

# Preliminary Qualitative Evaluation of Bioactive Constituents in The Bark of *Sterculia Urens* Roxb. From Akot Region, Maharashtra, India

Miss Vaishnavi R. Raut<sup>1</sup>, Dr. Santosh N. Patole<sup>2</sup>

<sup>1</sup>Research scholars, Department of Botany, Shri Shivaji Arts, Commerce and Science College, Akot

<sup>2</sup>Professor, Department of Botany, Shri Shivaji Arts, Commerce and Science College, Akot

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**Abstract**—*Sterculia urens* Roxb. is an ethnomedicinally important tree species traditionally used by tribal communities of central India for treating inflammatory conditions, wounds, skin diseases, and gastrointestinal disorders. Despite its traditional relevance, systematic phytochemical studies on the bark of *S. urens* from the Akot region of Maharashtra are limited. The present study aims to perform a preliminary qualitative phytochemical screening of aqueous and ethanolic bark extracts using standard pharmacognostical methods. The analysis revealed the presence of flavonoids, tannins, phenolic compounds, saponins, carbohydrates, glycosides, and triterpenoids, whereas alkaloids were absent or detected only in trace amounts. The presence of these bioactive constituents provides scientific support for the traditional medicinal applications of *S. urens* bark and highlights its potential for further pharmacological investigation.

**Index Terms**—*Sterculia urens* bark, Ethnobotany, Qualitative Phytochemical screening, Soxhlet extraction, Traditional Knowledge System.

## I. INTRODUCTION

India is recognized as one of the world's richest reservoirs of medicinal plant diversity, with extensive traditional knowledge systems such as Ayurveda, Siddha, and folk medicine (Kirtikar & Basu, 2005). Medicinal plants form the foundation of these systems, and their scientific validation is crucial for conserving indigenous knowledge and integrating it with modern evidence-based medicine (WHO, 2013).

Bark is always an important part of herbal formulations and ingredients in traditional therapeutic practices. Bark of trees, stem bark of climbers, and bark including stems of shrubs and herbs are common sources of medicinal agents. Bark is also used to make

various everyday items, such as rope, baskets, mats, and cane chairs (Kumar, 2015). The indigenous traditional knowledge (ITK) on barks is going to decline due to urbanization, deforestation, and migration from rural and tribal India (Kumar et al., 2012; Kumar et al., 2021; Saha et al., 2022; Das et al., 2022; Dimri et al., 2024). In this aspect, raising awareness about the medicinal uses of the bark of local plants is a very important task, and there is a need to address it in different ways (Snehalatha et al., 2022).

*Sterculia urens* Roxb., belonging to the family Malvaceae, is a medium-sized deciduous tree distributed predominantly in the dry deciduous forests of central and peninsular India. The species is commercially important for its gum exudate, commonly known as gum karaya, which is used in pharmaceutical, food, and cosmetic industries as a stabilizing and emulsifying agent (Evans, 2009).

In addition to its medicinal value, *S. urens* contributes significantly to the livelihoods of forest-dependent communities as an important non-timber forest product. The collection and trade of gum karaya and the use of bark fibers for ropes and household articles underscore its socio-economic relevance (Ved & Jain, 2018). Previous studies have reported the presence of bioactive phytochemicals such as phenolics, flavonoids, terpenoids, tannins, and glycosides in *S. urens*, which are associated with antioxidant, antimicrobial, and anti-inflammatory activities (Sharma et al., 2010; Singh & Jain, 2011). Therefore, qualitative phytochemical screening serves as an essential preliminary step to substantiate its traditional medicinal claims (Harborne, 1998; Evans, 2009).

The present study aims to conduct a preliminary qualitative phytochemical evaluation of the bark of *Sterculia urens* Roxb. collected from the Akot region of Maharashtra. The study seeks to identify the major classes of bioactive constituents using standard pharmacognostic methods, thereby providing scientific validation for traditional medicinal claims and laying a foundation for future quantitative and pharmacological research.

## II. MATERIALS AND METHODS

### 2.1 Precautions for Collection of Plant Material

Precautions were taken during bark collection of *Sterculia urens* due to its potential allergenic and irritant properties, which may cause skin reactions, respiratory discomfort, or eye infections. Protective gloves, masks, long-sleeved clothing, and safety goggles were worn, and hands and equipment were thoroughly washed after handling.

### 2.2 Collection and Authentication of Plant Material

Fresh bark samples of *Sterculia urens* Roxb. were collected from the Akot region, Maharashtra, India. The plant material was authenticated by Prof. Dr. Santosh N. Patole (Taxonomist) and also by using standard taxonomic keys and various floras.

### 2.3 Preparation of Plant Material

The bark was shade-dried at room temperature for 10-20 days and then pulverized into a coarse powder using a mechanical grinder. The powdered material was stored in airtight containers for further extraction.

### 2.4 Preparation of Extracts Using Soxhlet Apparatus

Sequential extraction was performed using a Soxhlet extractor with solvents of increasing polarity: petroleum ether, acetone, ethanol, and distilled water. Approximately 50 g of powdered bark material was extracted with each solvent for 6 - 8 hours until complete extraction. The extracts were filtered, concentrated, and stored for further analysis.

### 2.5 Qualitative Phytochemical Screening

Qualitative phytochemical tests were performed on each extract using standard Methods (Mirge et al., 2023) to detect the presence of Proteins, Amino acids, reducing sugars, Alkaloids (Mayer's, Wagner's, and Hager's tests), Phenolic compounds, Tannins, Glycosides, Flavonoids, Terpenoids, Steroids, Resins and Saponins.

## III. RESULTS AND DISCUSSION

Qualitative phytochemical screening of *Sterculia urens* bark extracts demonstrated the presence of various bioactive compounds, with their profiles differing across different extraction solvents. (Table 1).

Sr.no	Name of constituent test	Acetone	Petroleum ether	Ethanol	Aqueous
1	Protein	+	+	+	-
2	Amino acid	+	-	-	-
3	Reducing sugar	+	-	+	+
4	Alkaloids				
	Mayer's	+	-	+	-
	Wagner's	+	+	+	+
	Hager's	+	+	+	+
5	Phenolic compound	+	+	+	+
	Lead acetate				
6	Tannins	+	+	-	-
7	Glycosides	-	-	+	+
8	Flavonoids	+	+	-	-
9	Phenol	+	+	+	+
10	Terpenoids	+	+	+	-
11	Steroid	+	-	+	+
12	Resins	+	-	-	-
13	Saponins	-	-	+	-

Proteins were detected in acetone, petroleum ether, and ethanol extracts but were absent in the aqueous extract, suggesting their preferential solubility in organic solvents. Amino acids were observed only in the acetone extract, indicating limited extraction in nonpolar and aqueous solvents.

Reducing sugars were present in acetone, ethanol, and aqueous extracts, reflecting their polar nature and better solubility in polar solvents. The absence of petroleum ether confirms their hydrophilic character.

Alkaloids showed a strong presence across acetone and ethanol extracts, with partial detection in petroleum ether and aqueous extracts. Positive reactions with Mayer's, Wagner's, and Hager's reagents confirm the presence of multiple alkaloidal compounds, supporting the ethnomedicinal importance of the plant.

Phenolic compounds and phenols were consistently present in all extracts, indicating a broad polarity range and suggesting strong antioxidant potential. The uniform presence of phenolics highlights their abundance in the bark.

Tannins were detected in acetone and petroleum ether extracts but were absent in ethanol and aqueous extracts, indicating selective extraction of condensed tannins in less polar solvents.

Flavonoids followed a similar pattern, being present in acetone and petroleum ether extracts only.

Glycosides were exclusively detected in ethanol and aqueous extracts, consistent with their polar nature and traditional preparation methods involving water or hydroalcoholic solvents.

Terpenoids were present in acetone, petroleum ether, and ethanol extracts but absent in the aqueous extract, confirming their lipophilic nature. Steroids were detected in acetone, ethanol, and aqueous extracts, with absence in petroleum ether, indicating moderate polarity.

Resins were observed only in the acetone extract, suggesting selective solubility. Saponins, known for their surface-active properties, were detected only in

the ethanol extract, supporting the suitability of ethanol for extracting amphiphilic compounds.

The presence of these phytochemicals substantiates the ethnomedicinal claims associated with *S. urens*. The results underscore the significance of solvent polarity and Soxhlet extraction in enhancing phytochemical recovery. The findings align with traditional Indian knowledge, where crude and solvent-based preparations are commonly employed for therapeutic purposes.

#### IV. CONCLUSION

The study confirms that the bark contains diverse bioactive phytochemicals, with extracts obtained using acetone and ethanol showing the highest diversity. The presence of phenolics, alkaloids, flavonoids, glycosides, and terpenoids supports the plant's traditional medicinal use. These findings scientifically validate its ethnomedicinal importance and provide a basis for further quantitative and pharmacological studies

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