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Pharmacognostical and phytochemical investigation on stems of *Cassia javanica* Linn

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Abstract
Objective: The objective of present studies deals with the macroscopical and microscopical studies of stems of *Cassia javanica* Linn.
Methods: Microscopic study stain toluidine blue and Physiochemical parameter and preliminary phytochemical studies of the stems powder were also carried out.
Results: Some distinct and different characters were observed with section of young thin stems. The anatomy of the stems were studied by taking transverse section. Revealed that the initial phase of secondary growth. Cortex is followed by thin discontinuous bands or strips of perivascular sclerenchyma cells, which surround the vascular cylinder. Secondary xylem is composed of vessels, xylem fibers and xylem parenchyma cells. The Centre of stem is occupied by wide, thin walled, angular or polygonal shaped parenchyma cells. Physiochemical parameter and preliminary phytochemical studies of the stems powder were also carried out.
Conclusion: The present study on Pharmacognostical investigation of *Cassia javanica* Linn. stems might be useful to supplement information in regard to its identification parameters assumed significantly in the way of acceptability of herbal drugs in present scenario lacking regulatory laws to control quality of herbal drugs.

Keywords: *Cassia javanica* linn., stems, pharmacognosy, phytochemical, extract

Introduction
Cassia javanica, also known as Java cassia, pink shower, apple blossom tree and rainbow shower tree (family Fabaceae). *Cassia javanica* Linn. is a beautiful garden tree that belongs to family Leguminosae. It is cultivated throughout India for beautiful pink blossoms [1, 2]. Previous literature provides information about therapeutic uses of the plant. Bark of Cassia javanica is used as one of the ingredients in antidiabetic ayurvedic formulation [3]. Leaves are proved to be active against Herpes simplex infection [4]. Leaves are reported to contain variety of secondary metabolites, such as, flavones, sterols, several hydrocarbons, anthraquinone, glycosides etc [5, 6]. Among these flavones, glycosides and sterols are considered to be antidiabetic compounds [7, 8]. The presence of these antidiabetic phytochemicals of Cassia javanica leaves may give desired pharmacological action. As there are no scientific data available regarding antidiabetic effects of leaves, it felt relevant to assess bioactivity of leaves of *Cassia javanica*.

Traditional uses
The pods are used as medicinally as a substitute for cassia fistula. Pods are used as a purgative. The seeds may be useful as a source of industrial gum [9]. It is also traditionally used medicinal plants in china and Southeast Asian countries. It is conventionally believed that the medical herb can reduce fever, decrease the virulence of pathogenic organisms, regulates the flow of chi and lubricate the intestine. In china it is applied to treat gastric pain, cold, malaria, measles, chickenpox, and constipation. It is also used as an antimicrobial agent [10].
The objective of present studies were focused on Pharmacognostical and Phytochemical investigatin on stems of *Cassia javanica* Linn.

Material and Method
Plant material
The plant specimens for the proposed studies were collected from in the deep forest of Satpuda hills with the help of forest officers of Chopda tahsil, Dist. Jalgaon, Maharshtra (India) in the month of Dec. 2020 care was taken to select healthy plants and for normal organs. The plant was authenticated by Prof. (Dr.) Priyanka A Ingle, scientist, BSI (Botanical Survey of India), Pune (M.S.).
The required samples of different organs were cut and removed from the plant and fixed in FAA (Formalin-5 ml + Acetic acid-5ml + 70% Ethyl alcohol-90ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary-butyl alcohol as per method [11]. Infiltration of the specimens were carried out by gradual addition of paraffin wax (melting point 58-60^{0}C) until TBA solution attained super-saturation. The specimens were casted into paraffin blocks.

Sectioning
The paraffin embedded specimens were sectioned with the help of rotary Microtome. The thickness of the sections were 10-12 µm. Dewaxing of the sections were done by customary procedure [12]. The sections were stained with Toluidine blueas per the method [13]. Since Toluidine blue is a polychromatic stain, the staining results were remarkably good; and some Cytochemical reactions were also obtained. The dye rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage, blue to the protein bodies etc.

Photomicrographs
Microscopical descriptions of tissues were supplemented with micrographs wherever necessary. For normal

observations bright field were used. For the studies of crystals, starch grains and lignified cells, polarized light were employed. Since these structures have birefringent property, under polarized light they appear bright against dark background [14].

Physicochemical parameters

Physicochemical parameter of stems of *Cassia javanica* Linn. were determined such as total ash, acid insoluble ash, water soluble ash, sulphated ash, moisture content etc [15, 16].

Preliminary phytochemical parameters

Preliminary phytochemical test of *Cassia javanica* Linn. were performed and the chemical constituents were detected [17, 18].

Results and Discussion

Taxonomy of plant

Kingdom: Plantae
Sunkingdom: Tracheobionta
Super division: Spermatophyta
Division: Magnoliopsida
Class: Magnoliopsida
Order: Fabales
Family: Fabaceae
Genus: cassia L.
Species: Cassia javanica L. Var

Vernacular Names

English: Apple blossom senna, javanise cassia
Hindi: Java ki rani
Marathi: Mazeli
Tamil: Konne, Vakai

Morphological Description

Cassia javanica is a medium sized tree with widely spreading horizontal branches and showy blossoms. Bark smooth, brownish grey. Leaves paripinnate with 5-15 pairs of leaflets, petioles 1.5-4.o cm long, leaflet are elliptical, ovate to oblong. Flowers are bright rose or pink, fading to white with red sepals, in elongated bracteates corymbs. Pods are cylindrical, dark brown, smooth 45-60 cm long, flesh dry. The heartwood is yellow to brown, moderately hard, heavy and coarse texture. The sapwood is perishable (fig 1).

Fig 1: *Cassia javanica linn.* (Photo)

Microscopical studies

Microscopy (T.S. of Stem)

The stem is more or less angular in cross section; small, short and blunt ridges are present at the angles of the stem. Stem showed initial phase of secondary growth (fig: 2, 3). Cortex is followed by thin discontinuous bands or strips of perivascular sclerenchyma cells, which surround the vascular cylinder (fig 2, 4).

The vascular cylinder of the stem consists of narrow cylinder of secondary xylem and secondary phloem (fig: 3). Secondary xylem is composed of vessels, xylem fibers and xylem parenchyma cells, xylem vessels are narrow lumen, thick walled, circular or angular and occur in radial multiples of 2to3 vessel elements, xylem vessels are fairly well developed in the fascicular region than in the interfascicular region (fig: 3, 5). The Centre of stem is occupied by wide, thin walled, angular or polygonal shaped parenchyma cells.

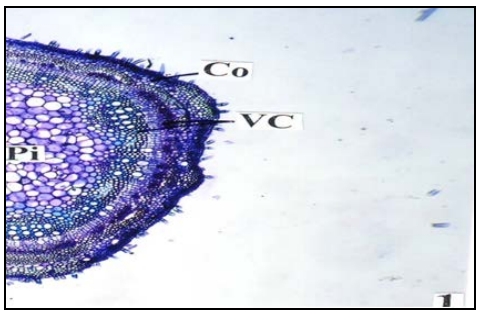

Fig 2: T.S of Stem

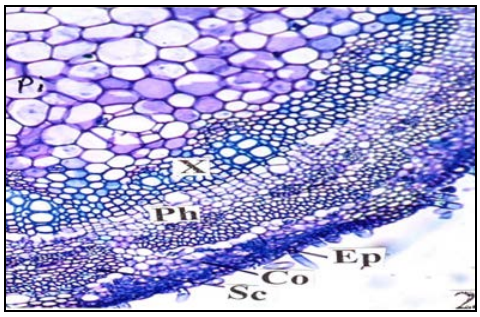

Fig 3: T.S of stem (enlarged sector)

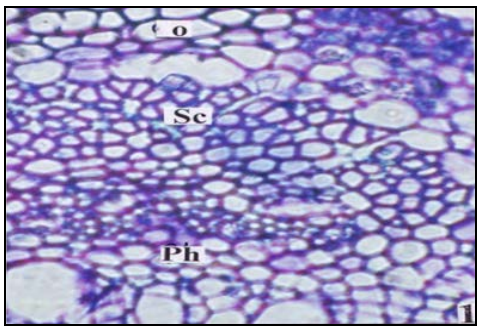

Fig 4: T.S of stem (cortex phloem enlarged)

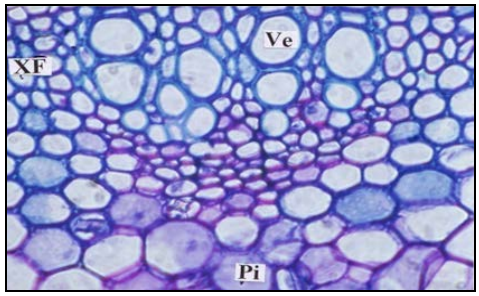

Fig 5: T.S. of stem (xylem portion) (Co-Cortex, Ph- Phloem, Sc-Sclerenchyma, Ve-Vessel, XF-Xylem Fiber, Pi-Pith, X-Xylem, Ep-Epidermis, VC-Vascular Cylinder)

Powder Microscopy

Calcium oxalate crystals

Calcium oxalate crystals are sparsely seen in the parenchyma cells of the stem (fig 6). The crystals are prismatic types. They are located in the cells in the sclerenchyma xylem tissues.

Parenchyma cells

Parenchyma cells are also frequently met with in the powder (fig 7). The cells elongated and scale like. They often contain dense accumulation of starch grain.

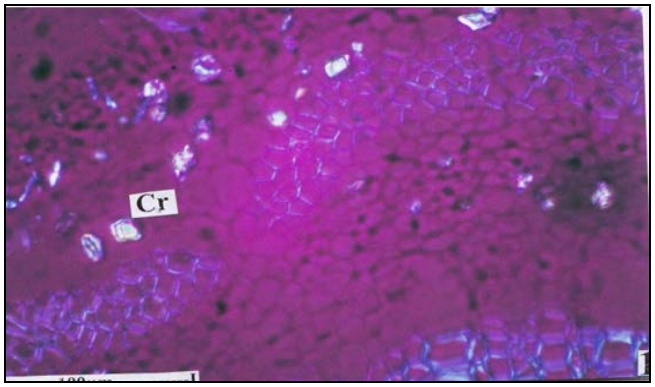

Fig 6: Crystal in stem (Polarized light)

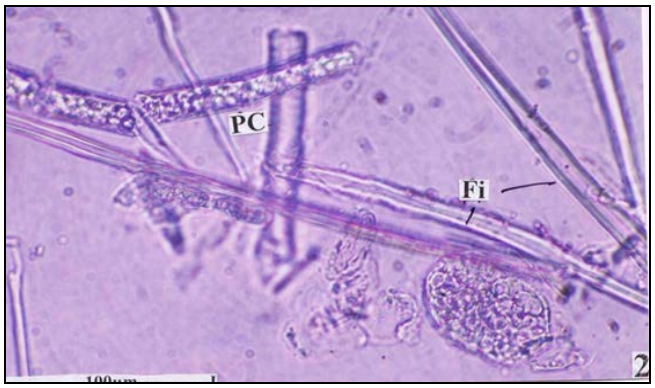

Fig 7: Fibers and Parenchyma cells (Cr- Crystals, PC- Parenchyma Cell, Fi- Fibers)

Physicochemical parameters

Table 1: Determination of quantitative standards of dry powder of stems of *cassia javanica* L.

Sr. No.	Parameter	Values obtained in air dried basis (% w/w)
1.	Ash value	
	Total ash	10.20 % w/w
	Acid soluble ash	7.18 % w/w
	Water soluble ash	7.26 % w/w
2.	Extractive value	
	Alcohol soluble extractive	13.88 % w/w
	Water soluble extractive	18.84 % w/w
3.	Moisture content	10.56 %

Preliminary phytochemical Investigation

The preliminary phytochemical analysis of the stems of *Cassia javanica* Linn. showed the presence of alkaloids, amino acids, flavonoids, phenol, proteins, sterols/terpenes and tannins [Table 2]. These secondary plant metabolites are known to possess various pharmacological effects and may be responsible for the various actions of *Cassia javanica* Linn.

Table 2: Preliminary phytochemical screening of various extracts of stems of *cassia javanica* L

Sr. No.	Constituents	Tests	Methonol	Aqueous
1.	Alkaloids	Mayer's test	-	-
		Dragordraff's tes	-	-
		Hager's test	-	-
		Wagner's test	-	-
2.	Sterols	Libermann's Burchard test	+	+
		Salkowski's	+	+
3.	Carbohydrates and Glycoisdes	Molisch's test	+	+
		Fehling's test	+	+
		Benedict's test	+	+
		Borntrager's test	+	+
4.	Fixed oils and fats	Spot test	-	-
		Saponification test	-	-
5.	Phenolic compound	$FeCl_3$ test	+	+
6.	Protein and aminoacids	Biuret test	-	-
		Ninhydrin test	-	-
		Xanthoprotein test	-	-
		Millon's test	-	-
7.	Triterpinoid and saponins	Foam test	-	+
		Haemolysis test	-	+
8.	Tannins	Gelatin test	-	-
		$FeCl_3$ test	-	-
9.	Gums and mucilage	Precipitation with 90% alcohol	-	-
10.	Flavonoids	Aqueous NaOH	+	+
		Conc. H_2SO_4	+	+

Table 3: Fluorescence characters of the powdered stems of *cassia javanica* L. under UV light

Treatments	Colour developed under UV light	
	Short (254 nm)	Long (366 nm)
Powder as such	Pale yellow	Green
1N HNO3	Pale green	Pale yellow
5N NaOH in water	Green	Pale yellow
1N HCl	Yellow	Green
50% HNO3	Yellow	Dark green
Acetic acid	Pale Yellow	Pale green green
Fecl3 (5%w/v aqueous solution)	Yellow	Dark green
50% H2SO4	White yellow	Dark green
1N NaOH in ethanol	Pale yellow	Green

Conclusion

The present Pharmacognostical studies of stems of *Cassia javanica* Linn. might be useful to supplement assumed significantly in the way of acceptability of herbal drugs in present scenario that lacks regulatory laws to control quality of herbal drugs.

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