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## Microscopic analysis of “*Trichosanthes dioica*”

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#### Abstract

One of the most nutrient-dense cucurbit vegetables is the pointed gourd (*Trichosanthes dioica* Roxb.), which enjoys a prized spot in the Indian market during the warm and wet months. It is a perennial crop that is quite popular because it is available for eight months out of the year (February–September). It has certain medical effects due to its high protein and vitamin A content, and there are numerous studies about its involvement in decreasing blood sugar levels. In this paper, an effort was made to examine the microscopic characteristics of *Trichosanthes dioica*. Leaf exhibited unicriate glandular epidermis with a single cellular head. Spongy parenchymatous cells, collenchymatous cells, pericycle, phloem, and xylem were all present after the epidermis. The Xylem vessels were spiral and reticulate. The collenchymatous cells' inside. The existence of uniseriate multicellular trichomes was shown by powder microscopy. crystal sheath oil globules, anomocytic stomata, lignified spiral arteries, and epidermis cells. The powders were subjected to various reagent treatments during the powder analysis, and various colours were visible to the naked eye and under UV light. There was quantitative microscopy. Vein termination and vein islet averages were 13.6 and 12, respectively. The upper and lower epidermis of the leaf had average stomatal counts of 12.5 and 16.33, respectively. The upper and lower epidermis of the leaf had average stomatal indices of 22.87 and 24.62, respectively. Data from these studies were helpful for evaluating the raw materials used in the manufacturing of herbal medicines and for anatomical research.

**Keywords:** *Trichosanthes dioica*, microscopic properties, stomatal index, Quantitative microscopy, medicinal plants

#### Introduction

One of the most nutrient-dense cucurbit vegetables is the pointed gourd (*Trichosanthes dioica* Roxb.), which enjoys a prized spot in the Indian market during the warm and wet months. It is a perennial crop that is quite popular because it is available for eight months out of the year (February–September). It has certain medical characteristics due to its high protein and vitamin A content, and numerous publications exist regarding its effectiveness in decreasing blood sugar and serum lipids. Fruits <sup>[1]</sup> have an easy digestion process and a diuretic effect. They also have anti-ulcerous effects, according to research <sup>[2]</sup>. It is a vegetable that grows all over India. It is recommended to enhance digestion and appetite <sup>[3]</sup>. Boils and other skin conditions are treated with the *Trichosanthes dioica* Roxb. decoction, which is also effective as a febrifuge <sup>[4]</sup>.

The juice of the leaf is applied to patches of alopecia areata. The root is used as a hydragogue cathartic tonic and febrifuge <sup>[5]</sup>. The fruits are used as remedies for spermatorrhoea, and the juice of unripe fruits and also tender shoots, are used for cooling and as a laxative <sup>[6]</sup>. The fruits and seeds have some prospects in the control of some cancer- like conditions and hemagglutinating activities <sup>[7]</sup>. It is prescribed to improve appetite and digestion <sup>[9]</sup>. The decoction of TD is useful as a valuable alternative tonic, and as a febrifuge, which is given for boils and other skin diseases <sup>[10]</sup>. The juice of the leaf is applied to patches of alopecia areata <sup>[11]</sup>. The root is used as a hydragogue cathartic tonic and febrifuge <sup>[12]</sup>. The fruits are used as a remedy for spermatorrhoea, and the juice of unripe fruits and also tender shoots, are used for cooling and as a laxative <sup>[13]</sup>. The fruits and seeds have some prospects in the control of some cancer- like conditions and hemagglutinating activities <sup>[1]</sup>.

In this work there was an attempt had to made to analyze macroscopic properties of *Trichosanthes dioica*.

#### Methodology

##### Collection and authentication plant

The plant specimens for the proposed study were collected from Sambalpur and authenticated by relevant local flora books.

### Macroscopic characters

Leaves of *trichosanthes dioica* were observed to be simple, sub flashy alternate, ovate, palmately 3 to 5 lobed with obtuse apex, ranging from 5-8 cm long and 3-6.5 cm wide. It shows reticulate venation with glabrous surface, dentate margin and cordate base. Petiole was stout, cylindrical, smooth, 1.2-3.0cm long, slightly flashy. The leaves have bright green upper surface and pale-green underneath, with characteristic odor and astringent taste [14, 15].

### Microscopy

#### Midrib region

Microscopical estimation showed, transverse section passing through midrib protrudes at the lower side and flat at the upper side. Single layered upper and lower epidermis was observed with straight walls. Epidermis was covered with thick cuticle bearing few short glandular trichomes. Below the upper epidermis single layered palisade cells were observed with spongy mesophyll cells and in between were the xylem and phloem vessels. Xylem and phloem are arranged in ring. Xylem ring present towards the center and is surrounded by phloem ring. Small collenchymatous patch lied under the upper epidermis and 1-3 layers of well-developed collenchymatous cells were on the lower side. Vascular bundles were semicircular, vessels arranged in radial rows, bicollateral, three, one centrally located was bigger in size, and two lying under the upper epidermis were smaller in size.

#### Petiole

Transverse section of petiole shows single layered epidermis, consisting of flattened, elongated cells with covering of cuticle. Under the epidermis 2-5 layered collenchymatous and 2-6 layered circular, thin walled, chlorenchymatous cells with intracellular spaces were observed. Bicollateral vascular bundles were arranged in a single ring. Some bundles were capped by one or two layered, thick walled, lignified, polygonal pericyclic sclerenchyma. In centre very wide pith was observed which was composed of large parenchymatous cells.

### Powder analysis

#### Powder microscopy

The leaf powder was cleared by boiling with 20% chloral hydrate solution. Different slides were prepared by taking

1. Powder alone
2. Powder + Iodine Solution 2%
3. Powder + Phloroglucinol 2% and Conc. Hydrochloric acid and finally observed under microscope.

### Quantitative microscopy

#### Vein-islet number

A portion of the fresh leaf was taken from midway between the midrib and the margin, cleared with chloral hydrate solution. Using a 16mm objective, a stage micrometer and camera lucida a 2X2 mm square was drawn. The leaf sample was mounted and the vein islets within the square were drawn. The number obtained was then divided by 4 to get the vein-islet number.

#### Vein- termination number

A portion of the fresh leaf was taken from midway between

the midrib and the margin, cleared with chloral hydrate solution. Using a 16mm objective, a stage micrometer and camera lucida a 2X2 mm square was drawn. The leaf sample was mounted and the vein within the square was drawn. The number obtained was then divided by 4 to get the vein termination number.

#### Stomatal number

The upper and lower epidermal layer of the leaf peel was cleared with chloral hydrate solution and mounted on a slide, with the help of camera lucida and stage micrometer one mm square was drawn on a paper. The stage micrometer was observed and their stomata were marked in that unit area. Then the number of stomata present in that unit area was calculated. Five such reading was taken and the average number of stomatal numbers was calculated.

#### Stomatal index

It is the percentage which the number of stomata forms to the total number of epidermal cells, each stomata being counted as one cell.

$$\text{Stomatal Index (I)} = \{S / (E+S)\} \times 100$$

Where

'S' denotes the number of stomata per unit area.

'E' denotes the number of epidermal cell in the same unit area.

### Results

#### Results of different macroscopic analysis given in table no (1-8)

**Table 1:** Results of Powder Microscopy

Sl. No.	Finding of Powder of Microscopy
1	Epidermis with Anomocytic stomata
2	Uniseriate Multicellular Trichomes
3	Lignified Spiral Vessel
4	Crystal Sheath
5	Oil Globules

**Table 2:** Determination of Vein-islet Number

Field No.	Vein-islet number per sq. mm. (A).	No. of vein-islet in 4mm. Area (B). B=A×4
I	4	16
II	3	12
III	2	8
IV	4	16
V	4	16

Average vein-islet number=13.6

**Table 3:** Detailed data of the vein termination number of the leaf

Field No.	Vein termination per sq.mm. (A).	No. of vein termination in 4mm.Area(A×4
I	3	12
II	2	8
III	3	12
V	4	16
IV	3	12

Average vein termination=12

**Table 4:** Range: vein termination number of the leaf

Minimum	Average	Maximum
08	12	16

**Table 5:** Range: stomatal number of upper epidermis of the leaf

Field. No	No. of stomata per sq.mm
I	4
II	2
III	3
IV	3

Average stomatal number=3

**Table 6:** Range: stomatal number of upper epidermis of the leaf

Minimum	Average	Maximum
14	16.33	18

**Table 7:** Range: stomatal index of upper epidermis of the leaf

Field No.	No. of Stomata Per Sq. mm. (S)	No. of Epidermal cells Per sq.mm (E)	Stomata Index $I = S/E + S \times 100$
I	15	48	23.80
II	14	48	22.58
III	16	50	24.24
IV	15	51	22.72
V	12	45	21.05

Average stomatal Index = 22.87

**Determination of stomatal index of lower epidermis****Table 8:** Range: stomatal index of lower epidermis of the leaf

Field No.	No. of Stomata Per Sq. mm. (S)	No. of Epidermal cells Per sq.mm (E)	Stomata Index $I = S/E + S \times 100$
I	18	50	26.47
II	16	50	24.24
III	15	45	25.00
IV	15	45	25.00
V	13	48	22.41

Average stomatal Index =24.62

**Conclusion**

As a part of standardization study, the macroscopical examination of leaf was studied. Macroscopical evaluation is a technique of qualitative evaluation based on the study of morphological and sensory profiles of drugs. The macroscopical characters of the leaf of plant can serve as diagnostic parameters. The microscopical characters of the leaf and powder characteristics of the leaf of the plant were studied. Leaf showed the presence of epidermis with unicellate glandular with unicellular head Epidermis was followed by spongy parenchymatous cells, followed by collenchymatous cells, pericycle, phloem, xylem. Xylem vessels were reticulate and spiral. Inside the collenchymatous cells. Powder microscopy showed the presence of uniseriate multicellular trichomes. Were observed. Epidermis cells, anomocytic stomata, lignified spiral vessels, crystal sheath oil globules. In the powder analysis the powders were treated with different reagents and different colours were seen on naked eye as well as on UV light. Quantitative microscopy was done. Average vein-islet and vein termination numbers were 13.6 and 12 respectively. Average stomatal numbers of the leaf of the upper and lower epidermis were 12.5 and 16.33 respectively. Average stomatal index of the leaf of the upper and lower epidermis were 22.87 and 24.62 respectively. Data of such types of study were useful for anatomical study and evaluation of raw material for herbal drugs preparation.

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