

Macro microscopical Evaluation of *Gobba marantina* Linn. Stem

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Abstract

Globba marantina Linn., family Zingiberaceae, is locally known as *Chhota rasna* by tribal people of Odisha. Ethno botany survey reports use of its various parts in the management of asthma, rheumatoid arthritis, cough, cold, snakebite etc. Though used traditionally, proper scientific evaluation of this plant for its pharmacognostical characters has not been reported till today. The present study reports the result of detail macroscopical and microscopical characters of its stem, being carried out following standard parameters. The chief diagnostic characters found are the presence of yellow content, prismatic crystals, oil globules etc. The observed data could be helpful to identify the stem of *Globba marantina* Linn at microscopic level.

Keywords

Chhota rasna, Gndhamardan hills, Pharmacognosy, Zingiberaceae



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INTRODUCTION

Classical pharmacopoeia of Ayurveda i.e., *Samhitas* and *Nighantus* codified certain medicinal plants for therapeutic uses and advised the physicians to learn the use of new medicinal plant from the cowherds/traditional practitioners¹. Ethnomedicine is the knowledge and practice that has survived through only folklore in certain human societies, particularly among the primitive and rural societies. There is worldwide interest in folklores about medicinal herbs to get leads to new sources of drugs. Study of folk medicine falls within the discipline of ethnobotany².

Globba marantina Linn., family Zingiberaceae, is known as *Chhota Rasna* in Odisha and Dancing girl ginger in English. It is an erect or inclined herb, leaves oblong to lanceolate attached with sheathing base, inflorescence compact and flower, yellow in colour, situated in the axil of one or more of the upper bract. It is found in Eastern Himalaya, West Bengal, Khasia hills, Sri Lanka, Odisha etc^{3,4,5}.

Different parts of *G. marantina* are being used traditionally for the management of asthma, snake bites, leucoderma, cough, cold etc^{3,4}. It is also used as a spice and is eaten as a seasoning in Malaya⁵. Though

various parts of this plant are reported for their traditional ethno-pharmacological claims, no scientific study has been undertaken to establish their microscopic characters.

Present study reports the identification of *G. marantina* stem through microscopical characters following standard parameters.

MATERIALS AND METHODS

Collection and authentication of plant materials:

Whole plant of *Chhota rasna* was collected by the first author with the help of traditional practitioner from its natural habitat Paikmal, Odisha and identified by the local taxonomist during the month of September-November 2014. Herbarium was prepared from the collected plant material and was authenticated from BSI, Kolkata (Specimen No. SR-01/CHN/Tech.II/2014/108/261) as *Globba marantina* Linn. A specimen of the sample herbarium has been deposited in Pharmacognosy laboratory, I.P.G.T & R.A (Specimen No. Ph.M: 6143/14/15) for further references (Plate 1, Fig 2). The stem was separated from the whole plant and washed with tap water then few pieces of stem was stored in solution of AAF (70% Ethyl alcohol: Glacial acetic acid: Formalin)

in the ratio of (90:5:5) to utilize them for microscopic studies⁶.

Preparation of powder: The remaining part of stem was dried under the shade. Then dried stem were subjected for powdering individually by mechanical mixer grinder and sieved through 60# for powder microscopy and stored in air tight glass container for further analysis.

Morphology:

Morphological characters of *Globba marantina* stem were studied as per visual observation, following the standard procedure of taxonomy and verified with existing floras for authentication^{3,7}.

Microscopical evaluation:

Thin free hand transverse section of stem of *G. marantina* was taken and sections were first observed in distilled water then stained with phloroglucinol (20mg/ml of alcohol) along with hydrochloric acid (6N) and ferric chloride solution (5% w/v in 90% alcohol) respectively and again examined to assess different cellular structure and content. The samples were observed under compound microscope (QUASMA, India) and photographs were taken by using Kodak easy share C140, 8.2 megapixels 3x optical/5x digital zoom HD camera^{8,9}.

Organoleptic characters:

The colour, odour and taste of stem were recorded separately through visual and sensory observation¹⁰.

Powder microscopic evaluation:

The stem was studied under microscope with distilled water and also examined after staining with different suitable reagents i.e. phloroglucinol (20mg/ml of alcohol) along with hydrochloric acid (6N) and ferric chloride (5% w/v in 90% alcohol)¹⁰ under compound microscope and photographs were taken by using Kodak easy share C140, 8.2 megapixels 3x optical/5x digital zoom HD camera.

Micrometric evaluation:

Measurement of the length, width of different cell contents were taken into consideration for micrometric evaluation¹⁰ with the help of compound microscope (QUASMA, India) and photographs were taken by using Kodak easy share C140, 8.2 megapixels 3x optical/5x digital zoom HD camera. All determinations were performed in triplicate and the results are presented as mean value.

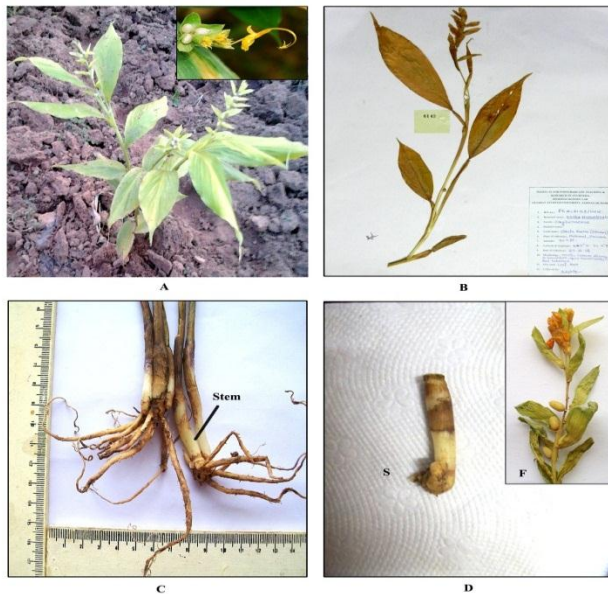
RESULTS AND DISCUSSION

Morphology:

Globba marantina Linn. is an erect or inclined herb, about 3ft in height with yellow flower (Plate 1, Fig 1). Stem very

short about 3-4 cm in length and 0.5-0.7 cm in width, attached with the leaf sheathing base. Stem is cylindrical, spongy, creamish white in colour with proper node and internode (Plate 1, Fig 3, 4).

Fig 1 Morphology of *Globba marantina* Linn.



A: *Globba marantina* Linn. whole plant, B: Herbarium sheet (Specimen No. Ph.M: 6143/14/15), C: Stem attached with root, D: Individual stem (S) and flower along with fruit (F).

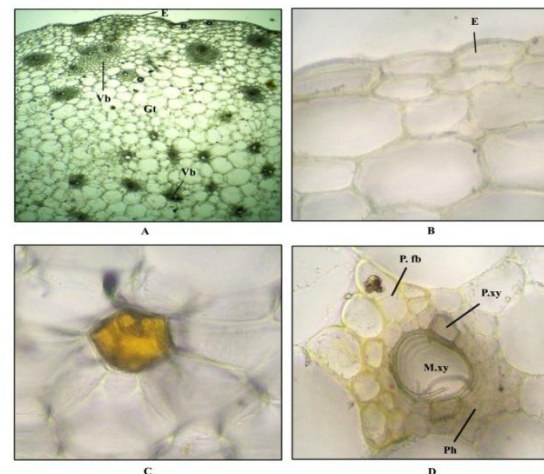
Microscopical evaluation:

Diagrammatic section of stem shows outer epidermis and large central ground tissue.

Detail transverse section shows outermost single barrel shaped epidermal cells, with cuticle. Some of the epidermal cells are interrupted by stomatal openings. Ground tissue is made up of parenchyma cell, occupied major part of the transverse section. Some parenchyma cells are interrupted by prismatic crystal, brown

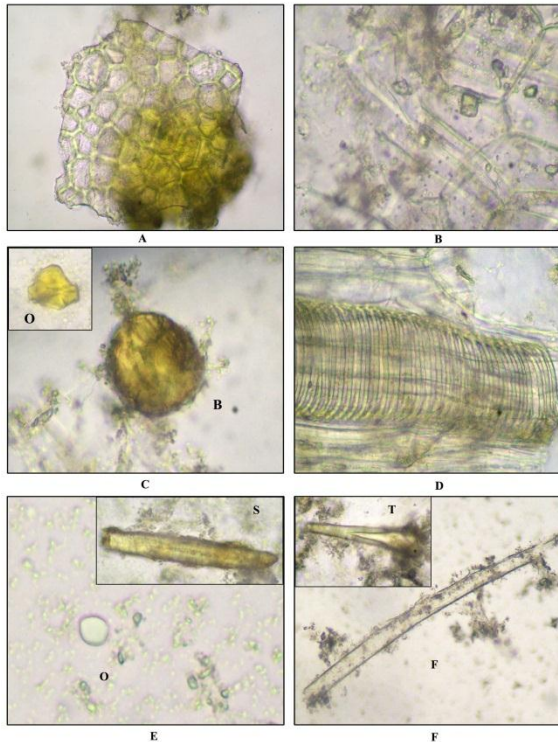
content and oleoresin. Vascular bundles closed type distributed all over the ground tissue, more concentrated towards the epidermal region. Each vascular bundle consists of 2-4 xylem vessels and phloem. Xylem made up of very few xylem parenchyma and its fibers whereas phloem made up of phloem fiber and sieve elements, forming a cap like structure. Vascular bundle surrounded by 3-4 layers of lignified pericyclic fibers. Some of the xylem vessel shows intraxylary pittings (Plate 2, Fig 1-4).

Fig 2 Transverse section of *Globba marantina* Linn. stem



A: Detail transverse section of stem; B: Epidermis with parenchymatous ground tissue; C: Oleoresin content; D: Vascular bundle after staining with phloroglucinol and HCl
E- Epidermis, Vb- Vascular bundle, Gt- Ground tissue, P. fb- Pericyclic fiber, M. xy- Meta xylem, P. xy- Protoxylem, Ph- Phloem.

Fig 3 Powder characters of *Globba marantina* Linn. stem



A: Fragment of epidermal cells; B: Fragment of parenchyma cells with prismatic crystal of calcium oxalate; C: Brown content (B) and oleoresin content (O); D: Annular vessel; E: Oil globule (O) and fragment of scleride (S); F: Fragment of fiber (F) and fragment of trichome (T).

Table 1 Results of histochemical tests of *Globba marantina* stem

| Reagen'ts | Characteristics | Observation | Result |
|----------------------|-----------------|--|--------|
| Phloroglucinol + HCL | Lignified cells | Pericyclic fiber in T.S and fragment of fiber in powder shows slight orange to pink colour | + |
| FeCl ₃ | Tannin content | No colour changes found | - |

'+'= Positive; '-'= negative

Table 2 Mean values of micrometric evaluation of different cell and constituents of *Globba marantina* stem

| Sample name | Length (L) and width (W) (mm) |
|-------------|-------------------------------|
|-------------|-------------------------------|

| | Crystal (40x) | Scleride (40x) | Fibers (10x) | Fragment of annular vessels (40x) | Fragment of trichome (40x) |
|--------|---------------|-----------------|--------------|-----------------------------------|----------------------------|
| Stem | L- 0.025; | L- 0.4; W- 0.07 | L- 0.25; | L- 0.4; W- 0.14 | L- 0.3; W- 0.06 |
| powder | W- 0.02 | | W- 0.02 | | |

'mm'= millimetre

Transverse section of stem after staining with Phloroglucinol along with hydrochloric acid shows slightly lignified pericyclic fibers whereas it shows no mark changes in colour after staining with Ferric chloride (Table 1).

Organoleptic characters:

Powder of *Globba marantina* stem is creamish in colour, sweet and pungent in taste with no characteristic odour.

Powder microscopy:

Diagnostic character of *Globba marantina* stem powder shows oil globules, prismatic crystals, annular, spiral vessels, fragment of lignified fibers, brown content, oleoresin content, fragment of epidermal cell surface view, fragment of parenchyma cell filled with prismatic crystal, scleride, fragment of trichome etc (Plate 3, Fig 1-6).

Micrometric evaluation:

Micro measurements i.e. length and width of fiber, crystal, scleride, fragment of vessels and trichomes of stem has been taken into

consideration. Then mean value has been calculated and are depicted in table 2.

CONCLUSION

Globba marantina Linn. stem bears closed type of vascular bundle, prismatic crystals, oleoresin content, brown content etc. The results are being reported for the first time, could be useful in the easy microscopical identification of *Globba marantina* Linn. (Zingiberaceae) stem. The data produced in the present investigation may also be helpful in the preparation of the crude drug's monograph.

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