



A PHARMACOGNOSTIC EVALUATION ON MOORVA BHEDA (*DREGEA VOLUBILIS* (L.F.) BENTH. EX HOOK.F.)

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ABSTRACT

Herbal medicines are traditionally used for treatment of various illnesses. Hence, medicinal plants have been receiving great attention worldwide by the researchers because of their safe utility. The plant *Dregea volubilis* (syn. *Wattakaka volubilis*, *Marsdenia volubilis*) is considered as a source plant of the Ayurvedic drug *Moorva*, is a climbing shrub of the family Apocynaceae. Traditionally, the plant is useful in different conditions such as pain, cold, boils, abscesses etc. In different states of India it is used by folks as a successful remedy in eye diseases. The study comprises includes macroscopy and microscopic of leaf, petiole, stem and root of *D. volubilis* and powder microscopy of leaf powder. This helps in correct botanical identification and characterization of the drug *Dregea volubilis*. Study reveals, in leaf numerous prismatic, rosettes and cluster crystals, lower epidermis had two types of stomata (paracytic and anomocytic), but stomata was absent in upper epidermis. Stem contain patches of non lignified fibers in cortex and presence of rosettes and cluster crystals, where as root had bands of stones cells in the cortex.

Keywords: *Dregea volubilis*, Microscopy, Macroscopy, Powder microscopy

INTRODUCTION

The importance of medicinal plants in traditional health care practices, providing clues to new areas of drug research and biodiversity conservation is now well recognized. *Marsdenia tenacissima* (Roxb.) Moon. is the accepted source of *Moorva*¹ one of the most controversial drugs in Ayurveda with more than 7 plant species from different families being used as the source in different parts of the country². *Dregea volubilis* (L.f.) Benth. ex Hook.f. [Syn: *Marsdenia volubilis* (L.f.) Cooke., *Wattakaka volubilis* (L.f.) Stapf.] is also considered as a source plant of *Moorva*³. As a closest relative to the accepted source, *D. volubilis* has been less explored pharmacognostically. Hence in this study an attempt has been made to evaluate *D. volubilis* pharmacognostically with special reference to macroscopy, microscopy and powder microscopy. The plant *D. volubilis* is a large woody twining perennial shrub⁴ of the family Apocynaceae⁵ and with a watery sap. Opposite decussate phyllotaxy with leaves are cordate. Pale green flower in dense drooping umbels⁶ (Fig.1).

Distribution: It is found to be growing in high rainfall as well as in low rainfall regions. Common throughout the tropical part of India and Car-Nicobar ascending to an altitude of 1500 m⁷.

The curative properties of medicinal plants are mainly due to the presence of various complex chemical substances such as dregein glycoside and alkaloids⁸ of different composition which occur as secondary metabolites. The leaves of *D. volubilis* are used as an application in boils and abscesses to promote suppuration. Root paste is applied to snake bites and given to women to cure headache after child birth. It is emetic, diaphoretic and diuretic. Traditional healers in Kerala use its leaves to treat inflammatory and painful conditions. The plant is being used very specifically in the indigenous systems of medicine such as Ayurveda, Siddha and Unani⁹.

Synonyms: - *Marsdenia volubilis* (L.f.) Cooke., *Wattakaka volubilis* (L.f.) Stapf.⁵

Rajanighantu (Ayurvedic text) mentions different synonyms to this plant like *hema*, *hemavati*, *hemalatha*, *swarnika*, *swarnalatha*, *hemajivanti*, *swarnajivanti* (indicates that the plant has similarity with *jivanti* plant but it may be golden in colour)¹⁰.

Kingdom: Plantae

Sub family: Apocynoideae, Asclepiadoideae

Family: Apocynaceae

Order: Gentianales

Series: Bicarpellatae

Subclass: Gamopetalae

Class: Dicotyledons¹¹

Regional and Linguistic names⁷:-

San: *Madhumalathi*, *Hema Jeevanti*

Hindi: *Nakchhikni*

Bengali: *Titakunga*

Tamil: *Kodipalai*

Telugu: *Dudhipaala*

Malayalam: *Vattakakkodi*

MATERIALS AND METHODS

Fresh plant material of *D. volubilis* was collected from Udupi dist. (Karnataka, India). Efforts were made to collect the plants in flowering and fruiting conditions for the correct botanical identification. The plant material was identified by the taxonomist Prof. Radhakrishna Rao, A.L.N. Rao Memorial Ayurvedic medical college, Koppa, Karnataka, India and voucher specimen was placed in the department for future reference (Voucher Ref no. PGDG/VHM - 102).

Organoleptic evaluation:

The color, odor and taste of wet & dry specimen were recorded separately.

Microscopic evaluation:

Microscopic studies were done as follows. Surface preparation was done by placing wet leaf on the glass slid and tissues were scrapped off with the sharp edge off razor blade with utmost care. Water was slowly and continuously added and scraping was done till transparent and colourless

epidermis was exposed. Free hand transverse sections through midrib of leaves, transverse section of stem and root were taken for microscopic study. Following the micro techniques method based on macro and microscopic characters were studied^{12, 13, 14}.

Histochemical test:

Free hand sections of leaves were taken, cleared with chloral hydrate and then stained with Saffron to observe the lignified elements. Other reagents were also used separately to starch grains (IKI) crystals (HCl) etc. Glycerin was used for slide mounting¹².

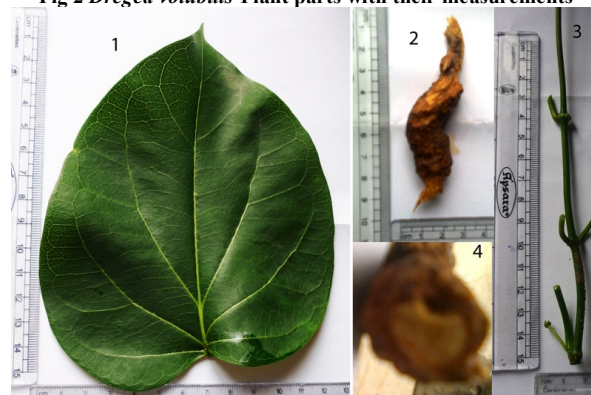
RESULTS AND DISCUSSION:

Results and discussion on Leaf and Petiole:

Macroscopic characters:

The leaves are simple, opposite, 15×13 cm broadly ovate or cordate, acuminate at apex and cordate or round at base, glabrous or more or less softly pubescent. The venation patterns of leaves are observed as camptodromous – brochidodromus. Reticulate veined, margin is entire, upper surface of leaves is dark green in colour and lower surface is light green in colour. Green coloured petioles with 3–5cm long. (Fig 1 & 2) Both had peculiar pungent smell and bitter in taste.

Fig 2 *Dregea volubilis*-Plant parts with their measurements



2.1 Leaf, 2.2 Root part, 2.3 Stem 2.4 Inner view of root

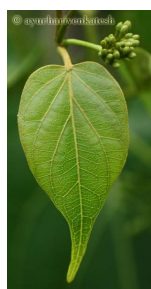
Microscopic characters:

In transverse section of the mid rib, lower and upper epidermis consists of thin walled compact oval to oblong cells which are covered with thin cuticle. Collenchymas cells are seen below the upper and above the lower epidermis, in lower around 6–7 layers of collenchymas cells were as in upper 2–4 layers were observed. The vascular bundle was bicollateral. Protoxylem facing towards the upper side. Remaining cells in midrib was filled with parenchymatous cells. Cluster crystals were seen at places in midrib. Mesophyll tissue has two types of cells just below the upper epidermis one-two layers of palisade parenchyma cells were seen which extends up to midrib below upper epidermis. Followed by spongy parenchymatous cells with ovate to oblong in shape which covers the rest of the portion of the lamina. Both epidermises were seen with uniseriate multicellular and glandular trichoms. Numerous prismatic, rosettes and cluster crystals were present in the mesophyll portion of the lamina. (Fig 3 & 4) Upper epidermis did not possess stomata whereas in lower epidermis two types of stomata which were paracytic and anomocytic were observed. (Fig 4)

Fig. 1 *Dregea volubilis*-Plant and its parts



1.1 Habitat

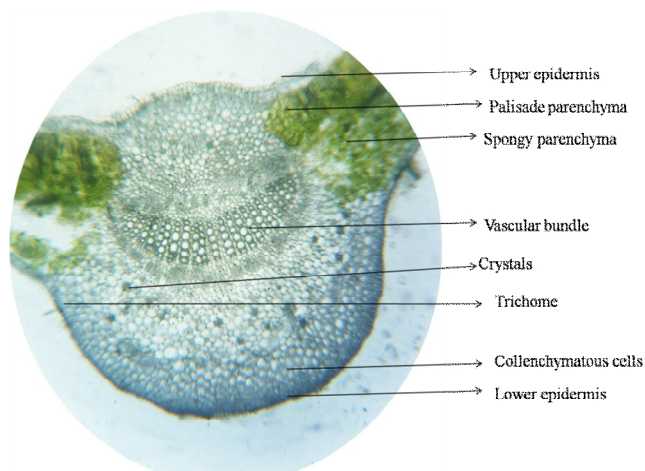


1.3 Leaf



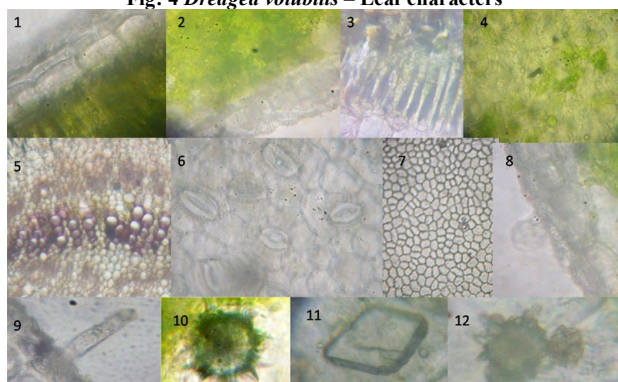
1.2 Flowers

Fig: 3 *Dregea volubilis*-T.S of Leaf



- Upper epidermis
- Palisade parenchyma
- Spongy parenchyma
- Vascular bundle
- Crystals
- Trichome
- Collenchymatous cells
- Lower epidermis

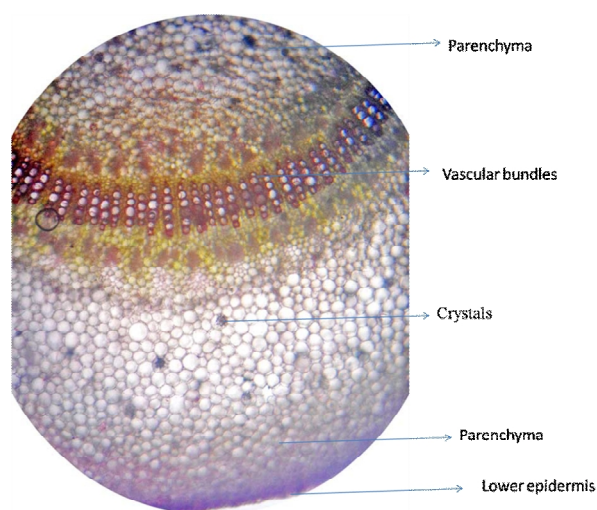
Fig: 4 *Dregea volubilis* – Leaf characters



4.1 Upper epidermis, 4.2 Lower epidermis, 4.3 Palisade parenchyma, 4.4 Spongy parenchyma, 4.5 Vascular bundle, 4.6 Lower epidermis in surface view, 4.7 Lower epidermal in surface view, 4.8 Glandular trachoma, 4.9 Unicellular trichome, 4.10 Rosette crystal, 4.11 Prismatic crystal, 4.12 Cluster crystal.

Transverse section of the petiole showed similar structure of petiole except presence of small and separate bands of vascular bundles. Near both the edges of bicollateral vascular bundle, tannin, rosette and cluster crystals were observed. (Fig 5)

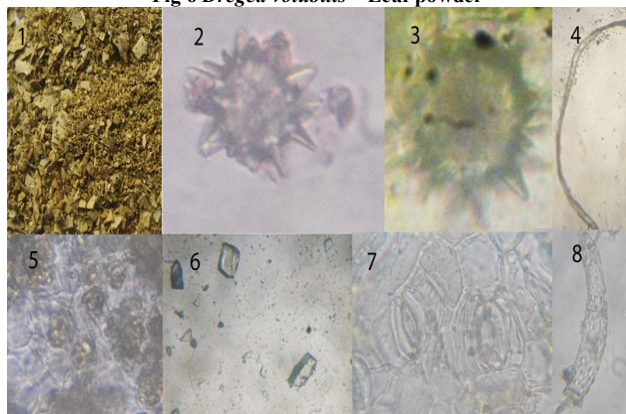
Fig 5 *Dregea volubilis* – T S of petiole



Powder microscopy of Leaf:

The powder microscopy possesses presents of cluster, rosette & prismatic crystal of calcium oxalate, simple fibers, trichome, tannin and scalariform & spiral vessels. (Fig 6)

Fig 6 *Dregea volubilis* – Leaf powder



6.1 Powder of leaf, 6.2 Cluster crystal, 6.3 Rosette crystals, 6.4 Simple fiber, 6.5 Spongy parenchyma 6.6 Prismatic crystal, 6.7 Stomata, 6.8 Trichome

Results and discussion on Stem:

Macroscopic characters:

Stems are woody, much branched; 11M high and 95 Cm girth with densely lenticellate and pustular branches. Older branches ash-coloured, very long, glabrous often with lenticels and sometimes with black dots, young branches were green and slender. Latex was colourless and watery. Odour was characteristic and taste is bitter. (Fig 2.3)

Microscopic characters:

The outline of the transverse section of stem was almost circular. The outermost layer showed single row of epidermal cells. A distinct endodermis with casparian strips was absent. Pericycles were represented in the inner region of the cortex by scattered groups of thick walled lignified fibers in circular manner. Intraxylary phloem present at the periphery of the pith, in the form of separate strands. Medullary rays were uniseriate or biseriate. Cortex and pith were occupied by many rosette, cluster crystals and tannin. (Fig 7 & 8)

Fig 7 *Dregea volubilis* – T S of Stem

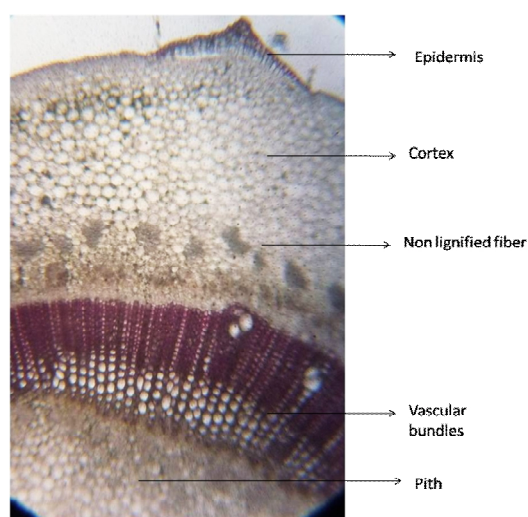
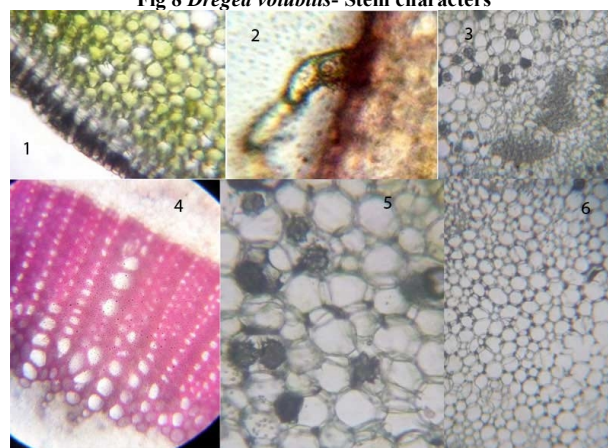


Fig 8 *Dregea volubilis*- Stem characters



8.1 Epidermis, 8.2 Trichome, 8.3 None lignified fibers, 8.4 Vascular bundles, 8.5 Crystals 8.6 Pith

Results and discussion on root:

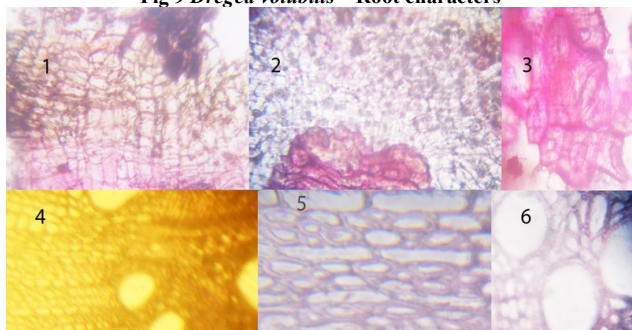
Macroscopic characters:

Strong stout root, with almost round in shape; its size is 8cm×2cm×2cm in length, breadth and circumference. Outer surface was rough, dark brown color and with traverse wrinkles. Internally creamish yellow in color. Fracture is fibrous, odor nil and rough texture. (Fig 2)

Microscopic characters

Transverse section of root showed cork and cortex region by an endodermic layer. Cork possessed 5–15 layers of thick walled rectangular cells (Fig 9.1). Followed by the cortex, it contained thin walled parenchymatous cells; in inner cortex region 5–7 layers of stone cells in circular manner were observed. Both cork and cortex was rich with cluster, rosette & prismatic crystals. Compared to cork, cortex had more crystals. Single layer of Endodermis was present between the cortex and stellar region. In stellar region, Scattered Vascular bundles were observed (Fig 9.4). Uniserated Medullary rays (Fig 9.5) and root was devoid of pith. Simple starch grains were seen in section.

Fig 9 *Dregea volubilis* – Root characters



9.1Cork, 9.2 Cortex 9.3 Stone cells, 9.4 Vascular bundles, 9.5 Medullary rays, 9.6 Xylem vessels

CONCLUSION

Identification and authentication of raw material is the major problem in the herbal pharmaceutical industry¹⁵. *D. volubilis* is not only a substitute to Moorva but is also a potential drug commonly used in Folklore therapeutics. In

the present investigation, a detailed pharmacognostic account of *D. volubilis* which includes macroscopic and microscopic characters has been reported, which will be support for the correct botanical identification of the drug and helps to maintain the genuinity of the plant material used in the Ayurvedic Pharmaceutical Industry.

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