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Pharmacognostical study of *Ipomoea Digitata* Linn. Roots

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ABSTRACT

Ipomoea digitata Linn. of family convolvulaceae with the synonym elephant potato and commonly known as Bilaikand (Hindi) is an extensive perennial climber, with large ovoid or elongated tuberous roots. Root part of the plant used to cure various aliments by the locals and tribes in different part of India. Pharmacognostical studies (microscopical studies in the transverse section, proximate analysis and phytochemical investigations) are carried out to facilitate proper identification and standardisation of the crude drug.

Keywords: Pharmacognostical study, *Ipomoea digitata*, Root.

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INTRODUCTION

Ipomoea digitata Linn. grows as a vine, distributed from Assam, Bihar, Orissa, Bengal to Ceylon in moist areas, monsoon forests and coastal tracts [(1)].

Leaves are large, palmately 5-7 lobed, lobes lanceolate, 10-15 cm long, often broader than its length, acute or acuminate apex, glabrous, entire, pale coloured with prominent nerves beneath; petioles 5 to 12.5 cm long, glabrous. Stems are long, thick, twining, tough, and glabrous. Roots are tuberous; tubers are large, ovoid or elongated. Flowers are corymbosely paniculate cymes; peduncles solitary, auxiliary sometimes exceeding 5 cm long, stout, bracts minute and deciduous; pedicels 6mm long; sepals 6- 8mm long, orbicular oblong, sub-obtuse, concave, glabrous; corolla purple, 3.8- 6.3cm long; ovary 4 celled, complete and glabrous; capsules ovoid, 8-13 mm long, 4-celled, 4-valved, surrounded by the enlarged rather fleshy sepals; seeds: four, black, wooly, clothed with brownish detachable hairs, nearly 6 mm long [(2)].

It has been reported that powdered roots are given internaly in diseases of spleen and liver. Ethanolic extract of the root posses pronounced hepato protective activity [(3)]. The root is aphrodisiac, diuretic, carminative, expectorant, anthelmintic, stomachic, appetizer; useful in leprosy, syphilis, gonorrhea, and inflammations [(4, 5)].

Microscopical, morphological, physical, chemical and biological parameters play important role in the identification, standardization and quality evaluation of herbal drugs and their products. The true source of crude drugs can be located only after detailed pharmacognostic and chemical studies. In view of these, pharmacognostic studies and phytochemical analysis was carried out, which can serve as a tool in the proper identification of the plant.

MATERIALS AND METHOD

The roots and tubers of *Ipomoea digitata* Linn. were collected during the month of September from the forest of Tikabali in Phulbani district of Odisha, India, washed thoroughly and dried in shade condition. The specimens of plant materials collected as per the above description were identified by Professor P. Jayaraman, Director, National Institute of Herbal Science (Plant Anatomy Research Centre), Chennai.

After collection, the plant materials were thoroughly washed with water to remove adhering debris followed by rinsing with distilled water. The samples were fixed for 24 hours in FAA (Formalin-5ml + Acetic acid + 70% Ethyl alcohol-90ml) and de-hydrated with graded series of tertiary-butyl alcohol [(6)]. The specimens were cast into paraffin blocks. The paraffin embedded specimens were cut into thin sections with the help of Rotary Microtome. The thickness of the

sections cut, were 10-12µm. After de-waxing sections were stained with toluidine blue. The dye rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to violet to the mucilage and blue to the protein bodies [7]. Where ever necessary sections were also stained with safranin and fast-green [8].

Different cell components were studied and measured. Microscopic descriptions of tissues are supplemented with micrographs wherever necessary. For normal observations bright field was used. For the study of crystals, starch grains and lignified cells polarized light was employed. Magnifications of the figures are indicated by the scale bars.

Proximate Analysis [9]

The powdered samples were subjected for determination of their physical parameters like moisture content, total ash content, acid insoluble ash, water soluble ash, alcohol soluble extractive value and water soluble extractive value. The results obtained from the proximate analysis for the samples are mentioned in the table 1.

Preliminary Phytochemical Screening [10]

The coarse powder of the roots was successively extracted with petroleum ether, benzene, chloroform, acetone, ethanol and water by soxhlet extractor for 24 hours at each stage. After each solvent extraction, the resulting extracts were concentrated under vacuum. Yield of extracts with respect to the air dried material; colour and consistency of extracts are reported in table 2.

The individual extracts after successive solvent extraction was then subjected to qualitative chemical examination to find out the presence of various phytoconstituent. The results of preliminary phytochemical analysis for the extracts of roots, are given in table 3.

RESULTS AND DISCUSSION

Macroscopical and Organoleptical Analysis

Colour, odour and taste of the dried roots were observed as pale brown, odourless and taste less respectively. Diameters of the collected roots were measured to 2-3 cm; fracture of dried roots is fibrous (Photograph 1).

Photograph 1: Photograph showing roots with tubers of *Ipomoea digitata*.

Microscopical Analysis

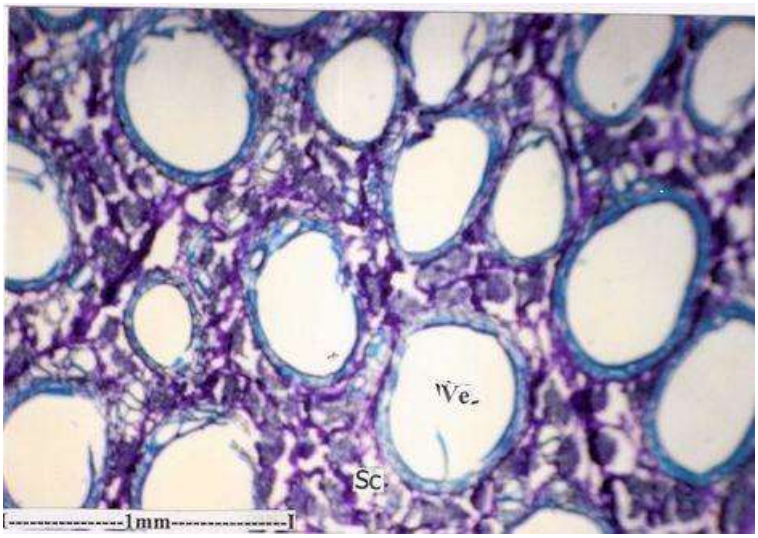
The root is either excentric or concentric in cross sectional view, with primary xylem core being seen towards side (photograph 2) or towards the centre respectively. The root has uniformly thick and continuous periderm, narrow cortex bounded internally by a thick continuous sclerotic layer, wide secondary phloem and central core of mixed secondary xylem.

There are about 6 primary xylem strands which are short and spindle shaped and are arranged in a ring around a narrow central pith (photograph 4 and 6). The primary xylem elements are narrow, angular and thick walled.

Photograph 2: T.S. of Root: Ground plan.

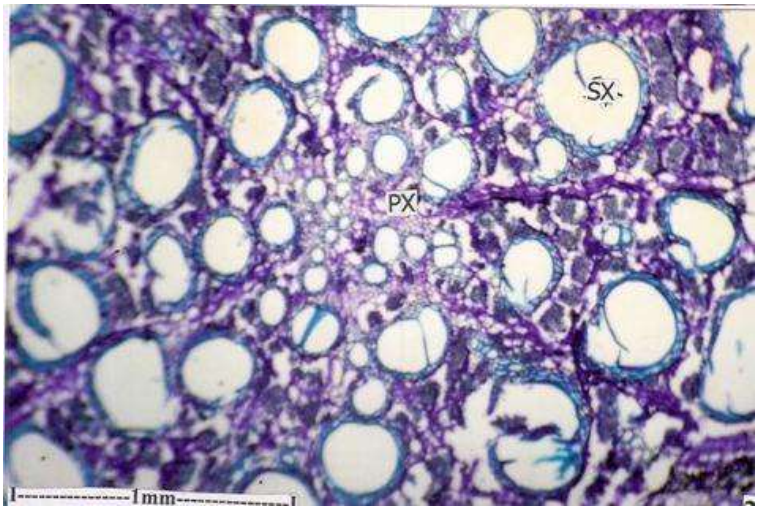
[Co: Cortex; Pe: Periderm; PX: primary xylem core; SC: Sclerenchyma cylinder; SPh: Secondary phloem; SX: Secondary xylem; Ve: Vessel]

Secondary xylem is a compound tissue. It consists of scattered masses of gelatinous fibres, wide thin walled, angular or circular solitary vessels which are diffused in distribution. The vessels are surrounded by two to five layers of fibers which have lignified walls (photograph. 7 and 9). The vessels are 200-450 µm in diameter.



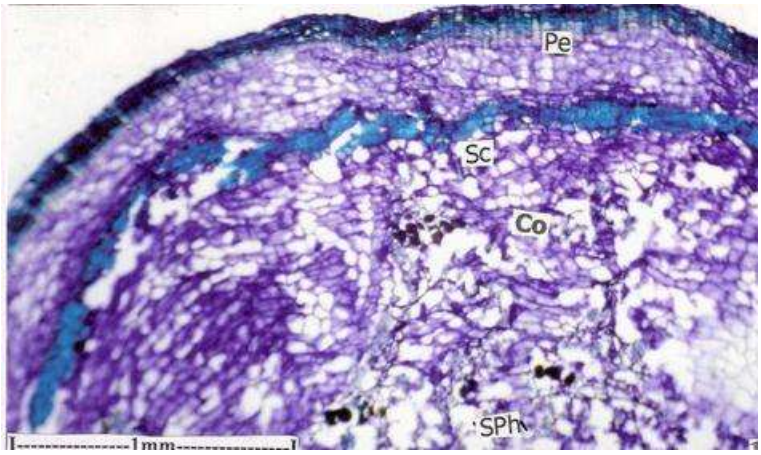
Photograph 3: T.S. of primary xylem and secondary portions- secondary xylem.

[Ve: Vessel]



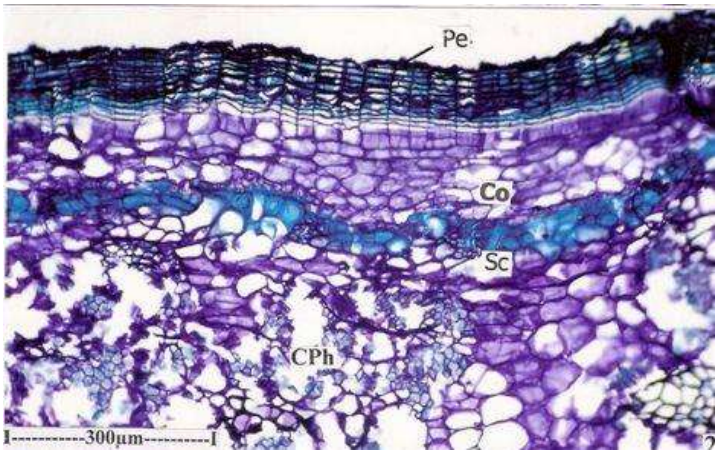
Photograph 4: T.S. of primary xylem and secondary portions- primary xylem.

[PX: Primary xylem; SX: Secondary xylem].

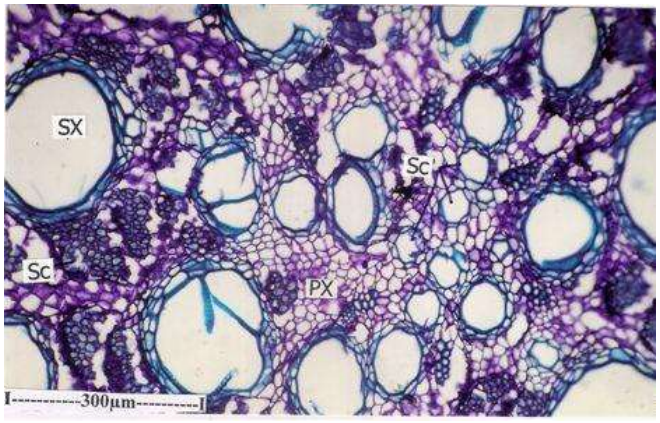


Photograph 5: Cortical portion and central portion enlarged-periderm, cortex and secondary phloem.

[Co: Cortex; Pe: Periderm; Sc: sclerenchyma cylinder; SPh: Secondary phloem.

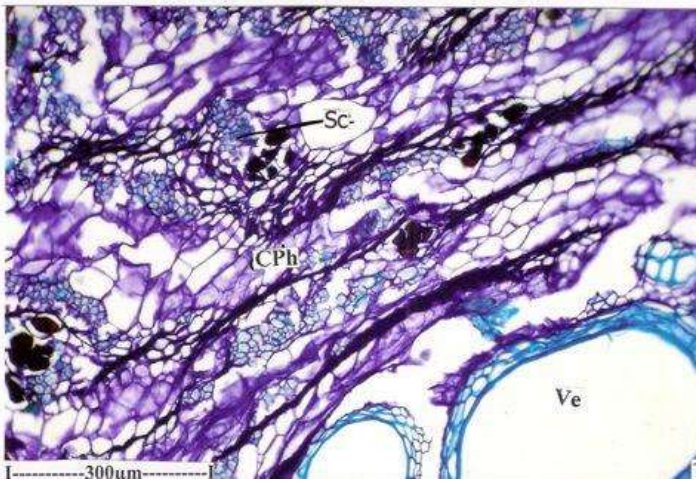


Photograph 6: Cortical portion and central portion enlarged- primary xylem strands. [Co: Cortex; CPh; Collapsed phloem; Pe: Periderm; Sc: sclerenchyma cylinder].

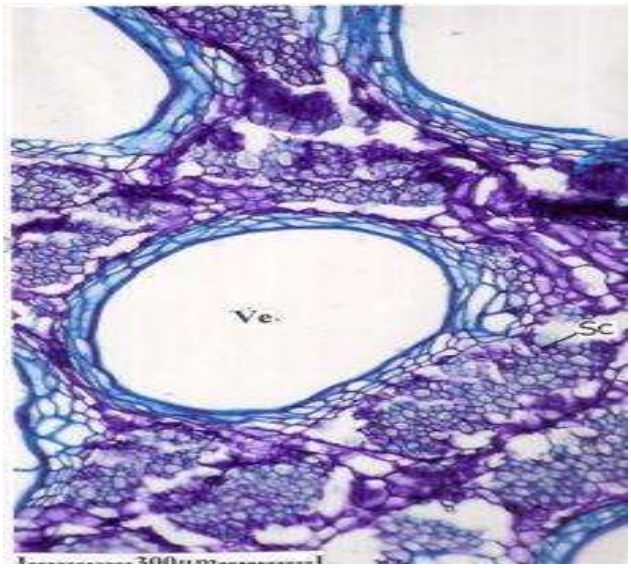


Photograph 7: Cortical portion and central portion enlarged- primary xylem strands.

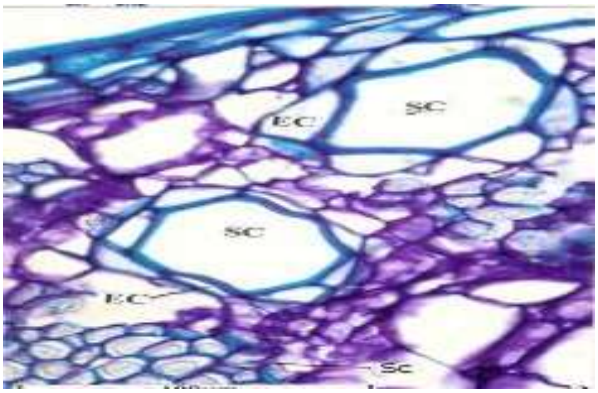
[SC: Secretory canal; SX: Secondary xylem].



Photograph 8: Secondary phloem, secondary xylem and secretory canal- xylem vessel and sclerenchyma. [CPh; Collapsed phloem; Sc: Sclerenchyma mass; Ve: Vessel].

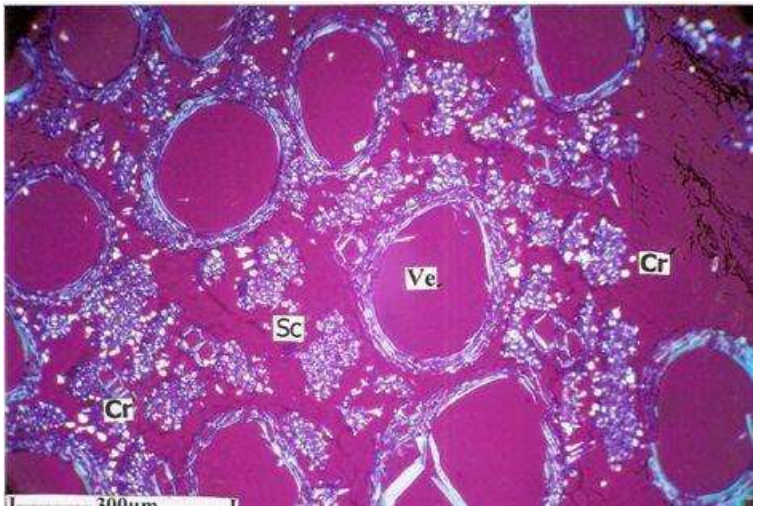


Photograph 9: Secondary phloem, secondary xylem and secretory canal- xylem vessel and sclerenchyma. [Ve: Vessel]

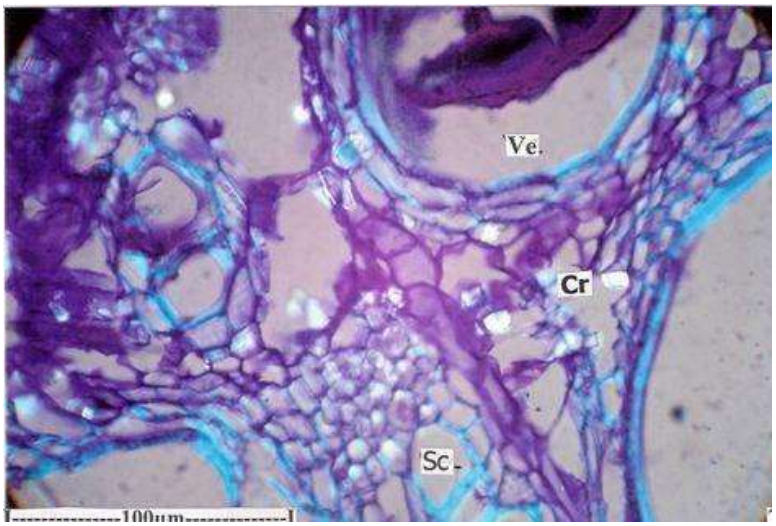


Photograph 10: Secretory canal.

[Sc: Sclerenchyma mass; SC: Secretory canal; EC: Epithelial cells.]



Photograph 11: Crystal distribution as seen under polarized light microscope; crystals in the ground parenchyma cells. [Cr: Crystals; Sc: Sclerenchyma cells; Ve: Vessel]



Photograph 12: Crystal distribution as seen under polarized light microscope; crystals of prismatic type enlarged. [Cr: Crystals; Sc: Sclerenchyma cells; Ve: Vessel]

Secondary phloem is wide and continuous around the xylem cylinder. The outer old phloem is crushed and compressed into successive dark bands (photograph. 8). In between the crushed bands of phloem, are tangential blocks of gelatinous fibres.

Secretory canals (photograph 10) are scattered in the ground parenchyma which are numerous, wide, angular or circular. The canals are 50 µm wide and surrounded by large, 6-8 epithelial cells. The epithelial cells are 10-15 µm thick.

Periderm is superficial and uniform in thickness. It is smooth and even along the surface. It consists of 10-12 layers of tubular cells of phloem. Phelloderm is narrow and 2 or 3 layered. Cortex is

narrow and consists of four or five layers of parenchymatous cells. Cortical sclerenchyma cylinder is thin comprising of branchy sclereids.

Calcium oxalate crystals are fairly abundant in the ground parenchyma. They are prismatic type and are diffuse in distribution (photograph. 11 and 12). The crystals are 5 µm wide and 7-10 µm long.

Proximate Analysis

Results of proximate analysis is given in the table number 1.

Table 1: Proximate Analysis Report (% W/W).

Determinations	***Ipomoea digitata* Root**
Moisture content	43.5
Ash value	14.6
Acid insoluble ash	18.2
Water soluble ash	13.4
Water soluble extractives	4.6
Alcohol soluble extractives	7.1

Preliminary Phytochemical Screening

Percentage of yield and characters of various extract are mentioned in table number 2. Table number 3 denotes the results of preliminary phytochemical screening.

Table 2: Extractive Value (% W/W)

Extracts	**Percentage of extractives**	**Colour and Consistency of the Extracts (Under Day Light)**
Petroleum ether Extract	2.33	Yellow and sticky
Benzene Extract	1.69	Pale yellow and sticky
Chloroform Extract	7.12	Dull green and semisolid
Acetone Extract	8.67	Dull green and sticky
Ethanol Extract	14.16	Dull green and solid
Chloroform Water Extract	14.31	Dull green and solid

Table 3: Phytoconstituents detected by qualitative tests of different extracts

Sl. No.	**Constituents and Their Respective Tests**	**Extracts**					
		PEE	BE	CE	ACE	ETE	AQE
1.	Carbohydrates	-	-	-	-	+	+
2.	Glycosides	-	-	-	-	-	-
3.	Proteins and aminoacids	-	-	-	-	+	+
4.	Fixed oils and fats	+	+	-	-	-	-
5.	Alkaloids	-	-	-	-	-	-
6.	Saponins	-	-	-	-	+	+
7.	Flavonoids	-	-	+	+	+	+
8.	Phytosterols	+	-	-	-	-	-
9.	Phenolic compounds and tannins	-	-	-	+	+	+
10.	Gums and mucilages	-	-	-	-	+	+

(+) Sign indicates phytoconstituent present, (-) Sign indicates Phytoconstituent absent

[PEE : Petroleum Ether Extract, BE : Benzene Extract, CE: Chloroform Extract, ACE: Acetone Extract, ETE: Ethanolic Extract, AQE: Aqueous Extract.].

REFERENCES

1. Government of India. Council of Scientific and Industrial Research. Wealth of India, Vol. V. The Controller of Publications, New Delhi: 1959: 24.
2. Hooker JD. The Flora of British India, Vol. IV, Kent: The Oast House; 1985: 202.
3. Padhy IP, Choudhury NSK, Dash SK, Padhy SK. Hepatoprotective Activity of *Ipomoea Digitata* Linn. Roots against Carbon Tetrachloride Induced Hepatotoxicity. Int. J. Ph. Col. and Bio. Sci 2008; 2: 135-137.
4. Kirtikar KR, Basu BD. Indian Medicinal Plants, Vol.-III, Allahabad: Lalit Mohan Basu; 1933: 1719.
5. Ramachandran K, Kashyp K, Chand R, Ambasta SP. The Useful Plants of India, New Delhi, Publications and Information Directorate, CSIR; 1986: 196.
6. Sass JE. Elements of Botanical Microtechnique, New York: McGraw Hill Book Co; 1940: 124.
7. Johansen DA. Plant Microtechnique. New York: McGraw Hill Book Co; 1940: 134.
8. O'Brien TP, Feder N, Mc Cull ME. Polychromatic Staining of Plant Cell Walls by Toluidine Blue. O Protoplasma 1964; 59: 364.
9. Government of India. Ministry of Health and Family Welfare. Indian Pharmacopoeia Vol. I & II. The Controller of Publication, New Delhi; 1985: 478.
10. Kokate CK. Practical Pharmacognosy. 4th ed, New Delhi: Vallabh Prakashan; 1994: 124.