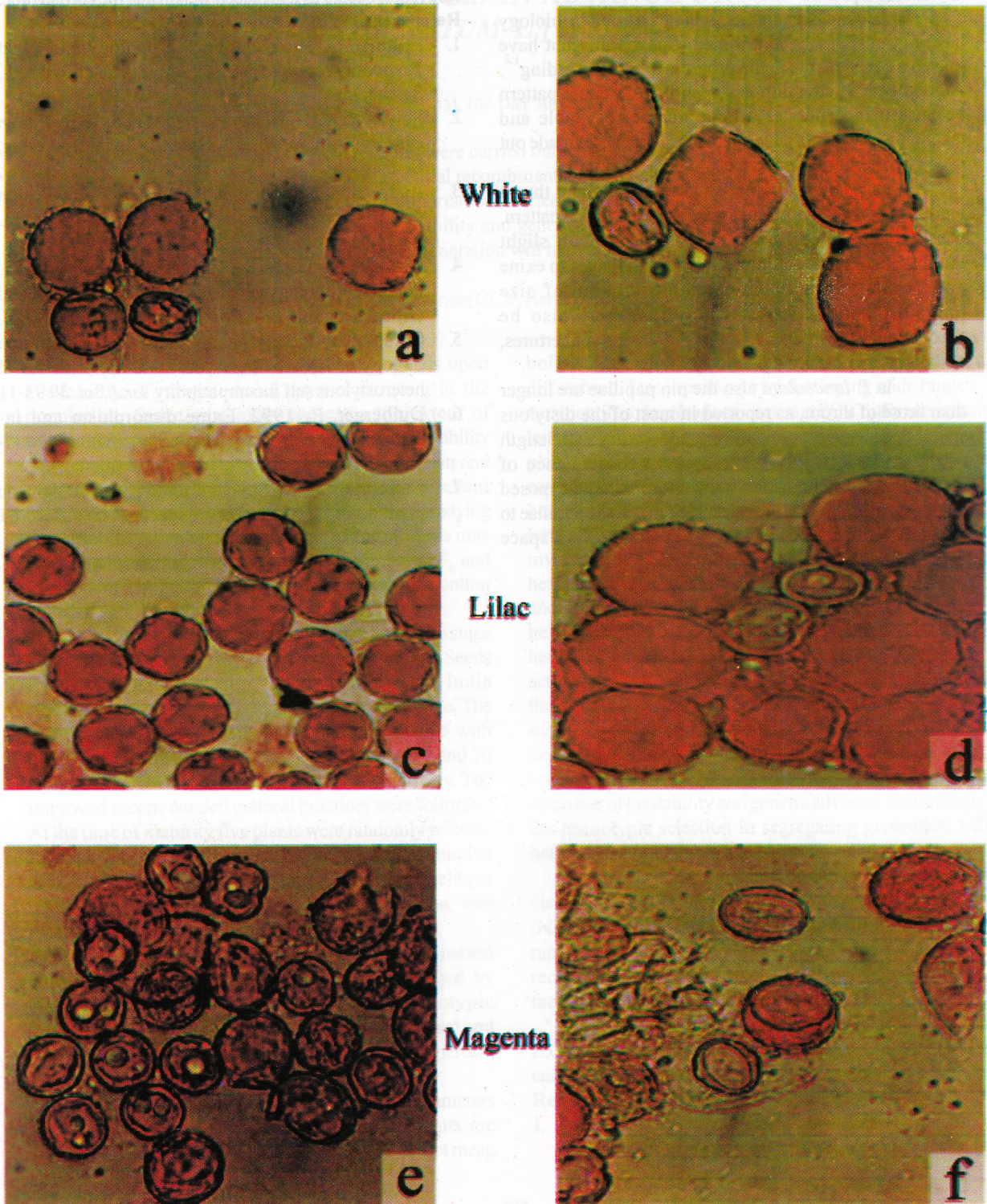


Fig.1. (a to f) Pollengrains of 3-zonocolporate in pin and 4-zonocolporate in thrum

both the morphs.

Advances in the knowledge of pollen biology have not only richly contributed to taxonomy but have played a decisive role in the progress of plant breeding<sup>1,2</sup>. A good deal of attention has been paid to exine pattern because it incorporates a large number of stable and taxonomically identifiable characters that can be made out even from herbarium specimens<sup>3</sup>.

In *P. lanceolata* pollen grains of pin and thrum morphs show polymorphism in size as well as exine pattern. Dissimilar pollen size may be associated with slight differences in exine sculpture<sup>4,5</sup>. The differences in exine pattern may be a developmental outcome of size polymorphism<sup>6</sup>. Size polymorphism may also be accompanied by differing numbers of shapes of apertures, with larger grains having more apertures<sup>4</sup>.

In *P. lanceolata* also the pin papillae are longer than those of thrum, as reported in most of the distylous species<sup>7</sup>. The length of papillae tends to vary with length of the style. Probably this may be a consequence of differential style elongation in the morphs<sup>6</sup>. The exposed condition of pin stigma provides freedom for the papillae to elongate whereas in the case of thrum flowers space

restriction occurs as it is placed well inside the corolla tube.

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