



## Pollen morphology of two cultivars of *Trichosanthes dioica* Roxb. (Cucurbitaceae)

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The genus *Trichosanthes* includes over 90-100 species of which 22 occur in India (Boer *et al.* 2012). It is placed in tribe Sicyoeae, of family Cucurbitaceae, (Scharfer and Renner 2009, Renner and Pandey 2013). *Trichosanthes dioica* Roxb. (pointed gourd) commonly known as parwal/patal in India, is one of the most important and expensive summer vegetable crops and holds a coveted position in the Indian market during the summer and rainy season. It is one of the most important medicinal as well as nutritional cucurbitaceous vegetables. Pointed gourd is rated as a nutritious food rich in vitamins like vitamin A, vitamin B1, vitamin B2 and vitamin C (Roy and Mani 2020). Besides its nutritional value, parwal is well known for its medicinal value too (Anonymous 1976). Fruits are globose, oblong, smooth, striped or non-striped with either pointed or blunt ends. The young fruits are deep green in colour. The fruits become orange red after ripening. The crop is of Indo-Malayan origin and distribution, and is extensively grown in eastern India (Chakravarthy 1982). It is extensively grown in Eastern India and to a lesser extent in other parts of South Asia. It is said to be the native of South East Asia and probably the Northern and Eastern states of India, especially, of Bengal, Assam and Bihar (Nath and Subramanyam 1972) and has high economic value with export potential. Bihar is the largest producer of this crop. There are 15 cultivars mainly cultivated along the riverine belts of Bihar (Pandey 2000). It is propagated by stem or root cuttings, as the plants raised with seeds are weak with small leaves and take 2-3 years to fruit.

**Keywords :** Cucurbitaceae, *Trichosanthes dioica* Roxb., pollen morphology, acetolysis.

Pollen has direct relevance in agriculture, horticulture, plant breeding, crop improvement, and biotechnology (Shivanna and Rangaswamy 1992). Pollen morphology is of significance to taxonomy, phylogeny, palaeobotany aeropalynology (Shivanna and Rangaswamy 1992). It is important to visualise the general features of a pollen grain including symmetry, shape, size, aperture number and location as well as ornamentation. Pollen morphology was studied under light microscope (LM) and scanning electron microscope (SEM). These investigations are used to highlight the stratification and the uniqueness of the pollen wall layer as well as structural and sculptural features of pollen. In the present communication, morphology of pollen as observed under LM and SEM in two cultivars of *Trichosanthes dioica* Roxb. has been described.

Pollen grains for light microscopic studies were acetolysed (Erdtman 1969) and viewed using both an Olympus Magnus Microscope and SEM. For SEM studies,

pollen grains passed through dehydration series, were suspended in a drop of acetone and then transferred onto a 5mm round glass coverslip using double sided adhesive tape. The sample was coated with a thin layer of gold in a sputter coater (ion – sputter JFC - 1100) and viewed under Philips- XL-20 scanning electron microscope at NBRI (National Botanical Research Institute), Lucknow. The characters observed included pollen symmetry, shape, size, aperture and exine ornamentation which are given in Table 1.

The pollen grains were radially symmetrical, spheroidal, isopolar, 3- zonicolporate / tricolporate in both the species. Newly formed microspores were rich in cytoplasmic content with prominent centrally placed nuclei. The size of pollens of *Trichosanthes dioica* cv. Hilli was  $18.35 \pm 0.173 \mu\text{m}$  in diameter whereas *Trichosanthes dioica* cv. Dandali the diameter of pollen grains was  $21.27 \pm 0.21 \mu\text{m}$  in diameter. SEM of T. S. of mature anther prior to anthesis showed

Table 1.- Pollen characters of two cultivars of *Trichosanthes dioica* Roxb.

Cultivars	Symmetry	Shape	Size ( $\mu\text{m}$ )	Aperture	Surface Ornamentation
<i>Trichosanthes dioica</i> cv. Hilli	radially symmetrical, isopolar	tricolporate, and spherical	$118.35 \pm 0.173$	3 porus with annular opening	rugulate
<i>Trichosanthes dioica</i> cv. Dandali	radially symmetrical, isopolar	tricolporate and spherical	$21.27 \pm 0.21$	3 porus with annular opening	rugulate

pollen sac filled with a large number of pollen grains (Fig. 1A). Under SEM the surface of pollen grains showed distinct rugulate and granular ornamentation (Fig. 1BC). A circular aperture termed as poros (Fig.1BC) is seen in the pollen grains of both the cultivars of *Trichosanthes dioica*. The number of apertures is 3 so it is known as triporate. The aperture is covered by a ring-like structure, which is annular in appearance so it is known as annulate (Fig.1C). Margin of the operculum is distinctly incurved and the operculum seems to be protruded (Fig. 1C).

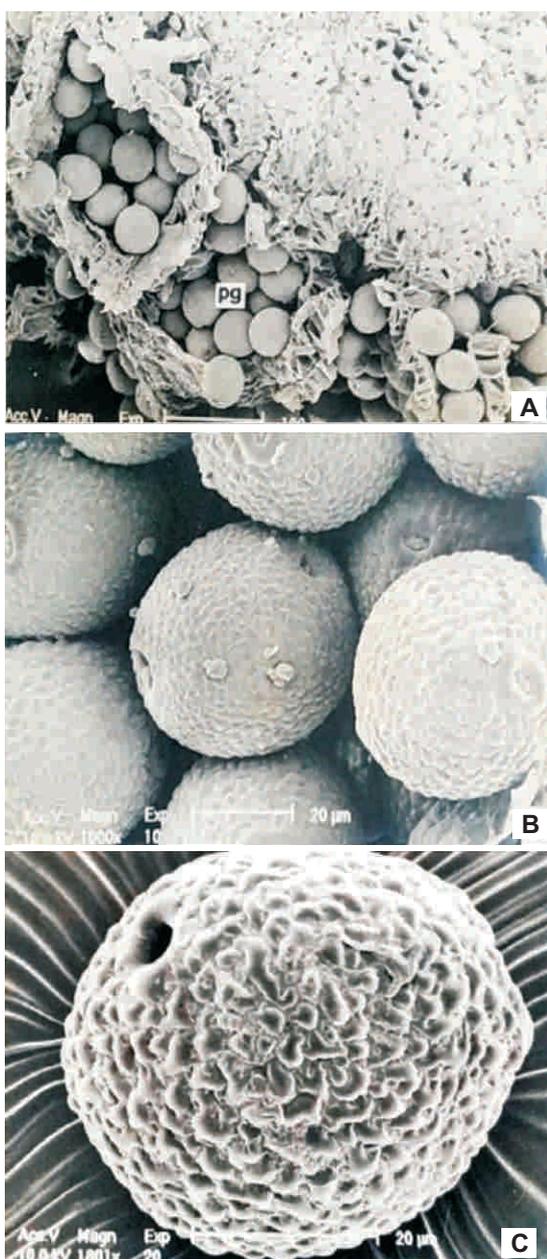


Fig. 1. Scanning Electron Micrograph (SEM) of mature anther and pollen grains of *Trichosanthes dioica* Roxb., A. TS of a mature anther, B Triporate pollen grains with annulate aperture, C. Single pollen showing a rugulate pattern. with annulate aperture.

Pollen morphology of several members of genus *Trichosanthes* have been studied (Erdtman 1952, Ikuse 1956, Alyoshina 1971, Huang 1997, van Der Ham 1999, Pruesapan and Ham 2005) and their findings have been used in taxonomy of the family and genus *Trichosanthes*. Yue and Zhang (1986) described the pollen of *T. multilobato* have rugulate sporoderm, which is similar to the findings in *T. dioica* Roxb. as mentioned in this communication.

*Trichosanthes higakiensis* had coarsely reticulate pollen whereas *Trichosanthes ovigera* were found to have finely regulated pollen with distinct costae surface (Huang et al., 1997). The largest deviation was reported in the description of the pollen of *T. villosa*. It showed pollen with psilate covering, and indistinct colpi. In the present study, however, the pollen surface appeared to be rugulate, with 3 distinct colpi (Fig. 1B, C).

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