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## STUDIES ON PHARMACOGNOSTIC PARAMETERS AND PHYTOCHEMICAL SCREENING OF *OROXYLUM INDICUM* LEAF

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### ABSTRACT

**Background:** To confirm reproducible quality of plant material, proper regulation of starting material is important. Thus, there has been an increase in the standardization of selected herbal plants of potential medicinal values. Identification of herbal drugs by pharmacognostic studies is more reliable. Till date there is no work on pharmacognostic evaluation and phytochemical screening of *Oroxylum indicum* leaf. Therefore, the current study designed to the pharmacognostic parameters of the leaves of *Oroxylum indicum*.

**Materials and Methods:** Several quality control parameters like morphological study, transverse section, powder microscopic evaluation, leaf constants parameter such as stomatal index, physicochemical evaluations (moisture content, ash values, extractive values), preliminary phytochemical screening were carried out.

**Results:** Major microscopic characters such as Spongy mesophyll, Upper palisade, stomata and trichomes. Phytochemical screening of several extracts of leaves indicated the presence of phenolic compounds and flavonoids in the methanol extract and in aqueous extract exhibited the presence of alkaloids and phenolic compounds.

**Conclusion:** The quality control parameters bring referential information for proper identification of the herbal material and will also be useful in preparation of monographs.

**Keywords:** *Oroxylum indicum*, Pharmacognostic parameters, Preliminary Phytochemical Screening

## INTRODUCTION

The World Health Organization estimates that 80% of the world's population relies on herbal medicine [1]. The use of plants, parts of plants and isolated phytochemicals for the prevention and treatment of various health ailments has been in practice from time immemorial [2]. Characterization of microscopy of similar looking herbs of different species of the same genus can be differentiated by studying the details of cell structure and their general arrangement, Calcium oxalate crystals, starch grains, Stone cells, types of trichomes etc [3]. *Oroxylum indicum* (Bignoniaceae) also known as 'Sonapatha' is an important herb in Ayurvedic medicine and indigenous medical system for over thousands of years [4]. Roots, leaves and stems of *Oroxylum indicum* have been used as a single drug or as a component of certain compound drug preparations in the Indian Ayurvedic system of medicine for treatment of various disorders as well as used as a tonic and Rasayana drug [5, 6]. Leaves are used externally to treat an enlarged spleen and also to alleviate headaches and ulcers and also reported for its analgesic and antimicrobial activity [7, 8]. The leaves have been reported containing flavones and their glycosides baicalein and scutellarein. Leaves also contain an anthraquinone, aloe-emodin [9, 10, 11].

The present work has been designed to study the Pharmacognostic parameters of the leaves of *Oroxylum indicum*.

## METHODOLOGY

The fresh leaves *Oroxylum indicum* were collected in the month of December 2020, from Rajkot, Gujarat, India. The plant was then taxonomic identified in Botany Department, Shri M & N Virani Science College, Rajkot and Gujarat, India. A voucher specimen number AIP/20/02 has been deposited in herbarium department.

### Preparation of leaf extracts

Leaves of *Oroxylum indicum* were dried in shadow and pulverized. One hundred grams of powdered leaves were subjected to successive Soxhlet extraction by solvents in increasing order of polarity viz. petroleum ether, toluene, chloroform and methanol. Before each extraction the powdered material was dried in hot air-oven below 50° C. Finally, marc was digested with distilled water for 24 hours to obtain the aqueous extract. Each extract was concentrated by distilling off the solvent and then vaporizing to dryness on the water-bath. Extracts were weighed and percentage was calculated in terms of the air-dried weight of the drug powder material. The various extracts of *Oroxylum indicum* were subjected to qualitative chemical examination [12].

## Microscopic and Histological Techniques

### Study of Transverse Sections

The leaves of *Oroxylum indicum* were heated with water until soft. Free hand sections of the leaves were cut transferred on slides cleared by warming with chloral hydrate and mounted in glycerin. The lignified and cellulosic tissues were distinguished using distinction staining techniques [13].

### Photomicrography

Photographs of different magnifications were taken with Olympus microscope projection system with image card. For the study of crystals and lignified cells, polarized light was employed. Since these structures have birefringent property, under polarized light they appear bright against dark background [14].

### Powder microscopy

A little drops of chloral hydrate solution were added to a sample of powdered plant material on a slide, was enclosed with a glass slip and heat lightly over a microbunsen. Forceful boiling was avoided. The slide was examined under the microscope. When the clearing process is finished a drop of glycerol solution was added which will avoid crystallization of the mountant on cooling [15].

### Physicochemical analysis

Physicochemical parameters such as moisture content, total ash value, acid insoluble ash

value, water soluble ash value, water soluble extractive value, alcohol soluble extractive value, petroleum ether soluble extractive of the air-dried powder drug was determined [16, 17].

### Phytochemical Screening

The various extracts of *Oroxylum indicum* were subjected to qualitative chemical examination [18].

## RESULTS

### A. Microscopical evaluation

Transverse section of leaf is dorsiventral in nature which include following characters. Upper surface shows presence of single layer of rectangular celled of upper epidermis with covered thick cuticle which devoid of stomata (**Figure 1**). Lower surface consists of rectangular celled of lower epidermis, covered with thick cuticle and unicellular covering trichomes and anomocytic stomata. In lamina region, single layer of palisade cells beneath upper epidermis and contains compact elongated cells (**Figure 2**). Spongy parenchyma is 5 to 7 layered with intercellular spaces containing rosette of calcium oxalate crystals. Midrib shows presence of collenchyma below upper epidermis and above lower epidermis. Big vascular bundle present in centre of midrib. This collateral vascular bundle composed phloem and xylem which covered with discontinuous patches of

pericyclic fibres (Figure 3). Powder microscopy of leaf shows polygonal to rectangular epidermal cells, anomocytic stomata (figure4), unicellular trichomes (Figure 5) and reticulate xylem vessels (Figure 6).

#### Determination of Leaf constants

The surface parameters of leaves of *Oroxylum indicum* were measured (Table 1).

#### A. Physical Evaluation

The physical parameters of powdered leaves of *Oroxylum indicum* were evaluated. It includes moisture content, ash values and extractives values (Table 2).

#### Phytochemical Screening

The phytochemical screening of leaves of *Oroxylum indicum* were evaluated by performing chemical tests of various extracts. Results are given in Table 3.

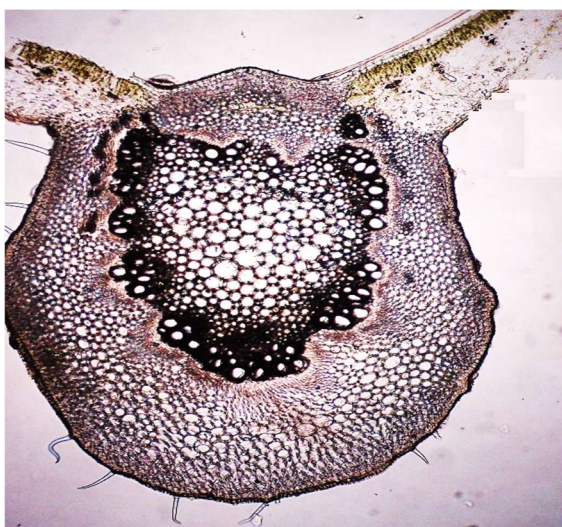


Figure 1: Transverse section of leaf

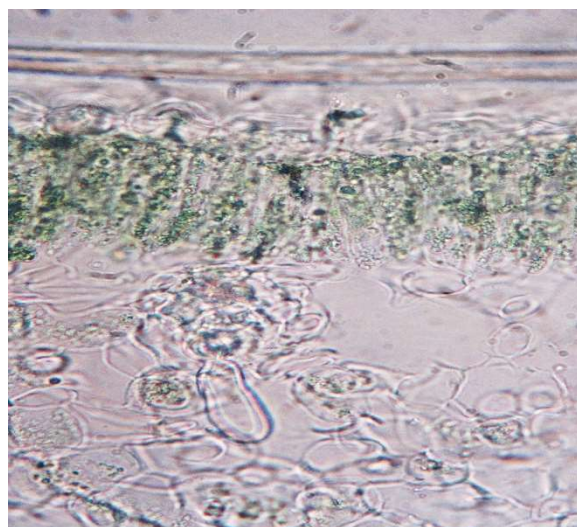


Figure 2: Lamina region of leaf

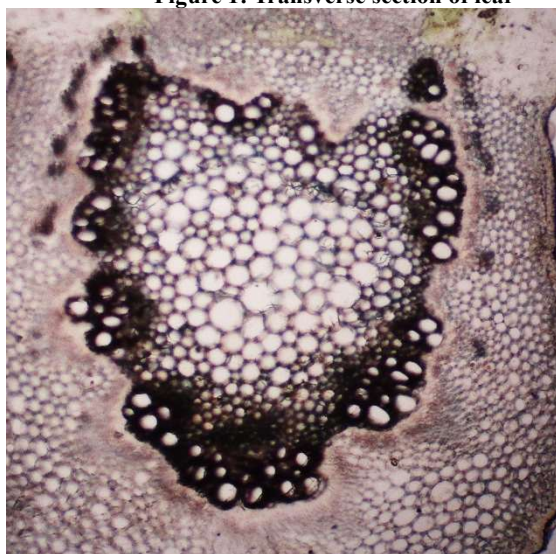


Figure 3: Vascular bundle of leaf

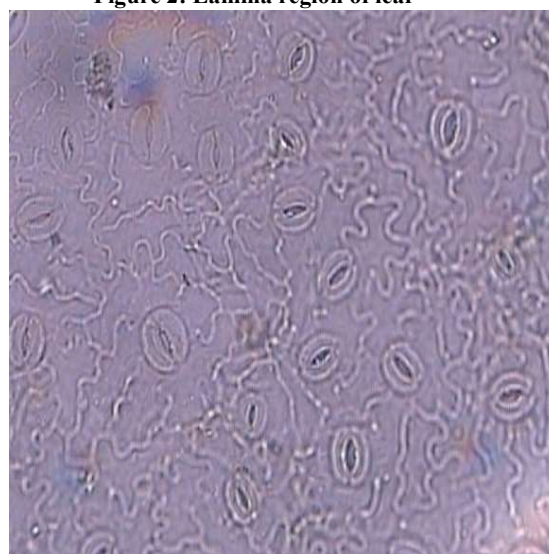


Figure 4: anomocytic Stomata



Figure 5: Trichome of leaf

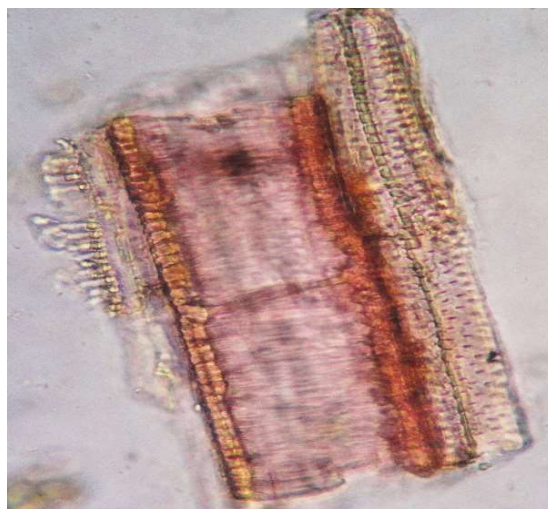


Figure 6: Reticulate xylem vessel

Table 1: Surface data of leaves of *Oroxylum indicum*

Leaf constant	Value per sq mm
Stomatal No	30
Stomatal Index	24.19

Table 2: Physical parameters of leaves of *Oroxylum indicum*

Physical Parameter	% (Air dried drug)
moisture content	9.8
Total Ash	9
Water Soluble Ash	4.7
Acid Insoluble Ash	0.7
Ethanol Soluble Extractives	11.5
Water Soluble Extractives	22.6
Petroleum ether Soluble Extractives	5.4

Table 3: Phytochemical screening of various extracts

Plant constituent	EXTRACTS				
	Petroleum Ether Extract	Toluene extract	Chloroform Extract	Methanol Extract	Aqueous Extract
Test/Reagent Used					
1) Alkaloids					
Hager's reagent	--	--	--	--	+
Wagner's reagent	--	--	--	--	+
Mayer's reagent	--	--	--	--	+
2) Triterpenoids					
Liebermann- Burchard's test	--	--	--	--	--
3) Saponins					
Foam test	--	--	--	--	--
4) Flavonoids					
Shinoda test	--	--	--	+	--
Lead acetate test	--	--	--	+	--
Sodium hydroxide test	--	--	--	+	+
5) Phenolic compounds and tannins					
Ferric Chloride solution	--	--	--	+	+
Lead acetate test	--	--	--	+	+
6) Carbohydrate					
Molisch's reagent	--	--	--	--	+
Fehling solution	--	--	--	--	+
Benedict's reagent	--	--	--	--	+

## DISCUSSION

The present work was carried out to study of various pharmacognostic parameters of leaves such as microscopical characters like transverse section of leaf, anomocytic stomata, unicellular covering trichome, reticulate xylem vessels, rosette of calcium oxalate crystals and stomatal index. These microscopical characters are helpful in identification of plant. Physical evaluation of leaves are of water, alcohol and ether soluble extractive values and ash values like total ash, acid insoluble ash and water soluble ash to helpful in authentication of plant. Percentages of the extractive values, ash values and loss on drying were calculated with reference to the air-dried drug. Leaves were subjected to successive and exhaustive extraction with standard solvents in the increasing order of polarity with a view to segregate their constituents on the basis of polarity. The percent extractives in different solvents indicate the quantity and nature of constituents in the extracts. The extractive values are also helpful in estimation of specific constituents soluble in particular solvent. Performing phytochemical screening of various extracts of leaves showed the presence of phenolic compounds, tannins, and flavonoids in the methanol soluble extract. Aqueous extract showed the presence of

alkaloids, phenolic compounds and carbohydrates. This finding is useful to supplement the existing information with regard to identification and standardization of *Oroxylum indicum* even in the powdered form of the plant drug to distinguish it from drug and adulterant.

## CONCLUSION

The present study may be useful to supplement the information with regard to its standardization and identification and in carrying out further research and its use in traditional system of medicine. These studies also suggest that the observed pharmacognostic and physiochemical parameters are of great value in the quality control and formulation development.

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