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PHARMACOGNOSTICAL AND PHYSICOCHEMICAL STANDARDIZATION OF *OROXYLUM INDICUM* VENT. ROOT BARK

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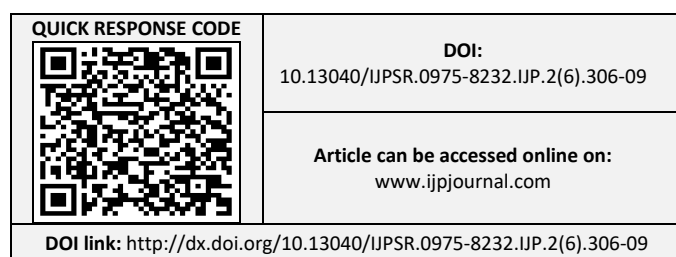
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ABSTRACT: *Oroxylum indicum* Vent., Bignoniaceae is one such plant which is extensively used in the Indian system of medicine as an essential ingredients 'Dashmula' and also one of the important constituents of a reputed Ayurvedic formulation 'Chyavanprash.' The drug consists of root bark of *Oroxylum indicum* Vent., Bignoniaceae. Identification and quality of the raw drug are necessary for their therapeutic effects. It is, therefore, become essential to search for the possible quality control parameters to ensure the quality of the raw drug by pharmacognostical investigations. The microscopical character of root bark is characterized by cork cells, which are varying interrupted by some stone cell, cork cambium, phelloderm, stone cell. Powder of root bark shown stone cells, fragments of cork, phloem fibers, vessels, and tracheids. TLC of extract shown spots in the solvent system and physicochemical parameters of the plant was found like ash value, aqueous & alcoholic extractive value, total sugars, starch, and tannin.

INTRODUCTION: *Oroxylum indicum* Vent., is an important medicinal plant which belongs to family Bignoniaceae. The Bignoniaceae is a family who is having about 100 genera and 800 species¹. In Ayurvedic literature, it is known as 'Shyonak' or Sonpatha and in English as Trumpet flower tree. It is small and deciduous tree, branched at top, bark light brown, soft and spongy; leaves large pinnate, bipinnate, or tripinnate ovate or elliptic; flower purple, fleshy; capsule large, flat, sword-shaped and seed flat and papery. It comes under *Brihatpanchmoola* of *Dashmoola*. It is also one of the important ingredients of 'Chyavanprash', the most popular and highest market valued herbal preparation.

Being an important medicinal plant, it is used extensively for treating a variety of ailments. It is used as a single plant remedy or in polyherbal formulations, particularly in organized systems of medicine such as Ayurveda. The root bark is astringent, bitter, and useful in curing cough, fever, diarrhea, anorexia, dropsy, troubles of bile and rheumatism^{2, 3, 4, 5, 6, 7}. The drug has been scientifically validated for certain pharmacological effects namely diuretic^{8, 9} antimutagenic¹⁰, antimicrobial, anti-inflammatory^{11, 12, 13}, antioxidant¹⁴, antiarthritic¹⁵, immunostimulant¹⁶, protective effect against acute colitis¹⁷. *Oroxylum indicum* Vent., Bignoniaceae is reported to contains number of phytoconstituents, flavone^{14, 15, 16}, alkaloids, galactose, tannic acid^{17, 18}, sterols¹⁶, glucuronide¹⁹, *p*- coumaric acid, prunetin^{14, 19}, ellagic acid²⁰, benzoic acid, chrysin¹⁴, and pterocarpan⁴ from different parts.

In view of its diverse medicinal applications, and in order to ensure the quality of its supply, especially in the times of adulteration and substitution



prevailing on the crude drug markets of India, the present communication deals with detailed quality control parameters of the root bark of *Oroxylum indicum* Vent, Bignoniaceae collected from different geographical zones of India.

MATERIALS AND METHODS:

Plant Material: The shade dried root bark of *Oroxylum indicum* Vent., Bignoniaceae, were collected from Chitrakoot (Madhya Pradesh), India. These were identified and authenticated taxonomically at National Botanical Research Institute, Lucknow, India. A voucher specimen was deposited in the Institutional herbarium for future reference. The plant materials were further size reduced and stored until further use in an airtight container. Fresh plant material was obtained for macroscopical and microscopical evaluation.

Chemicals: All chemicals used were of analytical grade from MERCK and SD Fine Chemicals Ltd.

Macroscopic and Microscopic Analysis:²⁷ The microscopy of the plant was studied according to the methods of Johnson (1940), T.S. and T.L.S. were prepared and stained.

Physico-Chemical Analysis:^{28, 29, 30} The air-dried plant material was used for quantitative determination of physicochemical parameters such as the percentage of total ash, insoluble acid ash, water, and alcohol-soluble extractives were calculated according to methods described in the Indian Pharmacopoeia. The percentage of sugar, starch, and tannins were also calculated using a spectrophotometer.

TLC Fingerprinting: 1 g of powdered root bark was refluxed for 5 min on a water bath with 5 ml methanol, filtered, and the filtrate taken as test solution and was then applied on HPTLC precoated silica gel G60 F254 Merck glass plates of 4x10 cm with the help of a Camag Linomat-IV applicator and the plate eluted to a distance of 6.20 cm at room temperature (19 °C) in a solvent system of Toluene, Ethyl acetate and Acetic acid (5:5:0.1) and scanned at 366 nm.

RESULTS AND DISCUSSION:

Macroscopic Characters: The root bark of *Oroxylum indicum*. Bignoniaceae is yellowish brown having a characteristic odor and sweet

mucilaginous in taste with fine longitudinal striation, external and internal surface smooth, and fracture short and splintery **Fig. 1** and **Fig. 2**.



FIG. 1: *OROXYLUM INDICUM* TREE WITH ITS FRUITS



FIG. 2: DRIED ROOT AND ROOT BARK OF *O. INDICUM*

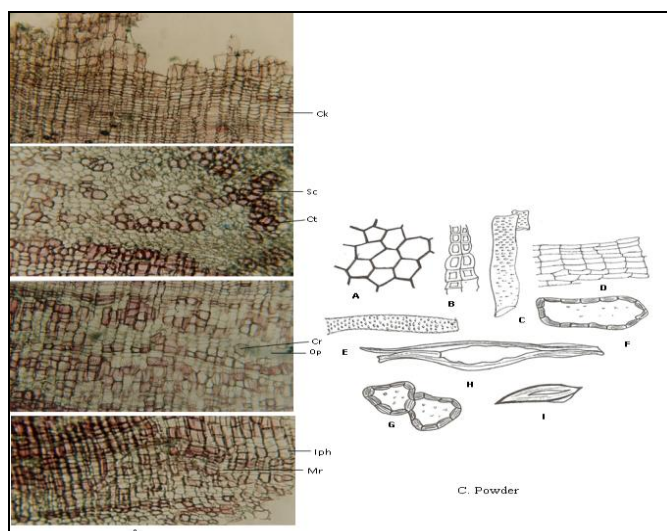


FIG. 3: MICROSCOPY OF ROOT BARK OF *OROXYLUM INDICUM* VENT., BIGNONIACEAE. A. TRANSVERSE SECTION OF ROOT BARK. B. TRANSVERSE LONGITUDINAL SECTION OF ROOT BARK. Ck. Cork; Sc. Stone cells; Ct. cortex; Cr. Crystals; Oph. Outer phloem; Iph. Inner phloem; Mr. Medullary rays; C. Powder A. Cork. B. Crystalloid fiber. C & E. Vessels; D. Parenchymatous cells; F-I. Stone cells and sclerids)



FIG. 4: TLC FINGERPRINT PROFILE OF *OROXYLLUM INDICUM* VENT., BIGNONIACEAE

Microscopic Characters:

Root Bark: TS of root bark shows outer most cork cells either large in size or collapsed, cork 700-1000µm thick, cork cells are varying in sized interrupted by some stone cells, cork cambium 2-3 cells large; broad phelloderm embedded with large groups of stone cells, stone cells with broad lumen and narrow boundaries, phelloderm divided into outer and inner, the inner phelloderm comprises with lesser number of scattered stone cells; secondary phloem narrow composed of scattered or tangential bands of stone cells as in phelloderm region but interrupted by 2-3 seriate medullary rays and parenchymatous cells filled with starch **Fig. 3**.

Powder Microscopy: The root bark of *Oroxylum indicum* Vent., Bignoniaceae is brownish cream in color showing fragments of cork, crystalloid phloem fibers, patches of parenchymatous cells, groups of stone cells and sclereids **Fig. 3**.

Physico-Chemical Analysis: The physicochemical parameters of *Oroxylum indicum* Vent, Bignoniaceae such as the percentage of total ash, acid insoluble ash, water and alcohol-soluble extractives, total sugars, starch, and tannin were shown in **Table 1**.

TLC Fingerprinting: TLC of methanolic extract on silica gel using toluene, ethyl acetate, and acetic acid in the ratio of 5:5:0.1, shows under 366 nm on the fluorescent zone at R_f 0.56, 0.62, 0.64, 0.79, 0.84 and 0.96 (all black in **Fig. 4** and **Table 2**).

TABLE 1: PHYSICO-CHEMICAL PARAMETERS OF *OROXYLLUM INDICUM* VENT., BIGNONIACEAE

S. no.	Parameters	Values % (w/w)
1	Total ash	14.68
2	Acid-insoluble ash	5.5
3	Water soluble extractives	12.16
4	Alcohol soluble extractives	6.25
5	Total Sugars	1.95
6	Starch	20.25
7	Tannin	4.72

TABLE 2: R_f VALUES AND COLOR OF BAND OF *OROXYLLUM INDICUM* VENT., BIGNONIACEAE

S. no.	R_f value	Color of band
1	0.56	Black
2	0.62	Black
3	0.64	Black
4	0.79	Black
5	0.84	Black
6	0.96	Black

CONCLUSION: The root bark of *Oroxylum indicum* Vent, Bignoniaceae is equated as a drug in the name of 'Shyonak' an important component of 'Dashmoola.' The market samples of the drug, however, consist of the majority of the stem bark pieces only, hence a well-established quality control parameters are highly essential for the plant. It is popular for its medicinal properties in the indigenous system of medicine, and some of its traditional claims have been scientifically validated.

In the present communication, the macroscopical and microscopical findings will lay down the standards which will be useful for the detection of its identity and authenticity. The other parameters viz., ash values, extractive values, total sugars, starch percentage, and TLC fingerprinting add to its quality control and quality assurance. Thus, the above findings will serve the purpose of quality control and assurance for the future studies.

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CONFLICT OF INTEREST: Nil

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