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A Preliminary Pharmacognostical report on the Stem bark of *Cassia fistula* Linn.

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Abstract

Plan: The present study on the stem bark of *Cassia fistula* Linn for laying down preliminary Pharmacognostical identification standards

Prologue: *Cassia fistula* Linn .is known as Aragvadhā in Ayurveda is an important medicinal plant belonging to family Caesalpiniaceae. The stem bark is anti dysenteric, laxative and diuretic.

Outcome: The diagnostic features are the presence of starch grains, stone cells, crystalliferous phloem fibers, uni or biseriate medullary rays.

Key words: *Cassia fistula* Linn. , Stem bark, Stone cells, Crystals.

1. Introduction

Cassia fistula Linn. (*Caesalpiniaceae*), known as Indian laburnum is a medicinal plant of immense importance. The stem bark is laxative, anti tubercular, anthelmintic, emetic, febrifuge, diuretic, depurative and useful in treatment of boils and pustules, leprosy, ring worm, colic, dyspepsia, constipation, fever, diabetic, and cardiac problems¹. In Cambodia, the bark is used in dysentery². The stem bark is effective in suppressing blood glucose levels and in prevention and management of coronary artery disease³. It has antioxidant activity, inhibition of peroxidation, O₂⁻ and DPPH radical scavenging ability⁴. Fallen cow and buff hides are tanned by East India tanning process using stem bark⁵.

The stem bark commonly known as “Tanner’s bark of Cassia”, is rich in tannin and produce a bright red dye, 1,8-Dihydroxy-6-Methoxy-3-Me anthraquinone⁶. Two new flavonol glycosides, viz., 5, 7, 31, 41, - tetrahydroxy-6, 8-dimethoxyflavone-3-0- α -arabinopyranoside and 5, 7, 41-trihydroxy-6,8,3¹- trimethoxyflavone-3-0- α -L-rhamnosyl (1 \rightarrow 2)-0- β -D-glucopyranoside were isolated⁷, Lupeol, β -sitosterol and hexacosanol⁸; Fistucacidin, a leuco anthocynidin⁹.



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A racemic or meso-3, 4, 4¹, 7, 8-pentahydroxyflavan¹⁰. An earlier literature on Pharmacognosy is^{11,12} and hence due to its immense importance a detailed study on stem bark is undertaken and presented.

2. Materials and methods

Fresh stem bark material collected from Osmania University campus, Hyderabad. The material was preserved in glycerin and alcohol mixture (1:1) for softening. Sections of fresh barks were cut in transverse and longitudinal planes, stained with crystal violet and basic fuchsin and mounted in Canada balsam¹³. A portion of fresh bark was macerated and examined for elements. A small amount of powder boiled in water, stained in safranin and mounted in glycerin and observed for microscopical characters. The photomicrographs were taken with Olympus CH-2 microscope. The voucher specimens were deposited in herbarium, Osmania University.

3. Results

3.1. Morphology:

A moderate sized handsome deciduous tree, 8-15 m in height with grayish smooth bark exfoliating in hard scales. Leaves are pinnately compound, leaflets 4-8 pairs, ovate, acute, bright green, glabrous above, paler and silvery pubescent beneath when young. Main nerves numerous. Flowers bright yellow in axillary lax pendulous racemes. Pods cylindrical, pendulous, smooth, dark brown or black, 30-60 cm long. Seeds biconcave, broadly ovate, light brown, horizontally immersed in dark colored sweetish pulp^{12, 14}.

3.2. Stem bark:

Macroscopic: The stems bark 3-6 mm thick, externally creamish yellow to grey slightly greenish beneath with lenticular horizontal markings and brownish dots over surface. Internally pale reddish brown. Fracture fibrous; striations vertical (Fig. 1).

Microscopic features : In transverse section, the stem bark shows outer most cork consisting of 17-21 layers of rectangular to tangentially elongated cells arranged in vertical rows; 17.5-31.5 μm (24.5) long and 7-17.5 μm (10.5) wide, walls thin, suberised; contents dense with tannins and rhomboidal crystals of calcium oxalate (Fig. 2,5).

Phelloderm is of 35-45 layered, often interspersed with groups of stone cells, cells mostly polygonal to spherical, few tangential elongated, Isodiametric cells 21-39 μm (24.5) in diameter, elongated ones 28-70 μm (42) long and 10.5-28 μm (14) wide, walls thin, contents mostly with starch grains, few with crystals of calcium oxalates (Fig. 2,3). Stone cells abundant, mostly in groups, few isolated of various shapes and sizes; Isodiametric cells 17.5-31.5 μm (24.5) in diameter; elongated cells 21-126 μm (56) long and 21-35 μm (31.5) wide, walls thick, lignified with ramified pits, contents few with rhomboidal crystals of calcium oxalate (Fig. 3, 6).

Secondary phloem is abundant, consisting of phloem parenchyma, sieve tubes, phloem fibers, medullary rays and crystalliferous fibers. Phloem parenchyma abundant in between medullary rays arranged either in horizontal or vertical rows; cells mostly polygonal to spherical, few elongated.

Iso diametric cells 17.5 to 35 μm (27.5) in diameter, elongated cells 10.5-38.5 μm (31.5) long and 10.5 – 42 μm (14) wide, walls slightly thick, contents mostly with starch grains, in few with rhombic crystals.

Phloem fibers in groups (31.5-126 μm (84) in diameter) interspersed in phloem parenchyma. Often crystalliferous fibers are found in vicinity, sometimes attached with medullary rays; fibers 105-420 μm m (210) long, walls thick, lumen small, contents dense.

Medullary rays uni-or biseriate, rarely triseriate, cells radially long, rectangular, 31.5-112 μm (55) long and 10.5 –24.5 μm (17.5) wide, walls thin, contents dense with starch grains and in few crystals. Sieve tubes few, isolated in between (Fig. 4, 7, 8).

3.3. Powder microscopy:

Powder of stem bark when examined under microscope shows pieces of cork cells with dense contents; many stone cells isolated or in groups; cortical parenchyma cells with starch grains. Crystalliferous and phloem fibers rare; starch grains isolated; crystals of various shapes and sizes.

Organoleptic characters: Color: pale red, Taste: bitter, Odor: disagreeable, touch: slightly coarse.

4. Discussion and conclusion

Cassia fistula Linn, belonging to family Caesalpiaceae, popularly known as Indian laburnum is highly valued medicinal plant (loc.cit). The stem bark reveals Pharmacognostical features like stone cells, phloem fibres, calcium oxalate crystals which are of diagnostic importance.

The cork tissue is quite extensive showing rhytidome formation in its outer layers as described earlier¹¹. It is 17-21 layered and filled with tanniferous contents and crystals as also described earlier¹² (Fig. 5).

Phelloderm is 35-45 layered interspersed with groups of stone cells of various shapes and sizes (Fig. 6). Cortical cells contain starch grains and crystals of calcium oxalate in few.

Secondary phloem is extensive consisting of phloem parenchyma, sieve tubes, fibers, medullary rays and crystal fibers. Phloem fibers occur in groups in phloem parenchyma and tend to appear in tangential rows as also observed earlier¹¹ (Fig. 4). Starch grains also occur in phloem parenchyma and medullary rays (Fig. 7). The phloem fibers are 105-420 μm (210) in length. Few crystalliferous fibers also occur along with bast fibers (Fig. 8).

However the tissues of diagnostic importance recorded for the drug are i) Presence of rhytidome formation in the cork ii) groups of stone cells in phelloderm iii) Phloem fibers in tangential bands and iv) Crystalliferous fibers in secondary phloem. The powder microscopic features and organoleptic characters are also given (loc.cit).



Fig: 1 Pieces of stem bark

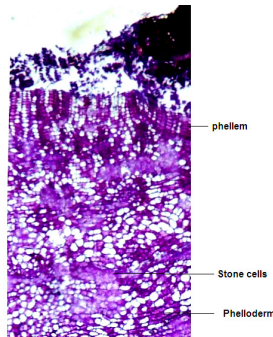


Fig: 2 T.S. of stem bark. (Periphery) X3

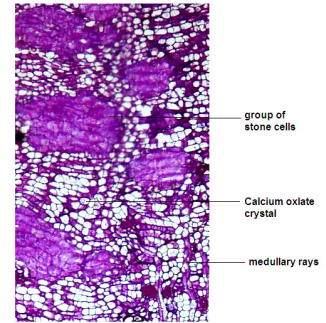


Fig: 3 T.S. of stem bark. (Median) X 78.

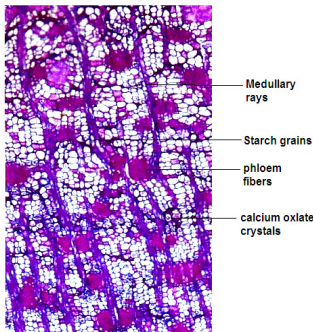


Fig: 4 .T.S. of stem bark. (Inner) X50.

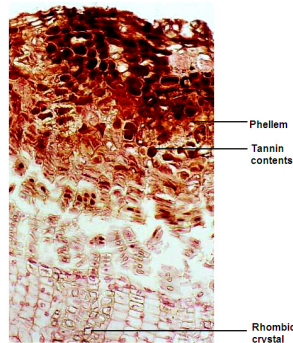


Fig: 5. T.S. of Phellem. (Magnified) X 250

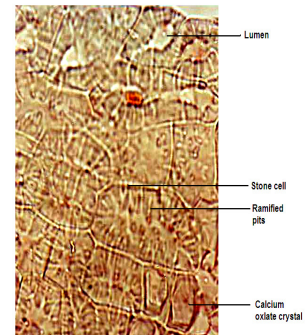


Fig: 6. T.S. of stem bark showing Stone cells. (Magnified) X 250.

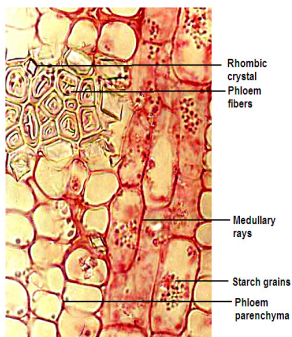


Fig: 7 Secondary phloem with medullary rays and phloem parenchyma with fibers. X500.

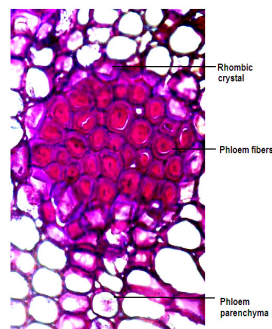


Fig: 8 Secondary phloem with phloem fibers and Crystal fibers. X 500.

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