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PHARMACOGNOSTIC AND PRELIMINARY PHYTOCHEMICAL EVALUATION OF THE LEAVES OF *CORCHORUS AESTUANS* LINN.

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ABSTRACT

Corchorus aestuans Linn (Tiliaceae), popularly known as chunch, is a small annual herb growing in open waste places at low and medium altitudes, in open areas along dikes and canals in rice fields. The present study deals with pharmacognostic and preliminary phytochemical evaluation of leaves of *Corchorus aestuans* Linn. The pharmacognostical studies were carried out as organoleptic, microscopic and physical parameters such as moisture content, ash value and extractive value were determined. For phytochemical evaluation, *Corchorus aestuans* leaves were subjected to successive solvent extraction using petroleum ether (60^0c-80^0c), hexane, ethyl acetate, methanol and distilled water. These extracts were then screened for presence of different chemical constituents. Thin layer chromatography (TLC) of the tested extracts was also performed to determine the active principles. These studies are useful in identification and chemical characterization of *Corchorus aestuans* and to explore its phytochemical and pharmacological potential.

KEYWORDS: *Corchorus aestuans* Linn, Pharmacognostical screening, Phytochemical screening, Tiliaceae.

INTRODUCTION

Corchorus aestuans Linn (Syn. *Corchorus acutangulus* Lam.), family-Tiliaceae, is an annual herb occurring throughout the hotter parts of the Subcontinent, Indo-china, Australia,

Tropical Africa, West Indies, and Central America. The roots and leaves are said to cure gonorrhea and used in making an injection for urethral discharge. The seeds are stomachic and used in pneumonia. A leaf decoction is given orally thrice a day in malaria.[1, 2] The plant is said to possess anticancer, antipyretic, anticonvulsant, stomachic and digitalis glycosides like action.[3] Pharmacognostic and phytochemical studies have not been reported for the leaves of this plant. Therefore, present investigation was planned to study the pharmacognostic and preliminary phytochemical aspects of *Corchorus aestuans* Linn.

MATERIALS AND METHODS

Collection and identification of plant material

The leaves of *Corchorus aestuans* Linn were collected from local area of Kheda district and its authentication was confirmed by Dr. M. S. Jangid, Botany Department, Sir P. T. Science College, Modasa, Gujarat, India. Herbarium of the plant was deposited at Department of Pharmacognosy, B. Pharmacy College, Rampura, Kakanpura, Dist. Panchmahal, Gujarat, India for future reference.

Pharmacognostical investigation

Morphological features: Morphological studies were done using simple microscope. The shape, apex, base, margin, color, odor and taste of leaves were determined.[4, 5]

Microscopical features: Microscopic studies were done by preparing a thin hand section of midrib and lamina region of *Corchorus aestuans* leaf. The section was cleared with chloral hydrate solution, stained with phloroglucinol and hydrochloric acid, and mounted in glycerin. Surface preparation of leaf was carried out by scrapping of leaf till transparent and colorless epidermis was exposed. The scrapped material was then placed on a glass slide, mounted in glycerin and examined microscopically. Powder (#60) of the dried leaves was used for the observation of powder microscopical characters. The powdered drug was separately treated with phloroglucinol-HCl solution, glycerin and iodine solution to determine the presence of lignified cells, calcium oxalate crystals, and starch grains.[6, 7]

Quantitative microscopy: As a part of quantitative microscopy, stomatal number, stomatal index, vein islet number, vein termination number and palisade ratio were determined by using fresh leaves of the plant by official methods.[7, 8]

Physicochemical parameters: Physicochemical parameters, i.e., percentage of ash values, extractive values and percentage of moisture content were performed according to recognized methods. Total ash, water-soluble ash and acid-insoluble ash were determined to check the quality and purity of drug. Alcohol and water soluble extractive values were determined to find out the amount of water and alcohol soluble components.[9- 11]

Preliminary phytochemical screening

100g of air-dried powdered material of leaves of *Corchorus aestuans* Linn. was successively extracted with petroleum ether (60º - 80ºc), hexane, ethyl acetate, methanol and distilled water in a soxhlet apparatus. The liquid extracts obtained with different solvents were collected. All the extracts were dried in an oven at 50^0c. The consistency, odour, colour, appearance of the extracts and their percentage yield were noted. The extracts were then subjected to various qualitative tests using reported methods, to determine the presence of various phytoconstituents.[12, 13]

TLC fingerprint profile: Thin layer chromatography of different extracts was performed and the R_f values were determined.[14-16]

RESULTS AND DISCUSSION

Morphological characteristics: The morphological studies showed that leaves of *Corchorus aestuans* Linn were 3-5-costate, hairy to almost glabrous, lanceolate to ovate, 2-9.5 cm long, 1-5 cm broad, oblique or obtuse at the base, serrate margin, basal serratures prolonged into setaceous appendages or not, glabrous except the hairy to glabrescent costae, acute apex; petiole 0.5-3(-4) cm long, purple, pilose; stipules setaceous, 5-7 mm long, pilose, color purplish green **(Fig. 1-2).**

Fig. 1: Herb of *corchorus aestuans*.

Fig. 2: Leaves of *corchorus aestuans*.

Microscopical characteristics

In the microscopic studies, the leaves showed the presence of unicellular covering trichomes with bulbous base on both the surfaces. Mesophyll showed dorsiventral leaf structure. Midrib region showed 4-5 layers of thick walled collenchyma cells below the upper epidermis and above the lower epidermis, crystal sheath and highly lignified vascular bundles. The vascular bundle is collateral and closed, comprises of xylem vessels, phloem and pericyclic fibres **(Fig. 3-7)**.

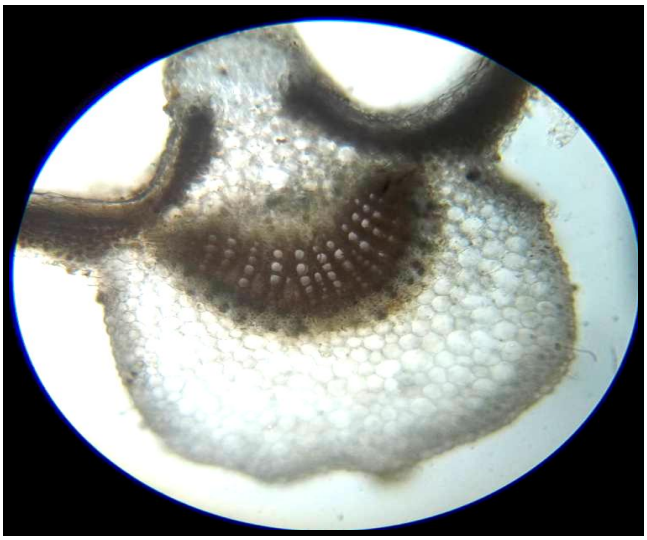


Fig. 3: Transverse section of leaf of *corchorus aestuans*.

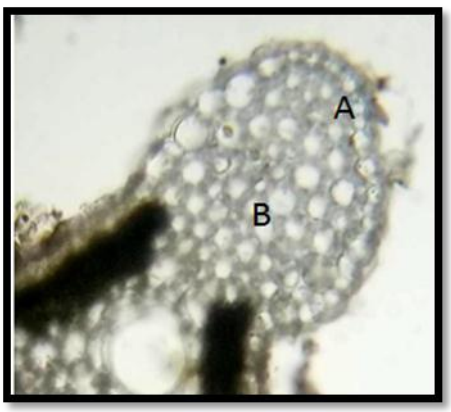


Fig. 4: A: Upper epidermis; B: Collenchyma

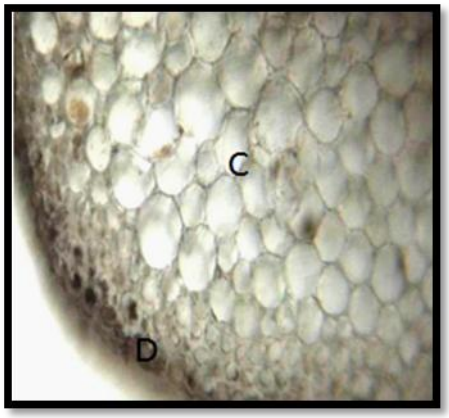


Fig. 5: C: Parenchyma; D: Lower epidermis

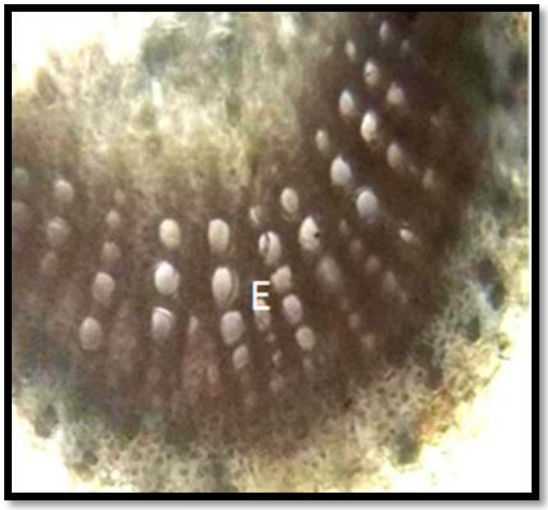
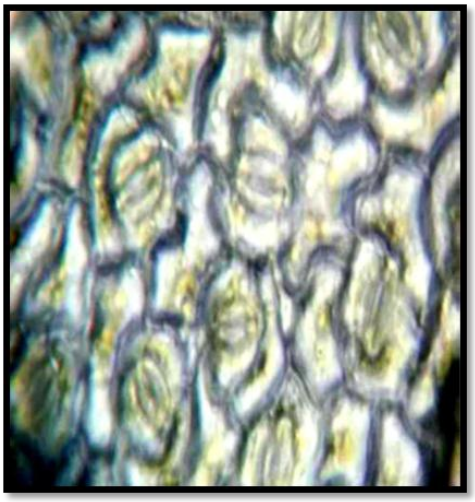


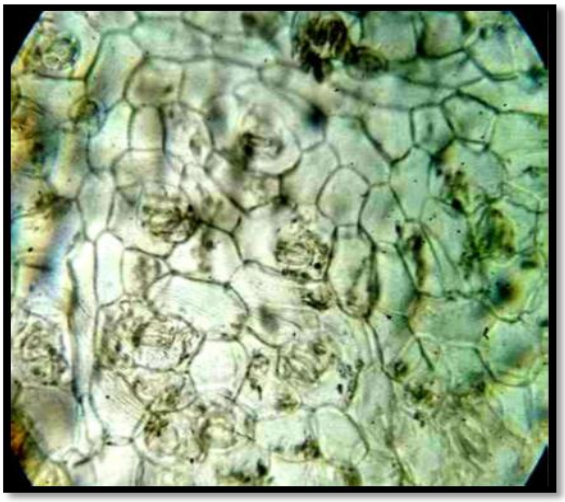
Fig. 6: E: Vascular bundle.

FIG. 7: F: Palisade cells; G: Trichomes.

In the surface view the lower epidermal cells exhibit wavy margin, but upper epidermal cells are polygonal with straight walls. Stomata are paracytic and present on both the surfaces but more common on lower surface. The unicellular covering trichomes with bulbous bases are present on both the surfaces **(Fig. 8)**



Lower epidermis



Upper epidermis

Fig. 8: Surface preparation of leaf of *corchorus aestuans*.

Microscopic study of *Corchorus aestuans* leaves powder revealed the presence of unicellular covering trichomes with bulbous base, paracytic or rubiaceous stomata with epidermal cells, Lignified xylem vessels with annular to spiral thickening, thick walled collenchyma and straight walled epidermal cells **(Fig. 9-12)**.

Fig. 9: Paracytic stomata.

Fig. 10: Xylem vessel with spiral thickening.

Fig. 11: Epidermal cells with trichomes.

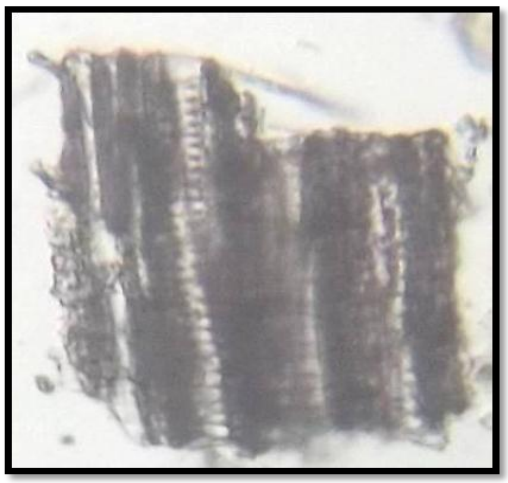


Fig. 12: Xylem vessels.

Quantitative microscopy: The leaf constants were determined following the standard methods and results have been furnished in **Table 1**.

Table 1: Leaf constant values of *corchorus aestuans* leaves.

Sr. No.	Determination	Value (per sq. mm)
i)	Stomatal index Upper epidermis Lower epidermis	 12.23-16.18 20.14-23.98
ii)	Vein-islet number	41-44
iii)	Vein-termination number	74-77
iv)	Palisade ratio	8-10

Physicochemical parameters: The various physicochemical parameters were determined and are represented in **Table 2.**

Table 2: Physicochemical parameters of *corchorus aestuans* leaves.

Sr. No.	Parameters	% W/W*
i)	Total Ash	13.80
ii)	Acid insoluble ash	7.52
iii)	Water Soluble ash	6.21
iv)	Alcohol Soluble extractive	6.58
v)	Water Soluble extractive	7.69
iv)	Moisture content	82.65

*average of three readings

Preliminary phytochemical Screening

Qualitative chemical examination of various extracts obtained by successive solvent extraction technique revealed the presence of carbohydrates, flavonoids, phytosterols, cardiac glycosides, phenolic compounds, triterpenoids, tannins and saponins. The colour, consistency and percentage yield of different extracts were determined and shown in **Table 3**. The results obtained by chemical examination of various extracts are shown in **Table 4**.

Table 3: Preliminary phytoprofiles of *corchorus aestuans* leaves.

Sr. No.	Solvent	Color and consistency after drying	Average value of extractive (% w/w)
1	Petroleum ether (60 – 80 ^{0}c)	Dark green sticky mass	1.30
2	Hexane	Dark green sticky mass	2.45
3	Ethyl acetate	Greenish yellow sticky mass	2.68
4	Methanol	Greenish brown sticky mass	6.37
5	Water	Reddish brown sticky mass	8.54

Table 4: preliminary phytochemical investigation of different extracts of *corchorus aestuans* leaves.

Groups of phytoconstituents	P. ether extract	Hexane extract	Ethyl acetate extract	Methanol extract	Water extract
Alkaloids	-	-	+ -	+ -	+
Flavonoids	-	-	+	+	+
Saponins	-	-	+ +	+ +	+
Carbohydrates	-	-	+ -	_ +	+
Cardiac glycosides	-	-	+ +	+ +	+
Fats and oils	-	-	-	-	-
Anthraquinone glycosides	-	-	-	-	-
Sterols and Triterpenoids	+	+	+	+	+

Phenolics	-	-	+	+	+
Coumarins	-	-	-	-	-
Tannins	-	-	-	+	+

(+): Present, (-): Absent

TLC fingerprint profile: The thin layer chromatography of different extracts was performed using the following mentioned solvent systems and results are shown in **table 5**. The detection of developed plates was done under UV at 366 nm.

Table 5: Qualitative chemical analysis of various extracts of leaves of *corchorus aestuans.*

Extract	Mobile phase	Spraying Reagent	No. of spots	Color of spots	R_f value
Petroleum ether	Hexane: Ethyl acetate (65 : 35)	Anisaldehyde sulphuric acid reagent	2	a) Purple b) Violet	0.82 0.74
Hexane	Chloroform: Glacial acetic acid: methanol: water (64:32:12:8)	Vanillin sulphuric acid reagent	2	a) Blue b) Brown	0.89 0.85
Ethyl acetate	Ethyl acetate: Formic acid: Glacial acetic acid: Water (80:10:10:20)	NP-PEG reagent	3	a) Brown b) Brown c) Blue	0.68 0.55 0.18
Methanol	ethyl acetate: methanol: water (100:13.5:10)	Antimony-III-chloride reagent	5	a) Yellow b) Purple c) Purple d) Purple e) Grey	0.89 0.78 0.72 0.67 0.53
Water	Chloroform: Methanol (85 : 15)	Libermann burchard's reagent	2	a) Violet b) Blue	0.74 0.57

CONCLUSION

The various morphological, microscopic and physicochemical standards developed in this study will help for botanical identification and standardization of drug in crude form. Further, the authentic plant material can be explored for its pharmacological and phytochemical potential on the basis of its phytochemistry.

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