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# Ultrastructural and Spectroscopic Analysis of Lignin of Stone Cells in *Mimusops elengi* L. (Sapotaceae) Fruit Mesocarp

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**Abstract:** Ultrastructural and spectroscopic analysis of lignin of stone cells of the fruit mesocarp of *Mimusops elengi* has been discussed here. Specific types of lignin, mostly present, Guaiacyj lignin (G-lignin), have been synthesized by Chemical methods and identified by Fourier Transform Infrared Spectroscopy (FTIR). An average domain (crystallite) size (L) of lignin is ~ 3.23 nm (32.3 Å) order calculated by X-Ray Diffraction (XRD). Calcium oxalate crystal (crystal sand type) has been seen in the sample and identified by the optical study by LM (Light microscopy). SEM (Scanning Electron Microscopy), Fluorescence Spectrophotometer, and FTIR. The essence of chemical compounds in our sample crystal and their structure has been determined by EDAX (Energy Dispersive X-ray Analysis) and XRD, respectively. The crystallite size of calcium oxalate is an average (187.5 ± 13.8) Å. Our present lignin is more active in the blue color region, analyzed by Chromatography plot using Fluorescence spectroscopy data under purple excitation light (380 nm). Also, we have studied the stone cells developed from parenchymal cells.

**Keywords:** *Mimusops elengi* fruit; XRD; FTIR; G-lignin; calcium oxalate; stone cell



## 1. Introduction

*Mimusops elengi L.* (Sapotaceae) tree is native to the Western peninsula. The Vernacular name of *Mimusops elengi* in English is Spanish cherry. Here, we have been focusing on *Mimusops elengi* fruit mesocarp grown in Purba Medinipur, Egra campus.

Fruit is an essential part of a plant. Spanish cherry fruit mesocarp contains stone cells. Brachysclereid is known as a stone cell, comprising a vast degree of lignin and cellulose, observed in the mesocarp layer, either aggregated or isolated forms known as sclereids [1,2]. Sclereids are developed from sclerenchyma cells—the secondary layout of lignin on the fundamental wall of parenchyma cells built sclereid [3,4]. Ca-base compounds, like Calcium Oxalate crystals in a different dimension, have been observed in different fruits.

The most abundant heterogeneous compound is lignin. It is a biopolymer in nature. It comprises up to one-third of plant cell walls [5]. Usually, it is evolved by the three

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# *Habenaria plantaginea* Lindl. (Orchidaceae): A new record for Eastern part of the Chhotonagpur Plateau, West Bengal, India

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ABSTRACT

The taxonomy and micro-morphology of the terrestrial orchid species *Habenaria plantaginea* Lindl. (Orchidaceae) is reported here as a new distributional record for the state of West Bengal based on field collection, literature survey and laboratory work. Botanical description, line drawings, colour photographs of different plant parts, notes on ecology, distribution pattern, stereo-microscopic and SEM studies of the taxon has been provided for authentication of identity.



## 1. Introduction

Orchidaceae is regarded as second largest family of the Liliopsida and contains 25,000-35,000 species under 800-1,000 genera in the world (Dressler, 2006). About 90% of the orchid species are epiphytes and rest grow in terrestrial habitats. In India, about 1300 species of orchids belonging to 140 genera are reported to occur and maximum concentration of species can be found in eastern Himalayas, the Western ghats, Eastern ghats and the South Indian hills. The genus *Habenaria* is represented by about 876 species (Batista *et al*., 2013) and these are widely distributed in all continents except Antarctica. India is well represented with 72 species of *Habenaria*, of which 30 are endemic (Misra, 2007; Prasad & Venu, 2015). The presence of 12 species of *Habenaria* from West Bengal state has so far been reported (Choudhury *et al*., 2011).

*Habenaria plantaginea* Lindl., a terrestrial orchid having prominent underground bulbs was observed in the slope of Ajodhya hills (Chamtaburu) in Purulia District, West Bengal at an altitude of about 2336 ft under the canopy of *Terminalia chebula*. Ajodhya hills are the eastern most part of the Chhotonagpur plateau and also considered by some as the extended part of Eastern Ghats ranges.

Review of literature revealed that very little work has been done on this group. Stern (1997) worked on vegetative anatomy of Habenariinae and Bhaurav and Rajaram (2016) analysed the distribution, density and characteristics of 18 species of *Habenaria* occurring in Western Ghats of India. Some sporadic work on orchids, in general, has been done in different parts of India such as from Andhra Pradesh (Miria *et al*., 2012), Madhya Pradesh (Mujaffar *et al*., 2013), Tamil Nadu (Kottaimuthu *et al*., 2008; Christudhas and Mary, 2015) and Jharkhand (Kumar *et al*., 2007). The present paper deals with the taxonomy, micro-morphology and SEM studies of *Habenaria plantaginea*.

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RESEARCH ARTICLE

# Studies on the Sclereids Diversity and Distribution Pattern in the Different Plant Organs (leaves, stems and fruits) of some Selected Medicinally Viable Angiospermic Taxa in Eastern India: A Systematic Approach

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**ABSTRACT**

*Sclereids or stone cells in the plant organs have great value in plant systematics studies. A comparative micro- morphological study of plant sclereids of 26 genera belonging to 15 families (each 3 members from Rosaceae, Sapotaceae, 2 members from Cucurbitaceae, Lauraceae, Euphorbiaceae, 1 member from Annonaceae, Ebenaceae, Magnoliaceae, Fabaceaewas done. Five types of sclereids were observed viz. Astro sclereids, Brachy sclereids, osteo sclereids, Macro Sclereids and Tricho Sclereids. Sclereids were associated with fibrous tissue which were elongated in structure and thick walled than the fibrous cells, but thickness of the wall of sclereids were not uniform. Among these 5 types of sclereids brachysclereid are more common in case of fresh fruits than other plant parts. The most diversified sclereids were observed in the aquatic angiosperms like Nelumbo nucifera, Nymphoides cristatum and Nymphaea nouchali. The structure, shape and size of sclereids varied between the different families and even within the family between the various genera. It has been observed that a combination of the typological diversity and surface distribution pattern could be utilized as an aid in the distributionof the taxon at the specific and subspecific level.*

***KEY WORDS**: Micro-morphological studies, sclereids, taxonomic tools*