



## Preliminary Phytochemical Screening and Microscopic Study of *Flacourtia jangomas*

Jeenu Joseph\*, Santhosh M Mathews

1. Professor, Department of Pharmacognosy, Pushpagiri College of Pharmacy, Thiruvalla, Kerala. India.
2. Principal, Pushpagiri College of Pharmacy, Thiruvalla, Kerala, India.

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### ABSTRACT

*Flacourtia jangomas* (Salicaceae family) commonly known as Indian plum or coffee plum or Paniala is a tropical deciduous tree that grows up to 6 to 14 m height. Various parts of *Flacourtia jangomas* is traditionally used for its analgesic, diaphoretic, astringent, stomachic, antimicrobial and anti-inflammatory properties. Microscopic study revealed the presence of important diagnostic characters such as paracytic stomata, epidermal cells, unicellular covering trichomes, bundle of lignified fibres and xylem vessels in leaves whereas bundle of lignified fibres, endosperm, calcium oxalate crystals, thin elongated fibres, starch grains, brownish matter and stone cells in fruits. Preliminary phytochemical screening of the leaves and fruits revealed the presence of alkaloids, tannins, carbohydrates, phenolics, flavonoids, fats, terpenoids and cardiac glycosides.

**Keywords:** *Flacourtia jangomas*; Ethnomedicinal uses; Morphological evaluation; Microscopic study; Powder microscopy; Phytochemical screening;

### INTRODUCTION

*Flacourtia jangomas* which belongs to Salicaceae family is also commonly known as Indian plum or coffee plum or Paniala. It is a tropical deciduous tree and grows up to 6 to 10 m height. It is a semi cultivated fruit tree which is said to originate from India and distributed all over tropical regions of East Africa and tropical Asia [1]. It is a salient fruit having immense medicinal and nutritional significance. The plant possesses phytoconstituents such as tannins, fixed oil, xanthones, limonoids, quinones and phenazines. Fruits are rich in proteins, sugars, fat, amino acids, minerals and vitamin C [2]. Various parts of *Flacourtia jangomas* is traditionally used for the treatment of countless ailments. It is therapeutically effective as analgesic, diaphoretic, astringent, stomachic, antimicrobial and anti-inflammatory. It is traditionally used for the treatment of diarrhea, skin diseases, jaundice, asthma, toothache and tumours. Fruits have antidiabetic property [3,4].

The aim of the present study is to investigate the morphological and microscopical characters, and to conduct the preliminary phytochemical screening of leaves and fruits of *Flacourtia jangomas*.

### MATERIALS AND METHODS

#### Collection, Identification and Preparation of Plant Material

Fresh leaves and fruits of *Flacourtia jangomas* was collected from Thiruvalla and authenticated by Dr. Jacob Thomas, Asst. Professor and Research Guide, PG & Research Dept. of Botany, Mar Thoma College, Thiruvalla. Fresh fruits and leaves are used for the macroscopical studies and powder is used for microscopical evaluation [5,6].

#### Morphological evaluation

Organoleptic evaluation includes evaluation of plant material by colour, odour, shape, taste, texture etc. The exterior characteristics of fruits and leaves of *Flacourtia jangomas*, are considered for macroscopical evaluation [5-11]. Macroscopic characteristics of leaf such as form, base, size, venation, apex, lamina, midrib and petiole are assessed according to conventional procedure.



### Microscopic studies

Transverse sections of *Flacourtia jangomas* fruits and leaves were taken using sharp blades. Thin sections were selected and stained using phloroglucinol and conc. HCl, examined under a microscope and photographed. A pinch of powder was transferred to a test tube and cleared with 5% KOH solution for analysis. Powder was also stained with phloroglucinol and conc. HCl, and then mounted on a glass slide. The glass slide was kept under microscope and photographed [5-11].

### Preliminary phytochemical screening

Qualitative phytochemical tests of the aqueous extract of the leaves and fruits to detect the presence of various secondary metabolites in was carried out using standard procedure. Phytochemical screening was undertaken by using standard methods for the analysis of secondary phytoconstituents like alkaloids, reducing sugar, saponins, flavonoids, tannins, glycosides, terpenoids and cardiac glycosides[5-11].

### Preparation of Extract

Aqueous extract was prepared by subjecting the coarsely powdered leaves and fruits to hydrodistillation [6].

## RESULTS AND DISCUSSION

### Morphological Characters of *Flacourtia jangomas* Leaves

Leaves are simple and arranged alternatively. Leaves surface is glabrous.

**Colour:** Green, tender leaves are pale pink.

**Shape:** elliptical

**Size:** 4.5 to 20 cm (l)

4.00 to 8.00 cm (w)



**Fig 1:** *Flacourtia jangomas* Leaves

### Morphological Characters of *Flacourtia jangomas* Fruits

**Colour:** Unripe fruits are Green in colour and turns pink or maroon when ripe.

**Shape:** Round in shape

**Size:** 1.5-2.5 cm broad when mature.

**Odour:** None

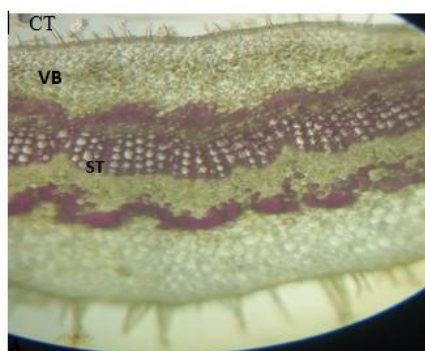
**Taste:** Sour



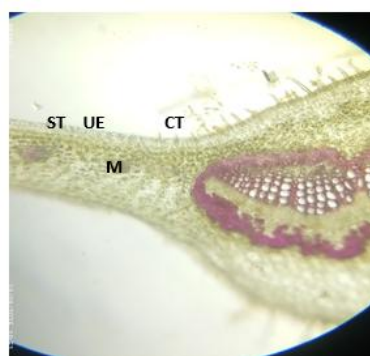
**Fig 2: *Flacourtia jangomas* Fruits**

**TS of *F. jangomas* Leaves**

Transverse section of *F. jangomas* consists of single layer upper and lower epidermis containing unicellular covering trichomes and straight walled epidermis with paracytic stomata. Midrib consists of epidermis, below which contain thick walled collenchyma, cortex with parenchyma and arch shaped vascular bundle at the centre. Vascular bundle is covered with lignified pericyclic fibres. Lamina contains a single layer of epidermis, and mesophyll with loosely arranged palisade cells and parenchyma. Starch grains are widely present in the parenchyma cells.



**Fig 3.a) TS of midrib of *F. jangomas***

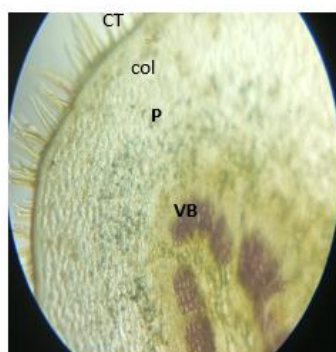


**Fig 3.b) TS of lamina of *F. jangomas***

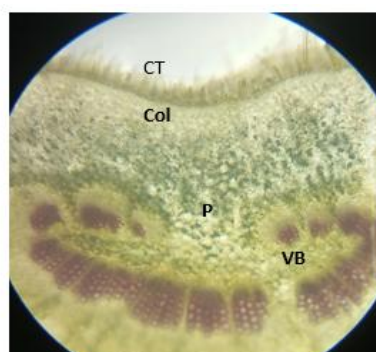
CT-covering trichomes, VB-vascular bundle, ST-stone cells, M-Mesophyll

**TS of petiole of *F. jangomas***

Transverse section of petiole of *F. jangomas* leaves is kidney shaped. It consists of single layer of epidermis containing unicellular covering trichomes and straight walled epidermis with paracytic stomata. Below the epidermis contain thick walled collenchyma, cortex with parenchyma and vascular bundle at the centre.



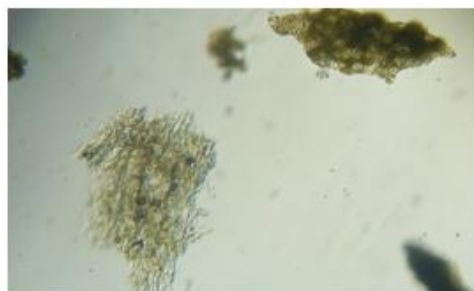
**Fig 4.a) TS of petiole of *F. jangomas***



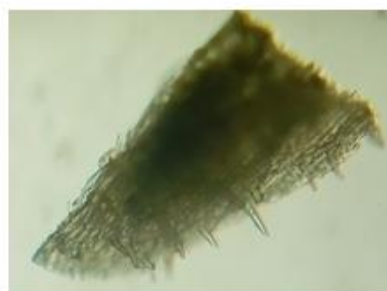
**Fig 4. b) TS of petiole showing CT-covering trichomes, C-cortex, VB-vascular bundle, Col-collenchyma**

### **Powder Microscopy of *F. jangomas* leaves**

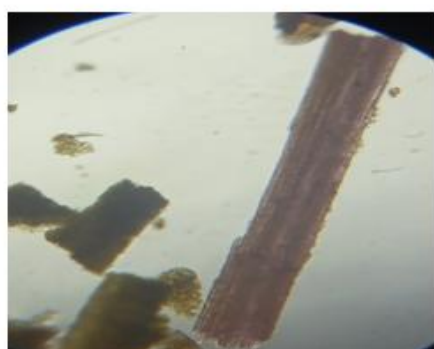
*F. jangomas* leaves powder consists of important diagnostic features such as straight walled rectangular epidermal cells, paracytic stomata and unicellular covering trichomes. Also contain lignified bundle of fibres, starch grains, calcium oxalate crystals and spiral shaped tracheids.



**a) paracytic stomata and epidermal cells**



**b) unicellular covering trichomes**



**c) bundle of lignified fibres**



**d) lignified xylem vessels**



**e) brownish matter, stone cells**

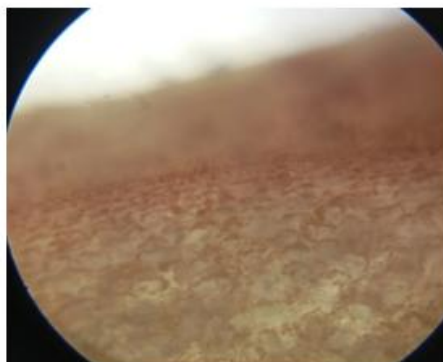


**f) fibres, calcium oxalate and starch grains**

**Fig 5: Powder Microscopy of *F. jangomas* leaves**

### TS of Fruit of *F. jangomas*

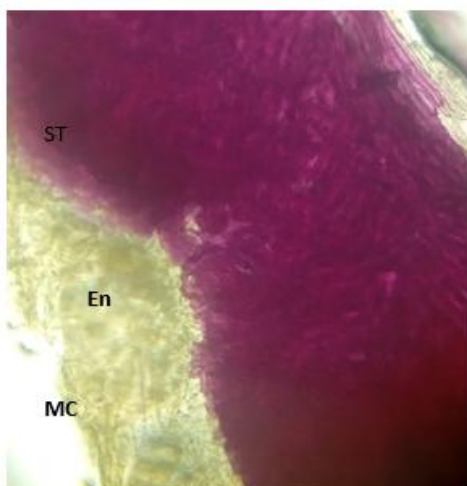
TS of fruit of *F. jangomas* consists of pericarp consisting of epicarp, mesocarp and endocarp. Epicarp is pink coloured with thin elongated tabular cells and mesocarp is white and consists of large parenchyma cells. Calcium oxalate crystals and abundant starch grains are present. Seeds are elliptical in shape with white coloured endocarp. Below the endocarp contains an elliptical lignified layer consisting of numerous layers of thin lignified fibres. The centre of the seeds contains a narrow lumen.



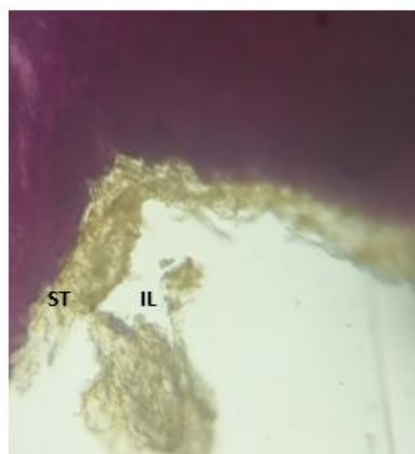
a) TS of Fruit of *F. jangomas*



b) TS of seeds in *F. jangomas* fruit



b) TS of *F. jangomas* seed SC-Seed coat inner lumen, ST-stone cells, MC-mesocarp



c) TS of *F. jangomas* fruit IL-

Fig 6: TS of Fruit of *F. jangomas*

### Powder Microscopy of *F. jangomas* fruit

*F. jangomas* fruit powder consists of important diagnostic features such as bundle of lignified fibres, endosperm, parenchyma cells, calcium oxalate crystals and thin elongated fibres.

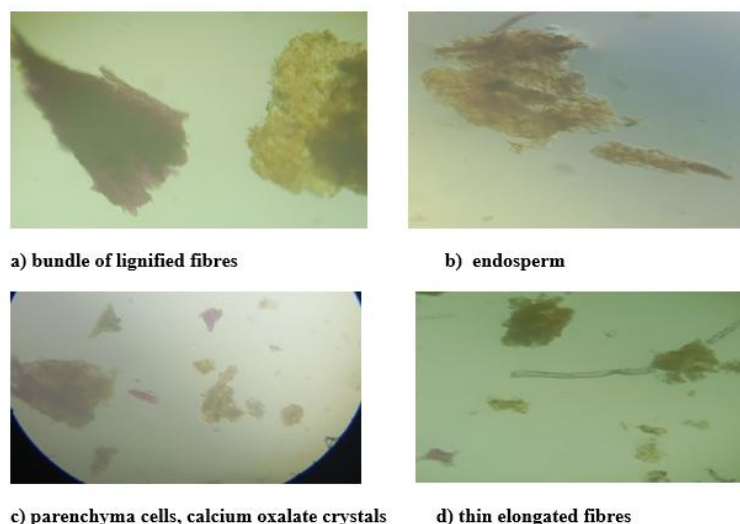


Fig 7: Powder Microscopy of *F. jangomas* fruit

### Preliminary phytochemical screening

Qualitative preliminary phytochemical screening of aqueous extract of *Flacourtia jangomas* leaves and fruit is performed and results are given in Table 1. Preliminary phytochemical screening revealed the presence of alkaloids, carbohydrates, fat, flavonoids, cardiac glycosides, tannins, phenolic compounds, terpenoids and proteins are present in leaves and fruits of *Flacourtia jangomas*.

Table 1: Preliminary Phytochemical Screening of aqueous extract of *Flacourtia jangomas*

No	Chemical Groups	Leaf	Fruit
1	<b>Test for reducing sugar</b> Fehling's test Molisch test	+++ +++	+++ +++
2	<b>Test for Fat</b> Stain Test	+	++
3	<b>Test for protiens</b> Million's test	+++	++
4	<b>Test for flavonoids</b> Shinoda test Sulphuric acid test	++ ++	++ ++
5	<b>Test for alkaloids</b> Dragendroff's test Mayer's test Wagner's test Hager's test	++ ++ ++ ++	++ ++ ++ ++
8	<b>Test for tannins and phenolic compounds</b> Lead acetate solution Ferric chloride test	+++ +++	+++ +++
9	<b>Test for cardiac glycosides</b> Legal's test Baljet Test	++ ++	++ ++
10	<b>Test for Terpenoids</b>	++	+

+++ : Highly positive, ++ : Moderately positive, + : Slightly positive, - : Negative



## CONCLUSION

Pharmacognostic studies are the primary step to ascertain the identity and purity of any herbal material. The present study revealed significant diagnostic features of *Flacourtia jangomas* which serves as beneficial profile for the correct identification, authentication, standardization of the species and detection of adulterants.

## CONFLICTS OF INTEREST

Nil

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Conflict of Interest Statement: All authors have nothing else to disclose.

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