

## **Pharmacognostical characterization and standardization of *Abutilon indicum* bark, Linn.**

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### **ABSTRACT**

*Abutilon indicum* is an important medicinal plant belonging to family malvaceae. The plant has medicinal property like aphrodisiac, laxative, diuretic, sedative, expectorant and demulcent. The present study provides botanical, physico-chemical and preliminary phytochemical details, which helpful in laying down standardization and pharmacopoeial parameters. The microscopical characters of the bark showed biseriate medullary ray, prism shaped calcium oxalate crystals and bundles of phloem fibres. The important parameters studied other than macro and microscopical are measurement of length of fibre, diameter of starch grain, histochemical studies, ash analysis, total extractive values, moisture content, behavior of powder with different chemical reagent & fluorescence analysis. Qualitative phytochemical screening of hydroalcoholic extract showed the presence of carbohydrate, steroid, glycoside flavonoid, alkaloid and phenolic compound.

**Key words:** *Abutilon indicum*, macro and microscopical character, physico-chemical parameter, fluorescence analysis & phytochemical screening.

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### **INTRODUCTION**

*Abutilon indicum* (malvaceae) is found throughout tropical India and Ceylon. Leaves contain mucilage, tannin, organic acids, traces of asparagin and ash, containing alkaline sulphates, chlorides, magnesium, phosphate and calcium carbonate. Roots also contain asparagin. Leaves are demulcent, aphrodisiac, laxative, diuretic, pulmonary, sedative and expectorant. Mucilage yielded by leaves is diuretic and demulcent. Infusion of leaves or roots are prescribed as a diuretic and demulcent in fevers, chest affections, gonorrhoea and urethritis. Decotion of leaves is used as an eye-wash, mouth-wash in toothache, in cases of tender gums, in gonorrhoea and internally for stone in the bladder. Flowers and leaves are a local application to boils and ulcers. Decotion of leaves is useful as a fomentation to painful parts. Seeds are used in decotion in piles and coughs. Infusion of roots is used in relieving strangury and haematuria. It is also useful in leprosy [1]. Establishment of the pharmacognostic profile of the bark of *Abutilon indicum* Linn. will be helpful in laying standardization and pharmacopoeial standards, which can guarantee quality, purity and identification of sample.

## MATERIALS AND METHODS

The bark material was collected from Barpali, Bargarh, Odisha, in the month of February. For microscopical studies free hand sections of fresh barks were cut, cleared with chloral hydrate solution and water, stained with safranin according to the prescribed methods [2]. A drop of HCL and phloroglucinol was used to detect the lignified cells in the powder drug [3]. Photomicrographs were taken by Sony digital camera. Powder of the dried bark was used for chemical analysis. Histochemical study [4], measurement of diameter of starch grains and width of phloem fibre [5], physico-chemical studies and preliminary phytochemical screening of the drug [6], behavior of powder drug towards different chemical reagent [7], fluorescence behavior of the powder drug in different solutions towards the ordinary and ultraviolet light [8], preliminary phytochemical screening of the extract were carried out [9].

## RESULTS AND DISCUSSION

### Pharmacognostic study

#### Macroscopical character

The sample of *Abutilon indicum* was collected and cut into pieces of 2-3 cm long, 1 cm broad. The outer surface is brownish grey in colour and inner surface is smooth, light yellow coloured. The test is bitter and odour is characteristic (Table-1).

Table-1

Organoleptic characters	
Colour	Brownish grey
Odour	Characteristic
Taste	Bitter
Texture	Rough
Length of fibre	345.02 $\mu$
Diameter of starch grain	32.42 $\mu$

#### Microscopical character

##### Transverse section of bark (Fig-1a,b)

Epidermis- It is single layered having rectangular cells. The epidermis is covered with thick & smooth cuticles.

Cork- The cork contains seven to nine layers of parenchymatous cells. The outermost and inner layers are reddish brown colour and colourless respectively.

Phelloderm- This layer contains one to three layers of radially arranged parenchymatous cells.

Phloem fibre- The bark contains thick walled phloem fibres which are arranged in bundles of 15-18 fibres. The cellulose and lignin present in outer and inner part of each fibres. Each bundle is surrounded by parenchymatous sheath.

Phloem parenchyma- These are thin walled parenchymatous cells.

Medullary rays- Medullary rays are biseriate in nature having parenchymatous cells. Prism of calcium oxalate crystals are present abundantly.

Cambium- Cambium strip have 12-14 layers of thin parenchymatous cells.

Xylem vessels- 70-180 $\mu$  in diameter with thick, pitted or reticulatly thickened walls lignified.

Xylem fibre- Xylem fibres are lignified.

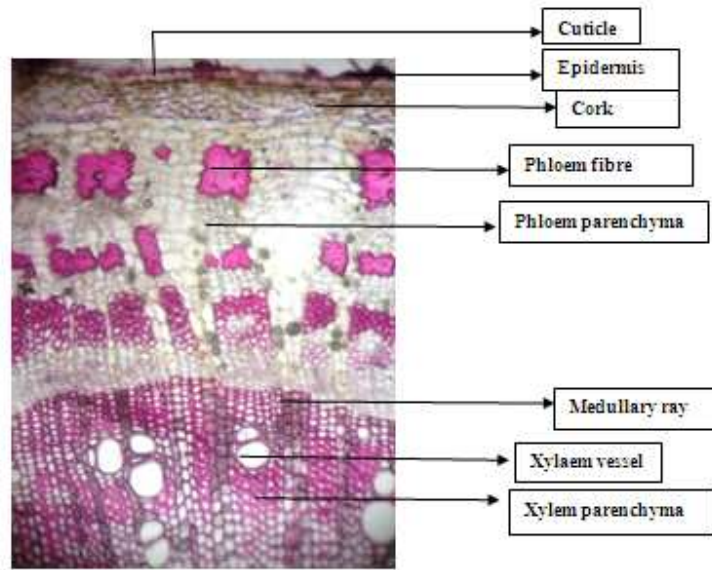


Fig-1(a)

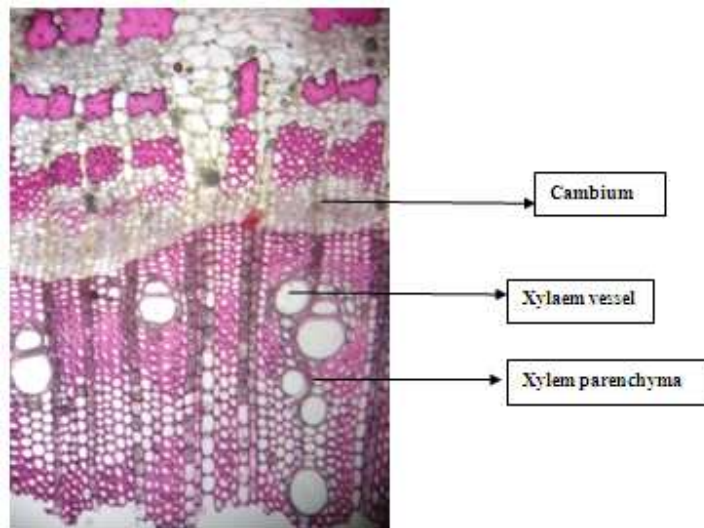


Fig-1(b)



*Fig-1(a,b): Transverse section of bark of Abutilon indicum*

*Fig-1(c): T.S of cork region.*

*Fig-1(d): T.S of phloem fibre*

*Fig-1(e): T.S of phloem parenchyma.*

*Fig-1(f): T.S of Cambium region.*

*Fig-1(g,h): T.S. xylem vessel and xylem fibre.*

*Fig-1(i): T.S medullary rays having calcium oxalate crystals.*

#### **Powder microscopy of bark**

The powder microscopy showed the fragments of dark brown cork, cork cells, colourless and large parenchymatous tissue, simple (Spherical) starch grain and prism shaped calcium oxalate crystals (Fig-2 a,b,c,d,e,f,g,h,i). From the powder the length of phloem fibre and the diameter of starch grains were found to be  $345.02\mu$  and  $32.42\mu$  respectively (Table-1).

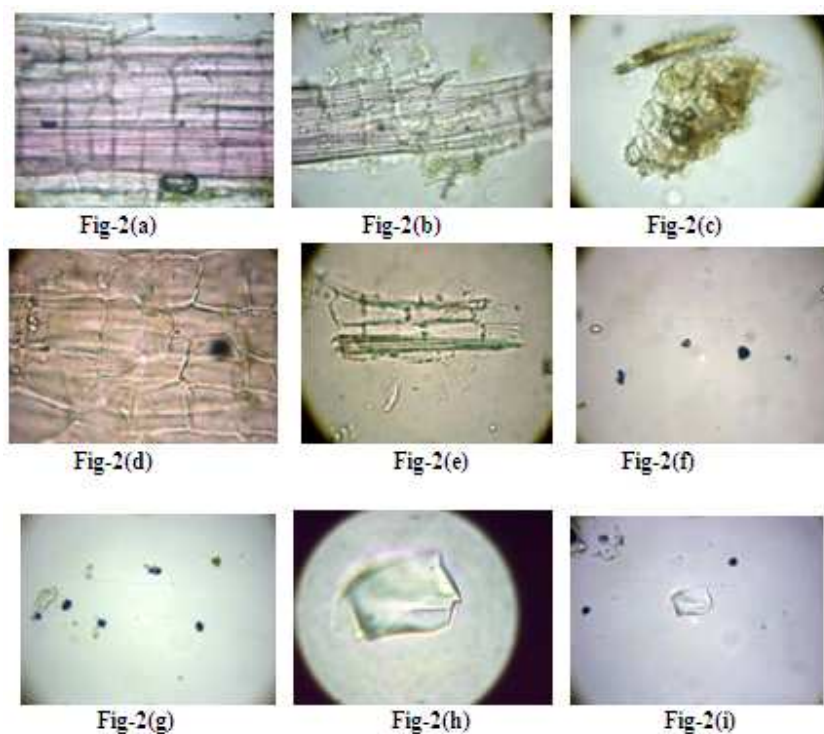


Fig-2(a,b,e): Cork

Fig-2(c): Cork in surface view.

Fig-2(d): Prerenchymatous cell.

Fig-2(f,g): Starch grain

Fig-2(h,i): Calcium oxalate crystal.

### Histochemical tests

Transverse sections of *Abutilon indicum* bark were treated with routinely used chemicals and reagents, gave positive tests for starch, tannin, phenol, lignin, steroid and alkaloid (Table-2).

**Table-2 Histochemical test of *Abutilon indicum* bark**

SL.No	Reagent	Test for	Inference
1	Section + Iodine solution	Starch	+
2	Section + IKI	Starch	+
3	Section + Sudan Red	Oil globules	-
4	Section + Ferric chloride	Tannin/Phenol	+
5	Section + Lugol's iodine	Tannin	+
6	Section + Toluidine blue	Polyphenol	-
7	Section + Phloroglucinol & HCL	Lignins	+
8	Section + Liberman	Steroid	+
9	Section + 5% KOH	Flavonoid	-
10	Section + Dragendorff's reagent	Alkaloid	+

+ Present, - Absent

### Physico-chemical and Preliminary phytochemical analysis.

#### Ash values

The total ash, water soluble ash, acid insoluble ash and sulphated ash of *Abutilon indicum* bark were found to be 14w/w, 7.5w/w, 1.5 w/w, 17 w/w. Total ash of *Abutilon indicum* bark was found to be more than water soluble ash and acid insoluble ash. Acid insoluble ash was found to be very less as compared to total ash and water soluble ash. Sulphated ash was found to more than water soluble ash & total ash (Table-3).

**Total extractive values**

The extractive values were determined to find out the amount of soluble compounds. The petroleum ether, chloroform, ethyl acetate and methanol extractive values of bark of *Abutilon indicum* were found to be 1.66w/w, 2.08 w/w, 2.52 w/w, & 6.12 w/w. The bark showed more amount of methanol soluble component than petroleum ether, chloroform & ethylacetate extracts (Table-3).

**Loss on drying**

The moisture content of bark was found to be 8.5w/w (Table-3).

**Table-3 Physico chemical analysis of *Abutilon indicum* bark**

Ash value in %w/w	
Total ash	14 w/w
Water soluble ash	7.5 w/w
Acid insoluble ash	1.5 w/w
Sulphated ash	17 w/w
Extractive value in %w/w	
Petroleum ether	1.66 w/w
Chloroform	2.08 w/w
Ethyl acetate	2.52 w/w
Methanol extractive	6.12 w/w
Loss on drying in %	8.5%

**Behavior of powdered materials towards some chemical reagents**

The behaviour of the powdered bark were treated with picric acid, conc.sulphuric acid, con.hydrochloric acid, con.nitric acid, glacial acetic acid, 5% ferric chloride, sodium hydroxide (5N), potassium hydroxide (5%), iodine/20 solution and the results are present in (Table-4).

**Table-4 Behavior of powder bark with different chemical reagents**

SL.No	Acid/Reagent	Observation
1	Powder as such	Light brown
2	Powder + Picric acid	Yellow
3	Powder + Con.Nitric acid	Brick red
4	Powder + Con.HCL	Light green
5	Powder + Con.H <sub>2</sub> SO <sub>4</sub>	Deep black
6	Powder + Glacial acetic acid	Light green
7	Powder + 5% FeCl <sub>3</sub>	Light green
8	Powder + NaOH(5N)	Yellowish green
9	Powder + KOH (5%)	Yellowish green
10	Powder + Iodine/20	Reddish brown

**Fluorescence analysis**

Fluorescence analysis of entire bark has been carried out in daylight and under U.V light. The powders were treated with different organic solvents and solutions & observed in normal daylight and under U.V. light. (Table-5).

**Table-5 Fluorescence analysis of the bark of *Abutilon indicum***

SL.No	Reagent	Day light	Short wave
1	Powder as such	Brown	Brown
2	Powder + 1N NaOH in methanol	Light green	Light green
3	Powder + 1N NaOH	Yellowish green	Yellowish green
4	Powder + Ethanol	Light green	Light green
5	Powder + HNO <sub>3</sub> +NH <sub>3</sub> solution	Light green	Green
6	Powder + 50%HNO <sub>3</sub>	Light yellow	Light green
7	Powder + 1N HCL	Light yellow	Light green
8	Powder + HCL	Light yellow	Light green
9	Powder + H <sub>2</sub> SO <sub>4</sub>	Light green	Light yellow
10	Powder + 50% H <sub>2</sub> SO <sub>4</sub>	Yellowish green	Light brown
11	Powder + Glacial acetic acid	Light yellow	Light green
12	Powder + HNO <sub>3</sub>	Yellow	Light green

**Extraction**

The dried bark powder of the material was extracted with hydro alcohol (70:30) for 18 hrs by decoction and solvent removed by distillation. The percentage yield of the bark extract were found to be 12.56%w/w (Table-6). The qualitative investigation test performed in the extract. It showed the presence of carbohydrate, steroid, glycoside, flavonoid, alkaloid and phenolic compound (Table-7).

**Table-6 Percentage yield of extracts of bark**

Extract	Hydro alcohol(70:30)
Percentage	12.56w/w

**Table-7 Preliminary phytochemical screening of different extracts of bark of *Abutilon indicum***

Test	Hydro alcohol (70:30)
<b>TEST FOR CARBOHYDRATE</b>	
Molish test	+++
<b>TEST FOR PROTIEN</b>	
Millon's test	-
<b>TEST FOR STEROID</b>	
Salkowski reaction	++
Liebermann-Burchard reaction	+
<b>TEST FOR GLYCOSIDES</b>	
Baljet test	+
Legal test	+
Saponin glycosides	+
<b>TEST FOR FLAVONOIDS</b>	
Shinoda test	+
Lead acetate test	+
<b>TEST FOR ALKALOIDS</b>	
Dragendorff's test	++
Meyer's test	++
Hager's test	+
Wagner's test	++
<b>TEST FOR TANNINS &amp; PHENOLS</b>	
5% FeCl <sub>3</sub>	+
Lead acetate	+

+ Mild, ++ Moderate, +++ Frequent, - Absent

**CONCLUSION**

These parameters, which are being reported for the first time, could be useful in the preparation of the herbal section of Indian Herbal Pharmacopoeia.

**Acknowledgement**

The author sincerely thanks to the principal and management of The Pharmaceutical College, Barpali, Bargarh for providing all the facilities to carry out the study and special thanks to Prof.P.Jayaraman (PARC) Chennai, for providing the information about plant and experimental work.

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