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Phytochemical Investigation and Pharmacognostic Study of Abutilon Indicum

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ABSTRACT

Abutilon indicum Linn. (Malvaceae) commonly called Country Mallow is abundantly found as weed in sub-Himalayan tract and in hotter parts of India. The present study attempts to summarize the pharmacognostical profile of Abutilon indicum Linn. The study comprises of preliminary phytochemical screening, morphology, and histology.

Keywords: Abutilon indicum Linn., Country Mallow, Kangi, Malvaceae, Pharmacognostic.

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INTRODUCTION

An estimated 70% of population around the world use traditional medicines derived from plant species for their treatment and cure. In order to formalize the position of these medicines within the present health care system, a necessary first step is the establishment of standards of quality, safety and efficacy. Keeping this objective in mind, the authors are involved in establishment of pharmacognostical standards of Indian traditional drugs from past few years[1]. *Abutilon indicum* Linn. *var*. Sweet (Malvaceae) commonly called "Country Mallow" is a perennial plant up to 3m in height. It is abundantly found as weed in sub-Himalayan tract, hotter parts of India, adjoining countries, Malaya, Philippine Islands and China. The plant is used in traditional medicine in India, Pakistan, China and Philippine for treatment of several diseases like bronchitis, body ache, toothache, jaundice, diabetes, fever, piles, leprosy, ulcers, cystitis, gonorrhea and diarrhea [2-6]. *Abutilon indicum* Linn. is reported to have hepatoprotective[7], hypoglycemic[8], antimicrobial[9], male contraceptive[10] and antidiarrhoeal[11] activities. A large number of phytoconstituents have been isolated from different parts of *Abutilon indicum* Linn. *viz*. carbohydrates, essential oil, flavonoids, sesquiterpenes, fatty acids, amino acids and sterols[12].

MATERIALS AND METHOD

Pharmacognostic study

Collection and authentication:

The plant *Abutilon indicum* (Linn) Sweet collected from local areas of Hubli. The Plant was authenticated by Dr. Masood, Professor and Head, P.G. Dept of Botany, osamina University, hyderabad. A voucher specimen of the same has been deposited in Research laboratory of Pharmacognosy Dept of Azad college of Pharmacy, Hyderabad.

Physical constants

Ethanol Soluble Extractive

5 gms of air dried powder of *Abutilon indicum* was macerated with 100ml of ethanol in closed flask , shaking frequently during the first 6 hours and allowing to stand for 18 hours. Thereafter it was filtered rapidly taking precaution against loss of ethanol.. Evaporate 25ml of the filtrate to dryness in tared flat-bottomed shallow dish, dried at 105°C and weighed. Percentage ethanol soluble extractive value was calculated with reference to the air-dried drugs. ethanol soluble extractive value was found to be 6.86%w/w.

Water Soluble Extractive

Add 5gms of powdered drug to 50ml of water at 80°C in a stoppered flask. Shook well and allowed to stand for 10min, cooled and filtered. The filtrate was transferred to a tared evaporating dish (7.5cm in diameter) evaporated the solvent on water bath, continued drying for 30 min, finally dried in a steam oven for 2 hours at 100°C and residue was weighed. Percentage of water soluble extractive value was calculated. water soluble extractive value was found to be 13.1 %W/W.

Loss on Drying

Glass stoppered shallow bottle was weighed which has been dried under the same conditions to be employed in the determination. A quantity of the sample was transferred to the bottle, covered it and accurate weight was recorded. Sample was distributed evenly in the bottle by gentle sidewise shaking to a depth not exceeding 10mm. The bottle was then placed in an oven at110°C to get a constant weight upto 3-4 hours. After drying, the bottle was closed promptly and allowed to cool to room temperature. Contents of the bottle were weighed and LOD was calculated[30].LOD was found to be 9.87%.

Phytochemical investigation

Method of Extraction

The plant *Abutilon indicum* (Linn.) Sweet were collected and shade dried in laboratory, pulverized and extracted with 95% ethanol in a soxhlet extractor and concentrated using rotary flash evaporator The residue was dried in desicator over sodium sulphite. The plant powder was macerated with distilled water 48-54hrs, to get the aqueous extract. The aqueous extract was concentrated using rotary flash evaporator. The residue was dried in desicator over sodium sulphite.

Successive Extraction

250 gms, of dried plant powder was extracted successively with various solvents having different polarity (Harborne.J.B.1988) such as, petroleum ether (60-80°c), chloroform, ethyl acetate and butanol. After drying the different extracts were weighed and percentage extractive values were calculated.

Table 1: Results of successive extraction of *Abutioln indicum* using various solvents.

S.NO	Extracts	Colour	%Yield
1	Petroleum ether (60-80°C)	Dark green	1.4
2	Chloroform	Dark green	1.0
3	Ethyl acetate	Greenish brown	1.0
4	Butanol	Brown	0.9
5	Total ethanolic extract	Dark green	11.8
6	Total aqueous extract	Brownish red	17.9

RESULTS AND DISCUSSION

Microscopy and histochemical analysis

Microscopic Analysis

Anatomy of *Abutilon indicum*

Transverse section of *Abutilon indicum* Leaf, Stem and roots were stained difference staining agent and mounted and observed under microscope under low power (10x and 8x) and the features were photographed.

T.S. OF LEAF:

It is said to be a dorsiventral leaf which is a characteristic of dicot plants. It shows the clear cut differentiation of mesophyll tissue into upper palisade and lower spongy tissue. It shows the following parts:

Epidermis:

It consists of upper and lower epidermis. The upper epidermis contains a few stomata and a few stellate epidermal hairs. The lower epidermis contains many stomata described as hypostomatic and stellate multicellular epidermal hairs The hairs protective and also meant for reducing the rate of transpiration. The type of stomata is anomocytic.

Mesophyll:

It is the tissue extending between upper and lower epidermis. It is differentiated into upper palisade tissue and lower spongy tissue. Palisade tissue consists of two layers of compactly arranged, columnar, rod shaped elongated cells. These lie at right angles to the upper epidermis and contain plenty of chloroplasts. Towards the lower half there are irregular shaped, loosely arranged parenchyma tissue forming spongy tissue. It contains few chloroplasts.

Vascular bundles:

In the midrib region a large vascular bundle is present with xylem (red stained with safranine lignified) towards lower epidermis and phloem unstained towards the upper epidermis On either sights of the vascular bundles bundle sheath extension formed of lignified cells are seen.shows the stomata observed epidermal peeling of a leaf. In the irregularly lobed epidermal cells there are isolated stomata, of anomocytic type.

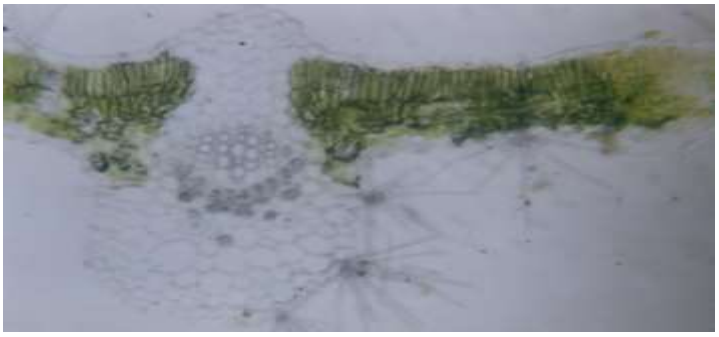

Plate 1: Photograph of Natural Leaf

Plate 2: Photograph of Leaf Liginin (Pink) Stain with Saffarin

Plate 3: Photograph of Lignified fibres stained with Saffrain

Plate 4: Photograph of Stomat

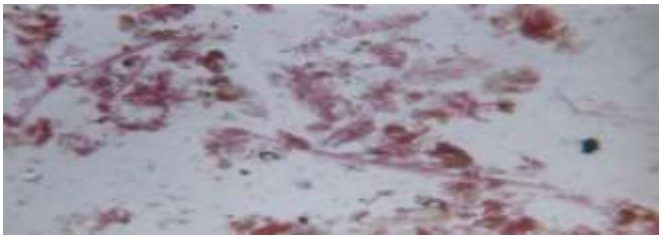

Plate 5: Photograph of Stone Cell and Lignified Fibres Stained with Saffrain

T.S. OF STEM:

Abutilon being a dicot stem shows the following features

Epidermis: Single layered with characteristic hairs i.e. many stellate hairs and a few isolated multicellular glandular hairs.

Hypodermis: 4 – 6 layered collenchymatous hypodermis.

General cortex:

It is of many layered parenchyma, with the inner most single layered endodermis that is not so distinct as in roots. The details of the tissues observed from the periphery towards the center are as follows:

Epidermis:

It is outer most, single layered, compactly arranged more or less rectangular cells. A moderately thick cuticle is present protective and function made up of cutin and cellulose, blue stained. Isolated multicellular glandular hairs and numerous stellate hairs are very distinct. Presence of such specialized hairs is a protective device, i.e. protective against intense sunlight. A distinct cuticle on the free outer surface of the epidermis is seen in the plate.

Cortex:

It is differentiated into i) an outer hypodermis, of 4-6 cells thick, with characteristic corner thickenings there are blue stained with haematoxylene (ii) An inner general cortex of large parenchyma cells with inter cellular spaces. The inner most layer of cortex i.e. endodermis is single layer but not well developed as in roots.

Stele:

The region interior to endodermis is pericycle. It is of red stained (lignin) polygonal sclerenchyma tissue. It is blue stained in plate 1. All the plates here are of old stems, so that secondary growth has taken place. In plate 1 there is a continuous band of 2-4 cells thick rectangular cells forming cambium, a meristematic tissue.

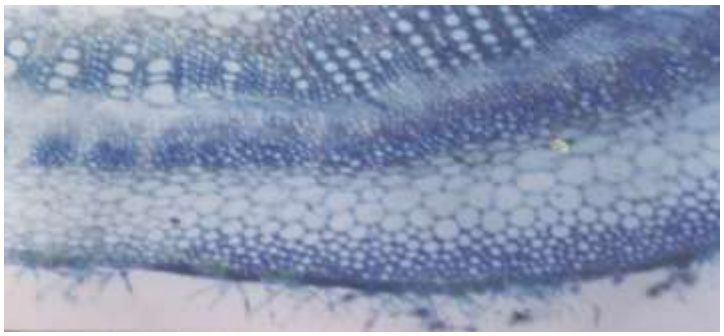

Plate 6: Photograph of Stem Polyphosphate Stained with Toludine blue

Plate 7: Photograph of Stem Cellulose (blue) Stained with Hematoxyline

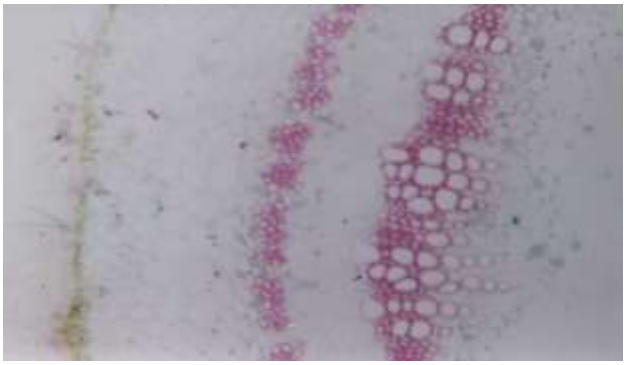

Plate 8: Photograph of Natural Stem

T.S. OF ROOT:

It is evident in the fact that pith is reduced with plenty of xylem, and presence of lenticels. It shows the following arrangement of tissues from the periphery towards the center.

Epidermis:

It is single layered, outer most protective layer extrastelar secondary growth has taken place epidermal hairs are also not seen.

Cortex:

It lies between epidermis and pericycle. The cortex is made up of parenchyma with isolated masses of sclerenchyma, red stained in and blue stained In the young roots the endodermis and pericyle are present but in these plates they are not seen because addition of secondary phloem towards outside (plate a – unstained thin walled cells), and red stained lignified xylem elements form a central mass of compactly arranged.

Stele:

The stele in the young roots shows distinct pericycle, xylem and phloem arranged radially, but in the old roots it is disturbed because secondary growth has taken place with plenty of secondary xylem at the center being formed) pith is almost absent.

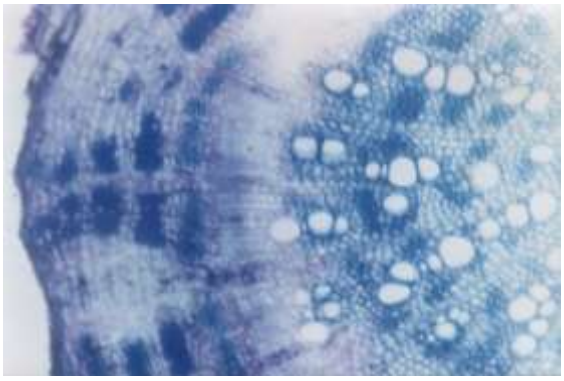

Plate 11: Photograph of Root Cellulose (blue) Stained with Hematoxyline

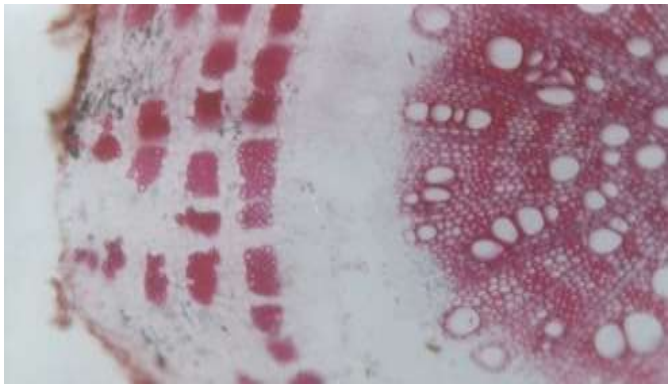

Plate 12: Photograph of Root Liginin (Pink) Stained with Saffranin

Table 2: Qualaitative Chemical examination of *Abutilon indicum*

S. No	Test for phyto-constituents	Pet. ether extract	Choloro-form extract	Ethyl acetate extract	Butanol extract	Ethanolic extract	Aqueous extract
1	*Alkaloids*	-	+	-	-	+	-
2	Carbohydrates	-	-	-	+	+	+
3	Glycoside	-	-	+	+	+	+
4	Phyto sterols	+	-	-	-	+	-
5	Isoflavones	-	-	+	+	+	+
6	Tannins	-	-	+	+	+	+
7	Amino acid& proteins	-	-	-	+	+	+
8	Triterpenoids	+	-	-	-	+	-
9	Coumarins	+	-	-	-	+	-

\+ = **Present**, - = **Absent**

HISTOCHEMICAL ANALYSIS:

TS Of Leaf Analysis:-Leaf contain Epidermis, Mesophyll, Vascular bundle ,Leaf contain anomocytic type of stomata**,**Vascular bundle contain lignified cells.

Table 3: TS of Leaf Analysis

S.no	Reagents	Test for	Colour change	Result
1	Saffranin	Lignin	Pink	+
2	Toludine blue	Polyphosphate	Blue	+
3	Sudan black-II	Lipids	Brown	+
4	Hemotoxylin	Cellulose	Blue	+
5	10%Fecl3	Tannins	Brown	-

Table 4: TS of Stem Analysis

S. no	Reagents	Test for	Colour change	Result
1	Saffranin	Lignin	Pink	+
2	Toludine blue	Polyphosphate	Blue	+
3	Sudan black-II	Lipids	Brown	+
4	Hemotoxylin	Cellulose	Blue	+
5	10%Fecl3	Tannins	Brown	+

Table 5: TS of Root Analysis

S. no	Reagents	Test for	Colour chang	Result
1	Saffranin	Lignin	Pink	+
2	Toludine blue	Polyphosphate	Blue	+
3	Sudan black-II	Lipids	Brown	+
4	Hemotoxylin	Cellulose	Blue	+
5	10%Fecl3	Tannins	Brown	+

CONCLUSION

The present study is we perform phytochemical investigation and pharmacognostic study of of *Abutilon indicum*. Determination of physical constants such alcohol soluble extract found to be 68.6%w/w, water soluble extract found to be 13.1%w/w and loss on drying found to be 9.87%w/w. Microscopic analysis and histochemical analysis we Study the transverse Section of Stem, Root and Leaf of the plant. Study of characteristics of Powder drug And Phyto chemical investigation of *Abutilon indicum* was present of alkaloids, glycosides, flavanoids, tannins, phytosterols, isoflavones, were present. By performing the all the parameters we concluded that: Abutilon indicum has shown lot of pharmacological activities like antidiabetic, antimycotic antioxidant, hepatoprotective, anti diarrhoeal, anti bacterial, anti convulsant, anti arthritis etc.In further we studying extracts for pharmacological activity.

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