

Research Article

Seeds of *Mimusops elengi* Linn. Pharmacognosy and Phytochemical Studies

*Bindu Gopalkrishnan, Shraddha N. Shimpi.

Research Laboratory, Department Of Botany, K. V. Pendharkar College,
Dombivli (E) 421203, Dist. Thane, Maharashtra, India.

ABSTRACT

Mimusops elengi Linn. belongs to family Sapotaceae. It is a large evergreen tree found commonly in India. The seed is known for its medicinal properties, such as in constipation, diabetes, hydrophobia, piles etc. The folklore mentions seeds to have spermicidal properties. The present investigation deals with the quantitative and qualitative microscopic evaluation of the seeds and establishment of its quality parameters, including physicochemical and phytochemical evaluation. Chief characters of transverse section include sclerenchymatous testa, parenchymatous tegmen, nucellar cells, parenchymatous endosperm and cotyledons cells. Physicochemical parameters were also established. Preliminary Phytochemical screening revealed the presence of phytoconstituents such as terpenoids, saponins, anthraquinone glycoside and cardiac glycoside. Saponin being the major biochemical, TLC was performed using standard marker. This study can be a reliable tool for investigating the status of the plant organ as a crude medicine. It will also serve as an important parameter for Pharmacological investigations and also ensuring quality formulations in future.

Keywords: Pharmacognosy, Phytochemistry, Sapotaceae, *Mimusops elengi*

INTRODUCTION:

Mimusops elengi Linn. (Family - Sapotaceae) is an evergreen tree. It is known as Bakulah in Sanskrit and Bakul in Marathi³. The plant is a huge tree, growing up to 40-50 ft tall, with dark gray bark. The fragrant flowers bloom from January to March. It starts bearing fruits from Jan to May. The fruit is a berry, yellow, ovoid 2.5cm long. It encloses one (rarely two) seeds¹. *Mimusops elengi* seed is used traditionally for curing piles, headache, constipation, spermicidal etc. The seed oil is used in cooking and as a luminant¹³. In, spite of the numerous medicinal uses attributed by the seeds. The plant is under ignorance. Therefore there is a need to put forth the pharmacopoeial standards for the seed. Hence the present investigation includes macroscopic and microscopical evaluation, determination of physicochemical constants and preliminary phytochemical screening along with TLC of *Mimusops elengi* seed.

MATERIAL AND METHODS

Collection and authentication of plant material

Authentic seed samples were collected from wild with prior permission from various places of Maharashtra. The sample was authenticated for its botanical identity from the standard herbaria at Blatter herbaria (Mumbai) and Botanical Survey of India (BSI Pune). A voucher specimen has been deposited in Botany Research

Laboratory of K.V. Pendharkar College, Thane, Maharashtra, India (KVP/BOT/0072).

Pharmacognostic studies

The macroscopy and microscopy of the seeds of *Mimusops elengi* was studied^{12,20}. Photomicrography of transverse sections of fresh seeds was performed. Seeds were dried under shade and made into powder. The powder study were carried out using camera lucida and stage micrometer^{8,9,10,11,16}. Histochemical studies were also done by using various reagents¹⁵(Table 1).

Physico-chemical evaluation

Physico-chemical values such as the percentage of ash values (total ash, water soluble and insoluble ash) and extractive values (water soluble and alcohol soluble extractives) were established using the powdered drug^{2,18} (Table 2).

Fluorescence study

The fluorescence response of powdered drug exposed to U.V. radiations were studied^{5,14} (Table 3)

Preliminary Phytochemical Screening

The powder was extracted with water, alcohol and chloroform. These extracts were tested for their respective phytoconstituents^{4,7,17} (Table 4).

Thin Layer Chromatography (TLC)

The seed powders were extracted for saponins and were subjected to TLC along with marker saponins^{6,19} (Table 5).

RESULTS

*Author for correspondence

E-mail: bindu_phd @ rediffmail.com



Figure 1: Habit of *Mimusops elengi*



Figure 2: *Mimusops elengi* fruit



Figure 3: Seeds of *Mimusops elengi*

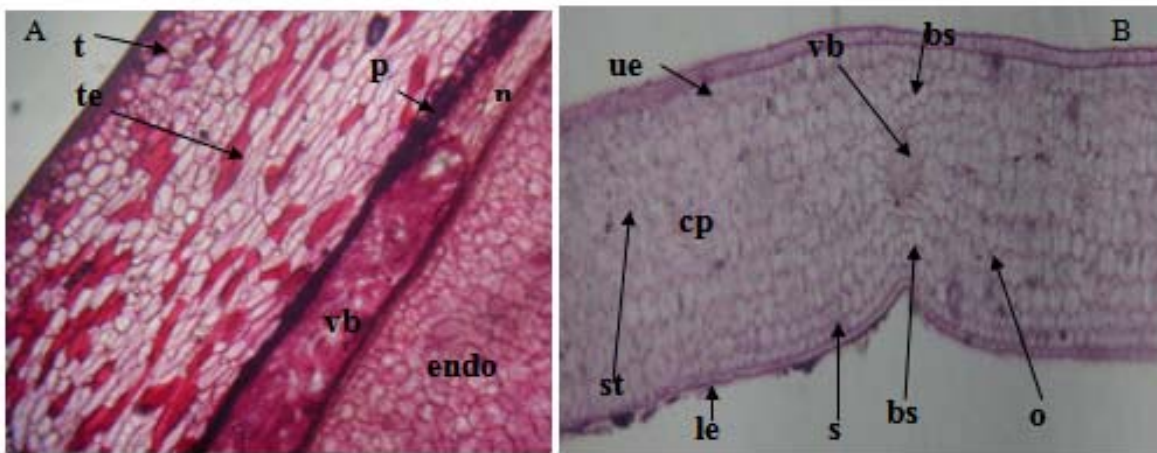


Figure 4: T.S. of *Mimusops elengi* seed

A, T.S. of seed passing through testa, tegmen, perisperm and endosperm (X 450);

B, T.S. of seed passing through cotyledon (X 450) (t, testa; te, tegmen; p, perisperm; n, collapsed nucellar cells; vb, vascular bundle; endo, endosperm; ue, upper epidermis; le, lower epidermis; s, sclerenchyma cells; cp, cotyledonary parenchyma cells; o, oil globules; st, starch grain)



Figure 5: Powder study of *Mimusops elengi* seed (X 450)

A, Cells of testa; B, Cells of tegmen with oil globules; C, Annular pitted vessel; D, cotyledonary parenchyma cells

Macroscopy

The fruit is a berry, containing usually one, rarely two seeds. Seeds are albuminous, dicotyledonous. When freshly cut milky latex exudes out from the seed. The seeds are 1.7-1.9cm in length and 1.2-1.5cm in breadth.

It is compressed, obliquely ovoid, hilum elongated and lateral. They are shining, light brown to blackish in colour. The testa is 1-2cm thickness, hard, light brown and shining with distinct parallel striations usually five. The tegmen is dark brown shiny, with impression of perisperm. Perisperm is thin membranous, shiny, light

Table 1 : Histochemical study

Plant constituent Test	Observations
Test for starch	+
Test for Lipids	+
Test for Proteins	+
Test for Tannins	+
Test for Alkaloids	-
Test for Saponins	+
Test for Glucosides	-
Test for Mucilage	+
Test for Calcium oxalate crystals	-

+ Present, - Absent

brown with dark brown striations on it. Endosperm 5-8mm in diameter and 9-12mm in length; white, thick and

Table 2 : Physicochemical evaluation

Ash values	Total ash	Not more than 0.5%
	Acid insoluble ash	Not more than 0.40%
	Water soluble ash	Not more than 0.30%
Extractive values	Ethanol	Not more than 18.90%
	Water	Not more than 12.88 %
	Chloroform	Not more than 11.16%

fleshy with impression of perisperm on the outer surface, while inner surface shows impression of veins, of the cotyledon. Embryo consists of cotyledons which are 5-8mm in diameter and 8-12mm in length, white, straight, oval in shape with reticulate venation. Radicle is minute and straight. Plumule is also very minute. It is odourless and bitter astringent in taste (Figures 1, 2, 3).

Microscopy

Transverse section of the seed show -

Testa: It is the outer most region of the seed coat,

consisting rectangular epidermis cells measuring 20.06-32.52µm in breadth and 18.65-27.67µm in length. Epidermis is followed by 12-15 layers of thick walled hexagonal to polygonal sclerenchymatous lignified cells measuring 33.06- 49.54-56.95µm in diameter. These cells are filled with masses of deep reddish shining bodies. Sclerenchymatous cells are comparatively smaller towards the periphery and larger towards the inner side measuring 32.03-49.96-56.6µm in diameter. Distinct plasmodesmata connecting cells of testa are seen between the cells.

Tegmen: Tegmen is demarcated from testa by a few layers of parenchymatous cells measuring 16.6-19.9-33.3-36.68µm in diameter. Each cell is filled up with brown content.

Perisperm: Tegmen is followed by a few layers of collapsed nucellar cells measuring 23.3-26.6µm in diameter. Vascular bundles with prominent xylem and a patch of phloem on the top are observed.

Endosperm: It consists of upper and lower rectangular epidermal cells measuring 26.6-32.2 µm in breadth and 23.1-27.6µm in length. The cells of endosperm are thin walled, parenchymatous, angular in matured seed while circular in young seed, measuring 16.65-16.6µm in diameter. The cells are filled up with oil globules and starch grains.

Cotyledon: is limited by the distinct rectangular upper and lower epidermii measuring 14.3-15µm in breadth and 10.56-12.34 µm in length. Lower epidermis shows distinct notch near the centre, below a large vascular bundle. Between the two epidermii the parenchymatous cells are present measuring 12.5-22.6-34.08µm in diameter. They are compactly arranged, thin walled, packed with oil globules and starch grains. Above the lower epidermis 1-2 layered thick walled sclerenchymatous hypodermis measuring 11.2-25. 6µm in diameter is seen. The vascular bundle is similar to that observed in the tegmen. It has the bundle sheath extensions reaching to the upper and lower epidermii (Figures 4. A, B).

Powder study

Powder is creamish brown in colour and coarse in texture. It has a characteristic odour and bitter taste. Diagnostic microscopic features of the powder include sclerenchymatous cells of testa, cells of tegmen with oil globules, annular pitted vessels, parenchymatous cells of endosperm and cotyledonary parenchyma cells (Figures 5. A, B, C, D).

DISCUSSION

Table 3 - Fluorescence analysis

Test	i	ii	iii	iv	v	vi	vii	viii	ix
Fluorescence	2F	3F	2B	2F	3B	yB	yB	yB	yB

Keys to the letters and numbers used-

Predominant colours:

F- Brown

B- Blue

Modifying colours:

y- Yellowish

Quality of colours:

2 Light

3 Dark

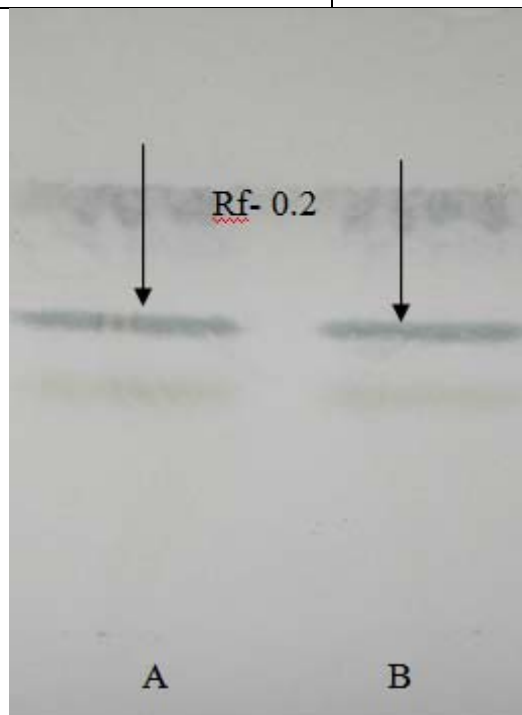
Table 4: Preliminary Phytochemical screening

Test for phytoconstituents	W	C	E
Test for Starch	+	+	+
Test for Terpenoids	+	+	+
Test for Proteins	+	+	+
Test for Amino acid	-	-	-
Test for Mucilage	+	+	+
Test for Alkaloids	-	-	-
Test for Anthraquinone glycoside	+	+	+
Test for Cardiac glycoside	+	+	+
Test for Saponin	+	+	+
Test for Tannins	+	+	+
Test for Steroids	-	-	-
Test for Flavonoids	-	-	-

Key: W- water extract, C- Chloroform extract, E- Ethanol extract, + Present, - Absent

Table5: Thin Layer Chromatography

Materials	Rf Value
Standard Saponins	0.2
<i>Mimusops elengi</i> Seed	0.2

**Figure 6:** Thin Layer Chromatography plate showing A, Standard saponin; B, *Mimusops* seed extract

For commercialization and acceptance in the international market, standardization of crude drug including macro and microscopical characters along with pharmacopoeial standards are necessary. In the present work, *Mimusops elengi* Linn. seed was studied for its pharmacognostic details. The macro and microscopical studies along with its powder study will enable the consumer and also the manufacturers to confirm authenticity of the drug. The Phytochemical screening, physiochemical constants and fluorescence analysis do supplement to achieve the genuine drug. In TLC the seed saponin has the same Rf value as the standard marker saponin. Thus the presence of saponin in the seed is confirmed. Hence *Mimusops elengi* seed can be added in to the list of saponin yielding plants. Appropriate pharmacological studies can bring this crude drug in the market.

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