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Pharmacognostical And Preliminary Phytochemical Studies Of *Calotropis Procera* Stem Bark

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The stem bark of Calotropis procera was studied for macroscopic and microscopic characters. The physicochemical standardization of the powder was carried out for ash value (acid insoluble ash value and water soluble ash value), extractive values with different solvents, loss on drying, crude fiber content, swelling index and volatile oil content. Its reaction after treatment with chemical reagents under visible light and UV light at 254 nm and 366 nm was also observed. The preliminary phytochemical screening was done for chloroform and hydroalcoholic extracts.

Keywords: *Calotropis procera*, Asclepidaceae, stem bark, Pharmacognostic, Phytochemical.

Introduction:

Calotropis procera (Asclepidaceae) is a medicinal plant distributed in north, western and central India. This plant is commonly known as 'Madar'1. The latex of the plant is used for treating epilepsy, inflammation, painful joints and swellings. Leaves are used as antibacterial and antifungal and to alleviate ear pain. Root bark is used in skin diseases and as an anthelmentic. Flowers are used in loss of appetite. The plant contains cardenolides, proceragenin2. The plant is used in treating eye troubles3. The pharmacognostical studies have not been reported for the stem bark of this plant so an attempt was made to standardize the drug on the basis of botanical and physicochemical parameters.

Materials and methods:

Plant material:

Calotropis procera stem bark was collected from Dhule district, Maharashtra, India, during the month of May 2009. It was identified and authenticated by T. Chakraborty, Joint Director, Botanical Survey of India, Pune, India. A voucher specimen has been deposited at the Herbarium of the Centre (V. No: CAPNAS1).

Morphological and microscopical Studies:

Morphological studies were done to determine the shape, odour and taste of stem bark. Microscopical studies were done by preparing a thin section of stem bark of *C. procera*. The section was cleared with chloral hydrate solution and then stained with phloroglucinol and hydrochloric acid (1:1), mounted in glycerine. A separate section was prepared and stained with iodine solution for the identification of starch grains. The powder of the dried stem bark was used for the observation of microscopical characters. The powder was treated with phloroglucinol and hydrochloric acid (1:1) and also with iodine solution for the identification of starch grains and calcium oxalate crystals4.

Physicochemical studies:

Physicochemical studies for ash value (acid insoluble ash value and water soluble ash value), extractive values with different solvents, loss on drying, crude fiber content, swelling index and volatile oil content were done5.

The behaviour of powdered stem bark with various chemical reagents was studied5. The fluorescence characters of the powder with various acids were observed under visible light and UV light as per the proceduere6.

Phytochemical studies:
Stem bark was collected, shade-dried and pulverized to reduce the surface area using pulveriser (DRONE 9500). About 300 g of the stem bark powder was subjected to successive extraction with 600 mL of chloroform and 600 mL of hydroalcohol by maceration at room temperature for 48 h using a mechanical shaker. The extracts were dried at 40°C under vacuum by using Rota Evaporator (BUCHI Rotavapor R-215) and used for preliminary phytochemical screening7.

Results and discussion:

Morphological and microscopic observations:
The stem bark is light brown, slightly curved with wrinkled surface, 5-10 mm thick, odourless and bitter in taste.
The cork is 4 to 5 layers of thin walled tangentially elongated cells. Outer two layers are radially arranged whereas remaining inner layers are not uniformly arranged. Cortex consists of several layers of thin walled parenchymatous cells filled with minute starch grains. Lignified stone cell layers in groups with rectangular to elongated shape. Secondary phloem region consists of phloem parenchyma, phloem fibres and medullary rays. Medullary rays are bi to tri seriate, wide towards the outside region (Fig. 1).

Powder characteristics (Fig. 2)
1. Fragments of cork occur with thin walled cells and appear redish brown in colour.
2. Lignified stone cells occur in groups with rectangular to elongated shape.
3. Phloem fibres appear in groups, individual fibre is thick and can appear either entire or in fragments.
4. Starch grains are simple, round and rarely compound.

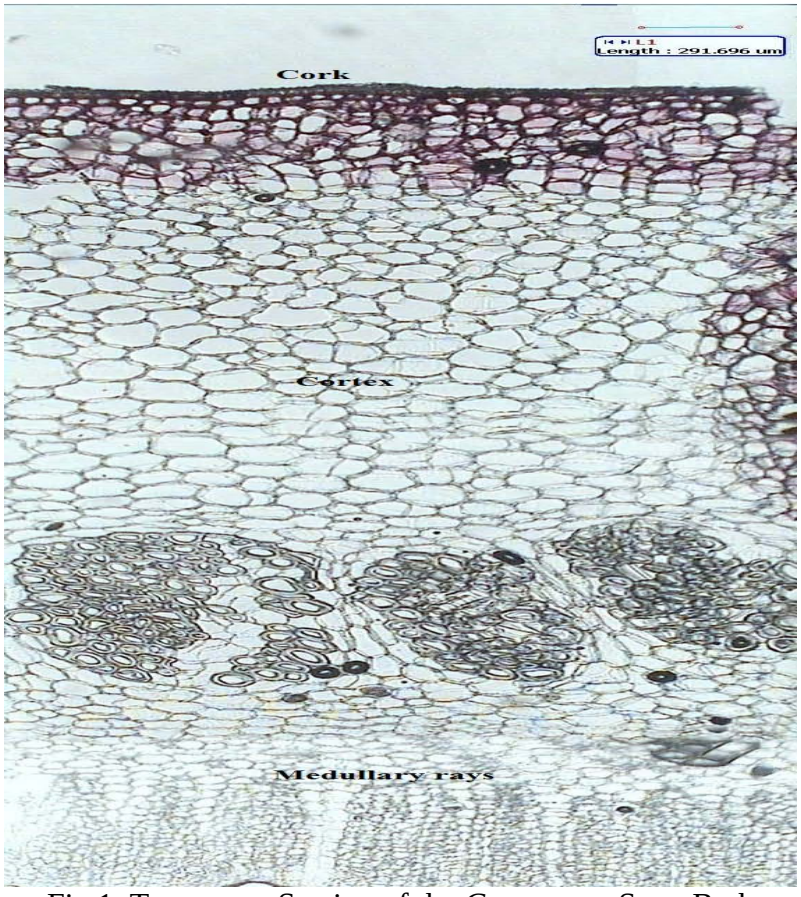
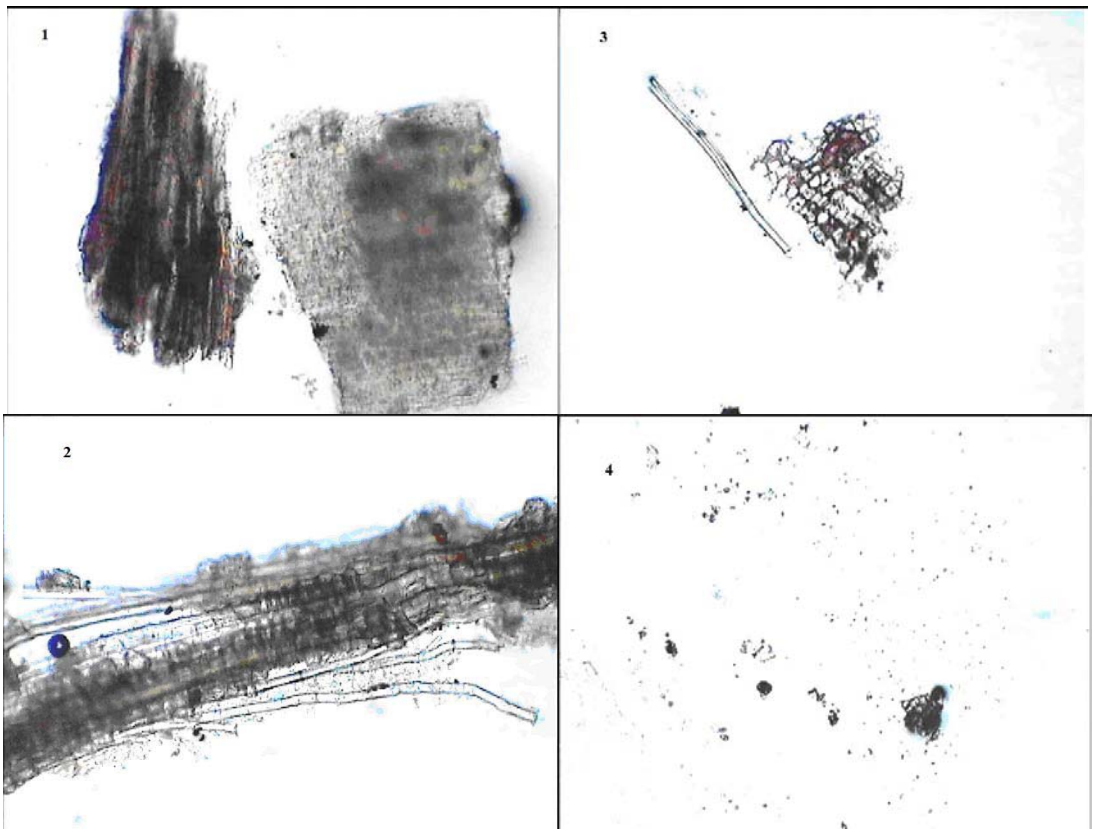


Fig 1. Transverse Section of the *C. procera* Stem Bark



1. Cork
2. Parenchymatous cells
3. Phloem fibres
4. Starch grains

Fig 2. Powder Characteristics of the *C. procera* Stem Bark.

Physicochemical Analysis:

The powdered sample was subjected to various physicochemical properties, which includes Foreign organic matter, Ash value, Extractive value, Loss on drying, Crude fiber content, Swelling index, Volatile oil content. The results obtained for these were as follows.

Foreign organic matter (2.10%), Ash value (6.28%), Acid insoluble ash (2.58%), Water soluble ash (2.84%), The Successive Extractive values (%w/w): Petroleum ether (60-80^{0}c) -2.09, Chloroform-6.92 Acetone-9.21, Alcohol-6.30, Water-9.41, Loss on drying-1.3%, Crude fiber content-28%, Swelling index-8.67, Volatile oil-0.0.*[values are an average of triplicate.]*

The behavior of stem bark powder upon treatment with different chemical reagents was also observed and reported in Table 1.

Table 1. Behavior of powdered stem bark of *C. procera* with different chemical reagents.

S. No.	Particulars	Under Visible light	U.V. light	
			Short wavelength	Long wavelength
1.	Powder as such	Slightly brown	-----	-----
2.	Powdered drug + Conc. HCl	Brown	-----	Brown
3.	Powdered drug + Conc. H_2SO_4	Brown	-----	Brown
4.	Powdered drug+Conc.	Dark brown	Brown	-----

	HNO_3			
5.	Powdered drug+ Glacial Acetic acid	Dull brown	-----	-----
6.	Powdered drug+ Aqueous NaOH	Slightly brown	-------	-----
7.	Powdered drug +alcoholic NaOH	Slightly brown	--------	-------
8.	Powdered drug + 10%Hcl	Slightly brown	Slightly brown	Slightly brown
9.	Powdered drug + 10% H_2SO_4	Slightly brown	--------	---------
10.	Powdered drug + 10% HNO_3	Brown	Slightly brown	Slightly brown
11	Powdered drug + 10% Glacial Acetic acid	Slightly brown	-------	--------
12.	Powdered drug + Water	Slightly brown	---------	--- -----

Preliminary phytochemical analysis (Table 2)

In preliminary phytochemical study, the chloroform extract showed the presence of terpenoids and steroids whereas successive hydroalcoholic extract showed the presence of polyphenols and tannins.

Table 2. Preliminary phytochemical screening of *C. procera* stem bark.

S. No.	Tests	Powder + Water	Chloroform extract	Hydroalcohol extract
1.	Alkaloids:			
	Dragendroff's test Mayer's test Hager's test Wagner's test	- ve - ve - ve - ve	- ve - ve - ve - ve	- ve - ve - ve - ve
2.	Carbohydrates:			
	Fehling's test Molish test	+ ve + ve	+ ve + ve	+ ve + ve
3.	Gums/Mucilage:			
	Water Alcohol	+ ve + ve	+ ve + ve	- ve - ve
4.	Tannins:			
	Aq. $FeCl_3$ Test Alc. $FeCl_3$ Test	+ ve + ve	- ve - ve	+ ve + ve
5.	Flavonoids:			
	Lead acetate test Shinoda test Alkaline test	+ ve + ve + ve	- ve - ve - ve	+ ve + ve + ve
6.	Sterols:			

	Salfowaski test Liberman Burchad test	+ ve + ve	+ ve + ve	- ve - ve
7.	Saponins:			
	Foam test Lead acetate test	+ ve + ve	+ ve + ve	- ve - ve

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