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Anatomical Studies on the Root of *Hemidesmus Indicus* (L.) R.Br.(Asclepiadaceae)

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Abstract

Hemidesmus indicus, commonly known as Indian Sarsaparilla vernacular name being *Sweta Sariva* a plant known for Dahaprasamana (alleviates burning sensations), Deepana (appetizing) and Raktashodaka (blood purifying) properties. Root is the official part of *Sweta Sariva*. It is very popular in Kerala as a medicine and as a health drink. A survey of commercial samples of India reveals that at present root and root-stalk of five different botanically identified plants from dissimilar families are being sold as Sariva. This study on the anatomical and powder characters of *Sweta Sariva* was done so that one can easily identify from its adulterants. The genuine *Hemidesmus indicus* roots are very slender with a diameter less than 1cm and they possess a characteristic pleasant smell with a sweetish taste. In the transverse section there are plenty of starch grains, prismatic crystals of calcium oxalate crystals and lactiferous ducts are seen in the cortex portion which forms the major identifying features. Three types of vessels are found in the powder microscopy.

Keywords: *Hemidesmus indicus*, Sariva, Anatomy, Pharmacognosy, Powder Microscopy

Introduction

Earlier systems of medicine are prominent in India and medicinal plants form the backbone of traditional systems of medicine. A number of tribal communities still use folklore medicinal plants for the cure of various diseases. The interest in the use of medicinal plants has led to intensified efforts on the documentation of ethnomedical data of medicinal plants [1]. Contemporary science has acknowledged their active action, and it has included in modern pharmacotherapy a range of drugs of plant origin, known by ancient civilizations and used throughout the millennia.[2] The knowledge of the development of ideas related to the usage of medicinal plants as well as the evolution of awareness has increased the ability of pharmacists and physicians to respond to the challenges that have emerged with the spreading of professional services in facilitation of man's life.

Materials And Methods

i) Collection of specimens

The plant specimen for the proposed study was collected from Guru Nanak College campus, Tamil Nadu, India during the month of September authenticated and herbarium specimen maintained as voucher number. GNC PBPBT-112, Reader, Presidency College, Chennai. Care was taken to select healthy plants and normal organs.

ii) Pharmacognostical evaluation

This evaluation consists of two phases:

- a. Macroscopic evaluation.
- b. microscopic evaluation [3, 4 and 5].

a) Macroscopic Evaluation

The samples were subjected to macroscopic, evaluation by observation with naked eyes, by tactile and other sensory inspection. A magnifying lens with a dissecting microscope was used for a better evaluation of surface characters.

b) Microscopic Evaluation

Microscopic evaluation will be carried out in two phases: Histological evaluation Powder microscopy. The root stock was cut and removed from the plant and fixed in FAA (4% Formalin Acetic Acid). Hand sections were taken.

Photomicrographs: Microscopic description soft issues are supplemented with micrographs wherever necessary. Photographs of different magnifications were taken with Nikon Lab Photo 2 microscopic unit. [6 and 7]

a) Phytochemical Evaluation

The plant aqueous extract was used for preliminary screening of phytochemicals such as alkaloids, tannins, flavonoids, proteins, saponins, carbohydrates, terpenoid, steroid. The screening was done as per the standard method [8].

b) Determination of total ash

Incinerate about 2-3 g accurately weighed, of the ground drug in a tared platinum or silica dish at a temperature not exceeding 4500c until free form carbon, cool and weigh. If a carbon free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on an ashless filter paper, incinerate the residue and filter paper, add the filtrate, evaporate to dryness, and ignite at a temperature not exceeding 4500. Calculate the percentage of ash with reference to the air-dried drug



Results

a. Macroscopic evaluation of the *Hemidesmus indicus* observed in the sample are tabulated below. [Table 1]

Table 1: Organoleptic Characters of The Experimental Plant

S. No.	Character	evaluation
1	Shape	Cylindrical
2	Size	20-30 cm in length, less than 1cm diameter
3	External colour	Dark Brown
4	Internal colour	Pale yellow
5	External surface	Marked with cracks and fissures bark thin easily detachable from the hard central core
6	Fracture	Short at the periphery and fibrous at the centre
7	Texture	Hard
8	Odour	Characteristic pleasant aroma
9	Taste	Sweetish, bitter

Roots fragmented, woody, slender, brown, thick and hard, rigid, elongated, cylindrical with rough and wavy outer surface, externally dark tortuous with transversely cracked and longitudinally fissured bark portion and internally yellowish brown, rootlets thin and wiry; cork is thin, separates easily and peels off in flakes; root fragment is 1.0cm to 2.0cm in diameter; central core solid, 0.4cm to 0.9cm in diameter and outer surrounding cylindrical portion is 0.4 to 0.6 in breadth; length of fragment of root varies from 1.5 to 3.2 cm; fracture short, splintery; taste is sweetish, astringent or acid; odour agreeable, very aromatic, slightly acidic, emitting a sweet scent reminiscent of a combination of vanilla, cinnamon and almonds.

b. microscopic evaluation of the *Hemidesmus indicus* observed in the sample are tabulated below. [Table 2]

Table 2: Microscopical/ Histological Characters of The Experimental Plant

S. No.	Character	Evaluation
	Periderm	Phellem Reddish brown coloured rectangular cells 3-6 layered Phellogen Colourless, compressed rectangular cells 1-2 rows



		Phelloderm colourless, rectangular cells 4-6 rows
	Cortex	Starch grains cortical cells with large sized starch grains Laticiferous ducts Scattered Calcium oxalate crystals Prismatic crystals
	Stele	Xylem Vessels vary in size spiral reticulate annular thickening Phloem 1-3 layered Alternate with uni-seriate medullary rays Cambium 1-2 layered Medullary rays uniseriate medullary rays, sometimes biseriate Cells are smaller than xylem parenchyma Rich in protoplasmic contents
	Pith	Absent

Table 3: evaluation of The Powder Characteristics

S.No.	Character	Evaluation
1	Crystals	Prismatic crystals of various sizes
2	Starch grains	Round or oval occur singly, dyad, triad or in groups
3	Parenchyma	square to rectangular
4	Resin	Reddish brown
5	Fibre	Long and small fibres Wiry fibres also seen

c. Phytochemical evaluation of the *Hemidesmus indicus* observed in the sample are tabulated below. [Table 4]

Table 4: Phytochemical Analysis of the Experimental plant

S. No.	Character	evaluation
1	Alkaloids (Dragendorff's Test)	+
2	Flavonoids (Lead acetate test)	+
3	Tannin	+
4	Terpenoids (L.B. test)	-
5	Steroids (L.B. test)	-
6	Carbohydrates (Molisch's test)	-
7	Poly phenols	+
8	Reducing Sugar (Benedict's test)	+



9	Glycosides	+
10	Saponins (Foam test)	+

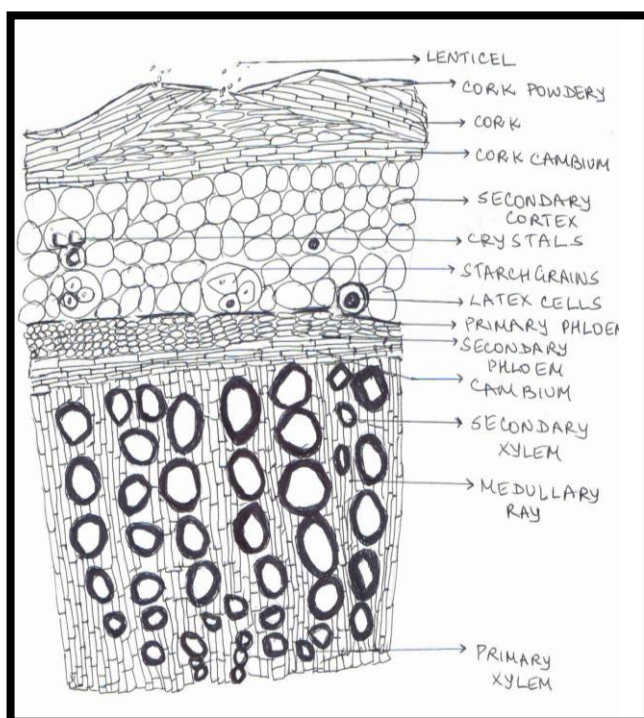
d) The Total cash value for the root of *Hemidesmus* not more than 3.8%

Images of Histological Evaluation of *Hemidesmus Indicus* Root

A) Habit of The Experimental Plant

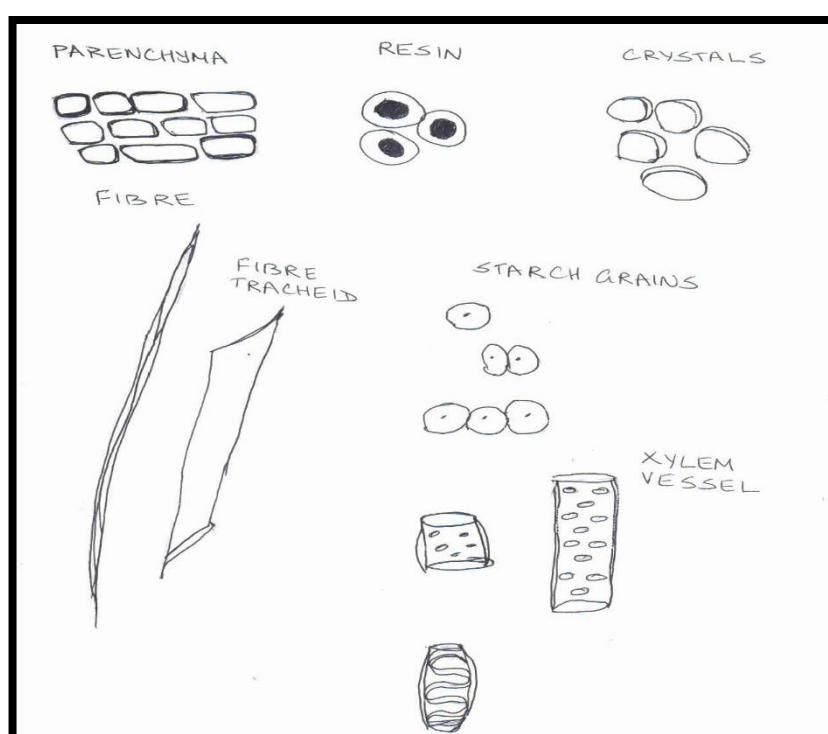


B) Anatomical Features of *Hemidesmus Indicus* Root



Transverse section of roots shows 3-15 layered cork (thick-walled reddish brown), 2-3 rows of colourless phellogen, 1-2 rows of narrow thin-walled cells phelloderm, 2-3 layered thick-walled polygonal parenchymatous cells with starch grains, prisms of calcium oxalate crystals. Cortex – Wide, contains thin walled, large tangentially elongated cells contains simple and compound starch grains, prisms of calcium oxalate. Phloem – Narrow, with sieve tubes, phloem parenchyma, companion cells and uniseriate medullary rays. Cambium – Narrow, distinct. Xylem Vessels - Scattered with pitted walls, tracheids, thick-walled fibres with uniseriate medullary rays.

B) Powder Microscopy of *Hemidesmus Indicus* root



The fine powder of root has the following characteristic features. Presence of thick lignified walled stone cells are with prominent pit canals in various shapes and sizes (oval, semi-circular, rectangular, triangular, long tracheid like), single and in compound form (sometimes 2 semi-circular stone cells are attached together); flattened, angular to semi rectangular, lignified walled cork cells; laticiferous ducts are unique. Fibre unicellular, aseptate, long, wavy fibres with undulated inner wall; numerous prismatic crystals of Ca-oxalate having different shapes (rectangular, triangular, irregular); abundant starch grains, simple, compound by 3 to 4 components with central hilum; groups of pitted and spiral xylem vessels, sometimes

attached with fibre; two types of parenchymatous cells viz. large squarish to rectangular to polygonal reddish brown cells in group with striated thick wall and cell contents inside and round to oval cells with cell contents inside; groups of light brownish polygonal, angular opaque cells; very few long, lignified tracheid fibres present with present serreted inner wall; few groups of xylem parenchyma with cell contents.

Conclusion

The macroscopical and histological characters of *Hemidesmus indicus* obtained were matching with the available standards mentioned in API. Powder characters are not available in the API. So, these powder character scan be used to test the genuineness of the market sample

REFERENCES

1. George S, Tushar K, Urmikrishnan K, Hashim K, Balachandran I. *Hemidesmus indicus* (L.) R. Br. A Review. *Journal of Plant Sciences*. 2008;3(2):146-56.
2. Anonymous. *Ayurvedic Pharmacopoeia of India-Part 11-Vol 1*. New Delhi: The controller of Publications; 2011. p. 184-6.
3. Anonymous. *Indian Medicinal Plants a compendium of 500 species*. Kottakkal: Universities Press; 2010. p. 141
4. Anonymous. *The Wealth of India. Raw materials, Vol. III, chapter-V and X*, CSIR: New Delhi, India, (1997)
5. Satheesh George, KV Tushar, KP Unnikrishnan, KM Hashim, I Balachandran. *Hemidesmus indicus* (L.) R. Br. A Review, *Journal of Plant Sciences*, 2008, 3, 146-156
6. Vaidya K, Kulkarni PH. A study of an Ayurvedic formula viz "Jivak", Vol 7, *Deerghaya International*, 1991, 20
7. Nadkarni AN. *Indian material medica*. Edn 1, Vol. 1, Popular Book Depot, Bombay, India, 1989, 619
8. J.B. Harborne *Phytochemical Methods A guide to modern techniques of plant analysis*. 1998 CHAPMAN & HALL London Weinheim

