

## PHARMACOGNOSTICAL EVALUATION OF *Taverniera nummularia* BAKER. LEAF - A PRELIMINARY STUDY

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### Abstract

*Taverniera nummularia* Baker. (Fabaceae), known as Jethimala, is a much branched under shrub that occurs along the banks of small streams. Leaves of *Taverniera nummularia* Baker. are used as poultice for sloughing wounds. Roots are sweet like licorice and used as an expectorant. In the present study, its leaves are evaluated for their morphological, microscopical and quantitative microscopic characters following standard procedures. The study showed the leaves were 0.6-1.25 cm. in size, 1-foliate, leaflets very variable in size, 0.6-2.5 cm. across. Microscopic evaluation of leaves showed the presence of pericyclic fibers, prismatic crystals, single layer of epidermal and endodermal cells. Surface study of the leaf showed the anomocytic stomata of upper epidermis and anisocytic stomata with cicatrix cells of lower epidermis. These observed microscopic characters could serve as a measure for authentication and standardization of the plant.

**Key words:** Jethimala; *Taverniera nummularia*; Pharmacognosy; Stomata; Quantitative microscopy.

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## INTRODUCTION

Medicinal plants play an important role in the health care of developing countries and main source of treatment since thousands of years. The genus *Taverniera* belonging to the family Fabaceae. *Taverniera nummularia* Baker. is a plant that occurs along the banks of small streams especially near the coastal area having salinity in soil. This plant is known as *Jethimala* by the local people of Saurashtra, Porbandar, and Kutchh region of Gujarat.<sup>[1]</sup> *T. nummularia* Baker. is a much branched under shrub, 1-2ft. height, leaves 1-foliolate, leaflets very variable in size, 0.62-2.5cm. across, orbicular or obovate, thick, glaucous, mucronulate, much longer than the petiolules, flowers in axillary lax, 2-6 flowered racemes, longer than the leaves, calyx 0.42cm. long, finely pubescent, corolla red, 0.95-1.25cm. long.<sup>[2]</sup> Leaves of *T. nummularia* Baker. are used as poultice for sloughing wounds,<sup>[3]</sup> applied externally on swelling, abscess and ulcers.<sup>[4]</sup> 2 teaspoon full decoction of roots is given orally twice a day for 3 day in throat problems.<sup>[5]</sup> Roots are used in cough. Seeds are fried and used in hoarseness of voice.<sup>[6]</sup> Review of literature shows that detailed pharmacognostical study of leaf of *Taverniera nummularia* Baker. is not established. Hence, the present study was undertaken to establish certain botanical standards for identification and standardization of *Taverniera nummularia* Baker.

## MATERIALS AND METHODS

### Collection of the sample

Leaves of *Taverniera nummularia* Baker. were collected from its natural habitat, Rosy port area, Jamnagar, Gujarat, during the month of November 2012 and identified with the help of botanical texts and flora.<sup>[7]</sup> A sample specimen was deposited to Pharmacognosy lab (Specimen No: PHM 6112/25/11/2012) for future references. Fresh leaves were used for microscopical evaluation.

### Morphological study

The morphological study includes size, shape, apex, margin, venation, base, petiole, surface, color of leaves of *T. nummularia* Baker.

### Microscopical study

Microscopical examinations were carried out by free hand thin transverse section of petiole, leaf through midrib,<sup>[8]</sup> type and distribution of stomata, epidermal cell and trichomes,<sup>[9]</sup> following standard guidelines.

Photographs of the section were taken with the help of Canon digital camera attached to Zeiss microscope.

### Quantitative microscopy

Quantitative microscopy was carried out to determine epidermal cell number, stomatal number, length of stomata, width of stomata and stomatal index.<sup>[10]</sup>

### Histo-chemical evaluation

Thick leaf sections of *Taverniera nummularia* Baker. treated with various reagents to detect the presence and absence of lignified cells, tannin, starch, calcium oxalate crystals etc.<sup>[11]</sup>

## RESULTS

### Morphological study

Macroscopic investigation showed that the leaves are 0.62-1.25cm in size, 1-foliolate; stipules scarious, triangular, acute, free, united into one deciduous one which is opposite the leaf.

Leaflets are very variable in size, 0.62-2.5cm. across, orbicular or obovate, thick, glaucous, mucronulate, much longer than the petiolules; petiolules 0.1-0.5cm. long. (Figure 1a and Figure 1b)

**Figure 1: T.S through petiole**



a. Natural habitat



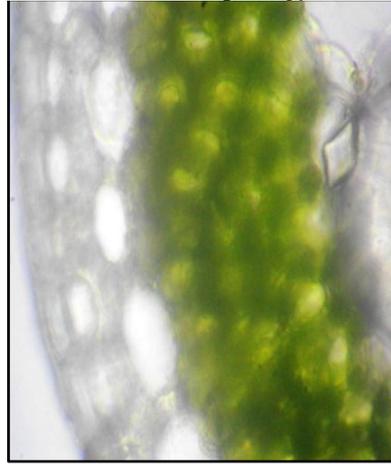
b. Leaves morphology



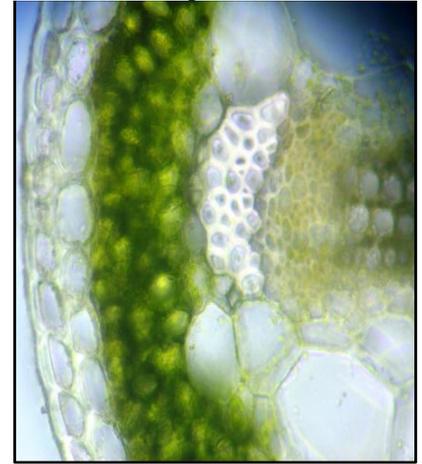
c. T.S of petiole



d. Epidermis, hypodermis, vascular bundles and pith



e. Prismatic crystal



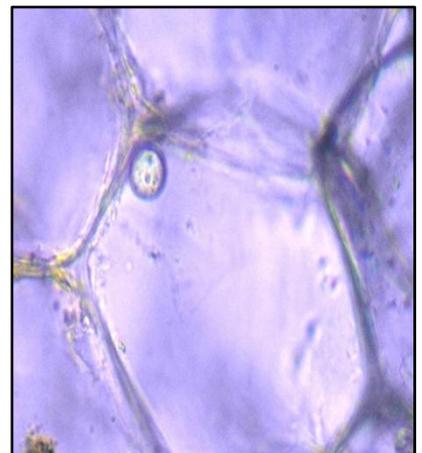
f. Pericyclic fibre, phloem and xylem



g. T. S of petiole after staining



h. Pericyclic fibers, phloem, xylem and pitted parenchyma



i. Oil globule

**Figure 2: Transverse section of midrib**



a. T. S through mid rib

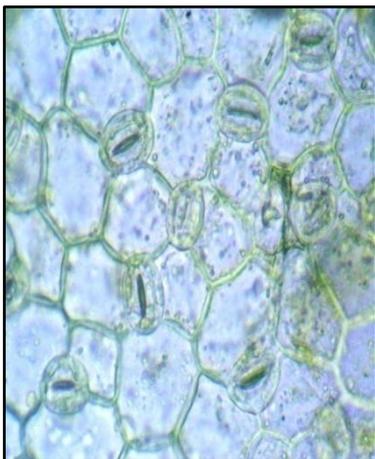


b. Tannin content



c. Phloem and xylem

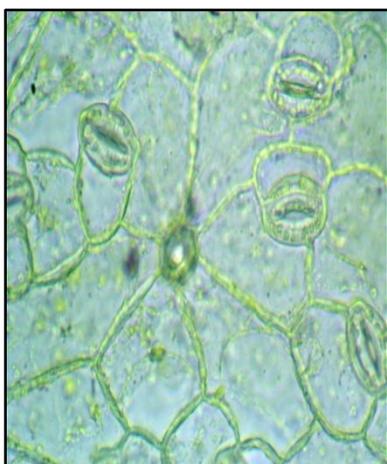
**Figure 3: Surface study of the leaf**



a. Stomata in upper epidermis were anomocytic as well as anisocytic type.



b.



b. Stomata in lower epidermis anisocytic type with cicatrix cells



## Microscopical study

### T.S. of Petiole

T.S of the petiole was more or less triangular in shape, showed epidermis, cortex, vascular bundles and central pith. (Figure 1c)

Epidermis was single layered, made up of barrel shaped cells arranged compactly and covered with thick cuticle. Hypodermis present just beneath the epidermis, made up of single layered compactly arranged cells. (Figure 1d) Cortex consists of chlorenchymatous cortical cells enriched by chlorophyll pigments. Endodermis was single layered, consists some prismatic crystals. (Figure 1e)

In the ground tissue, 2-5 layers of pericyclic fibres followed by three distinct vascular bundles. (Figure 1f) Vascular bundles open and collateral, Phloem present beneath the pericyclic fibers consisting sieve elements and phloem fibers. Xylem radially arranged beneath the phloem along with xylem parenchyma and xylem fibers. (Figure 1h) Centrally located large pith having parenchymatous cells consisting some starch grains.

### T. S. Through mid rib

T.S of the leaf through mid rib showed distinct upper and lower epidermis and centrally located vascular bundles. (Figure 2a) Upper and lower epidermis was single layered, covered with the cuticle, lower epidermis was

interrupted by stomata. Beneath the upper epidermis 6-7 layers of palisade parenchyma and beneath the lower epidermis 6-7 layer of spongy parenchyma was present. Some of the lower and upper epidermis cells filled with dark brown contents. (Figure 2b) The mesophyll tissue consists large quantity of oil globules and prismatic crystals. Mesophyll, upper separated by vascular strands. Vascular bundles situated at the centre of the midrib, made up phloem facing towards lower epidermis, xylem facing towards upper epidermis along with few elements of xylem parenchyma cells. (Figure 2c)

### Surface study of epidermis

Surface study of epidermis was carried out to determine type and distribution of stomata, epidermal cell and simple trichomes. Stomata in upper epidermis were anomocytic as well as anisocytic type (Figure 3a) and lower epidermis were anisocytic type with cicatrix cells. (Figure 3b)

### Quantitative microscopy

Quantitative microscopy of leaves was carried out to determine epidermal cell number, stomatal number, length of stomata, width of stomata and stomatal index. The stomatal number, number of epidermal cells, stomatal index were calculated by trial and error method (by taking 3-5 successive readings. Mean value was taken into consideration.) Results are tabulated in Table 1.

**Table 1: Quantitative microscopy of *Taverniera nummularia* Baker. Leaf**

Sr. No	Parameters	Result	
		Upper epidermis	Lower epidermis
1.	Type of the stomata	Anomocytic	Anisocytic
2.	Length of the stomata	25.2 $\mu\text{m}$	28.8 $\mu\text{m}$
3.	Width of the stomata	40.4 $\mu\text{m}$	21.6 $\mu\text{m}$
4.	Number of the stomata	6	5
5.	Number of epidermal cells	36	35
6.	Stomatal index	14	13

**Table 2: Histochemical evaluation of *Taverniera nummularia* Baker. Leaf**

Sr.No.	Reagents	Observation	Characteristics
1.	Phloroglucinol+Conc. Hcl	Red	Lignified cells
2.	FeCl <sub>3</sub> solution	Dark blue to black	Tannin cells
3.	Iodine solution	Blue	Starch
4.	Phloroglucinol+Conc. Hcl	Dissolved	Calcium oxalate crystals

### Histochemical test

To confirm the presence and absence of the chemical constituents the material was subjected to various tests. Lignified cells, tannin, starch, calcium oxalate crystals were present in the leaf. (Table 2)

### DISCUSSION

Presence of single layered hypodermis, pericyclic fibres and the prismatic crystals of calcium oxalate crystals dominant in the corticle region of the petiole. Leaf dorsiventral, upper with 6-7 layered palisade and lower with 6-7 layered spongy parenchyma. Presence of oil globules and prismatic crystals in the mesophyll tissue. Presence of simple trichomes and anisocytic stomata in the surface study. Stomatal index in upper epidermis 14 where as in lower epidermis was 13. Histochemical evaluation reveals that the presence of tannin, lignin and starch these characters were very specific in the identification of the plant.

### CONCLUSION

The observed parameters like morphology, microscopy, quantitative values like stomatal number and stomatal index are always constant. It may be useful to establish certain botanical standards for identification and standardization of *Taverniera nummularia* Baker. for the further studies.

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