

Pharmacognostic and Physicochemical Evaluation on Fruits of *Gmelina Arborea*

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ABSTRACT

The aim of present study was to carry out pharmacognostic and physicochemical evaluation of fruits of *Gmelina arborea*. Fresh fruits and dried powder of the fruits were studied by morphology, microscopy, qualitative chemical test and florescence analysis of powdered drug. Other physicochemical parameters were also performed as per WHO guide lines. The detailed microscopy revealed the presence of stone cells, vascular strand and pitted parenchyma. Physicochemical parameters and florescence analysis were also studied. The preliminary phytochemical screening showed the presence of alkaloids, proteins, saponins, sterols, phenolic compounds and carbohydrates. The result of these studies could be useful for identification and standardization of *Gmelina arborea* fruits.

Keywords: *Gmelina arborea*, Fruit, Phytochemical Screening, Physicochemical

INTRODUCTION

Gmelina arborea Roxb. belongs to family Verbenaceae, widely distributed in India, Ceylon, Malaya and Philippine Island. In Ayurveda, fruits are acrid, sour, bitter, sweet, cooling, diuretic, tonic and aphrodisiac. It promotes hairs growth, used in ulcers, anemia and leprosy. Fruits are reported butyric acid, tartaric acid, and saccharine substances. Chakradatta gave ripe fruits with honey for checking hemorrhage. Ripe fruits dried and cooked with cow's milk, for urticaria. Fruits used in dysuria, hemorrhagic disease^[1-6] The fruits are reported hepatoprotective,⁷ antibacterial, antioxidant and antidiabetic activity.^[8] The current study was carried out to provide pharmacognostic details, physicochemical and phytochemical analysis of fruits of *Gmelina arborea*

MATERIAL AND METHODS

Plant material

Fresh fruits of *G. arborea* were collected from Vadodara in the month of May-June 2011. Plant was identified and authenticated by Dr. P. S. Nagar at Botany Department of The M. S. University, Vadodara. Voucher specimen (DC-GM-1) was stored in herbarium of our laboratory. Fruits pericarps were separated dried under shade and powdered.

Reagent and Chemicals

All the chemicals and reagents used were of analytical grade, purchased from Sigma chemical co. (St Louis, MQ, USA) and Merck (Darmstadt, Germany).

Pharmacognostic study

Fruits were subjected to morphological examinations. Microscopic evaluation of fruit

was carried out by taking the transverse sections using standard procedures^[9-11] and then subjecting them to microscopic examination. The powdered samples were also subjected to histological examinations using standard procedures and their diagnostic features were identified and recorded and observed under Zeiss microscope using Mips Olympus camera (Magnification 10X and 40X). The section was stained with phloroglucinol and hydrochloric acid. Different diagnostic features were identified and reported in the results.

Fluorescence analysis

The fluorescence nature of powder drug was analyzed^[12] and the observations with different chemicals were also carried out and recorded.

Physicochemical evaluation of fruits of *Gmelina arborea*

The various physicochemical properties like water soluble extractive value, alcohol soluble extractive value and loss on drying) were determined as per WHO guidelines.^[13]

Phytochemical screening^[14-15]

A 20 g of pericarps powder was macerated with methanol and water for 24 hrs. The extracts

were filtered and concentrated by distilling the solvent and the extracts were dried under reduced pressure. Consistency, color, appearance of the extracts and their percentage yield were noted. The extracts were then subjected to various qualitative chemical tests to determine the presence of various phytoconstituents.

RESULTS AND DISCUSSION

Morphological study: Morphological character of fruits and seed reported and compared with reported character in Fig-1.

Seed: They are exalbuminous, Oblong, Light brown colored, oily Taste, Characteristic odor and having size 0.7-0.9 cm length 0.2-0.5 cm width, 0.1- 0.2 cm thickness.

Fruits: Fruits are drupe with calyx, Dark green color when unripe, yellow when ripe and Black when dried, Obovoid or pyriform, 1.9- 2.5 cm length and 1.2-1.5 cm width, smooth glossy surface, base; Cordate, odour; Characteristic, strong and disagreeable, exocarp; succulent and aromatic, endocarp, bony and usually 2-4 celled.

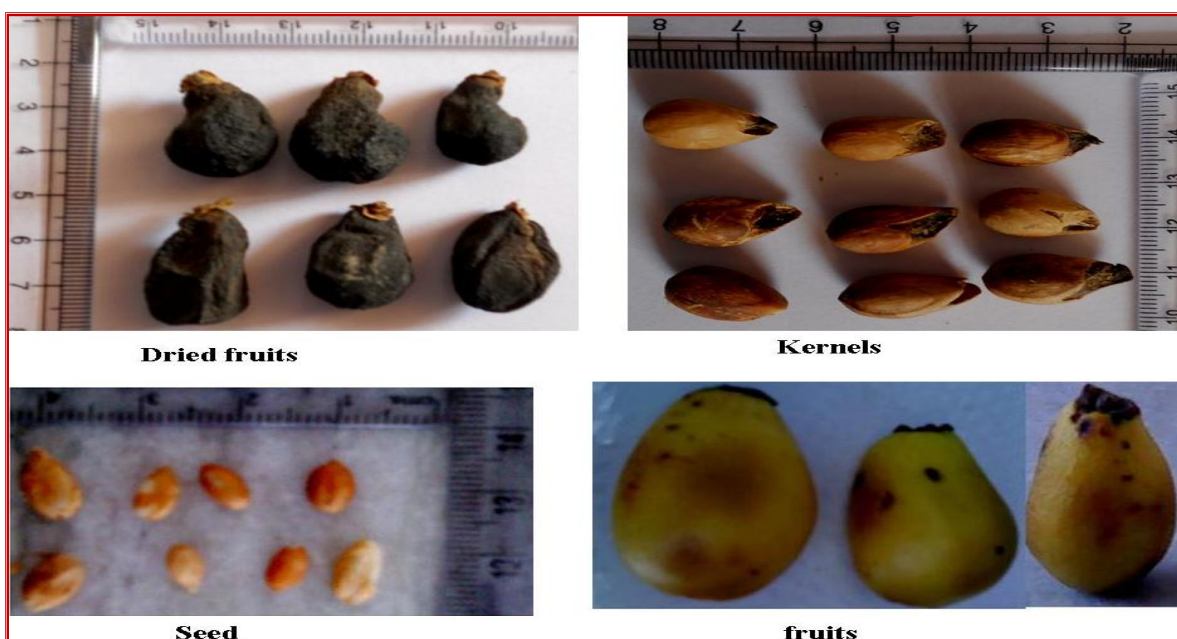


Fig.1 Morphological characteristics of dried fruits, kernels, seed and ripe fruits of *G. arborea*

Microscopical evaluation

Microscopical characteristics of fruits:

Fruit pericarp is differentiated into epicarp, mesocarp and endocarp. Epicarp is made up of single layered cells. Mesocarp is fleshy and multilayered made up of parenchymatous cells. Outer portion of mesocarp is made up of isodiametric or oblong parenchymatous cells while inner portion of mesocarp is made up of thin walled elongated cells. Vascular strand and sclereid was also observed. Endocarp is hard, made up of sclerenchymatous tissue.

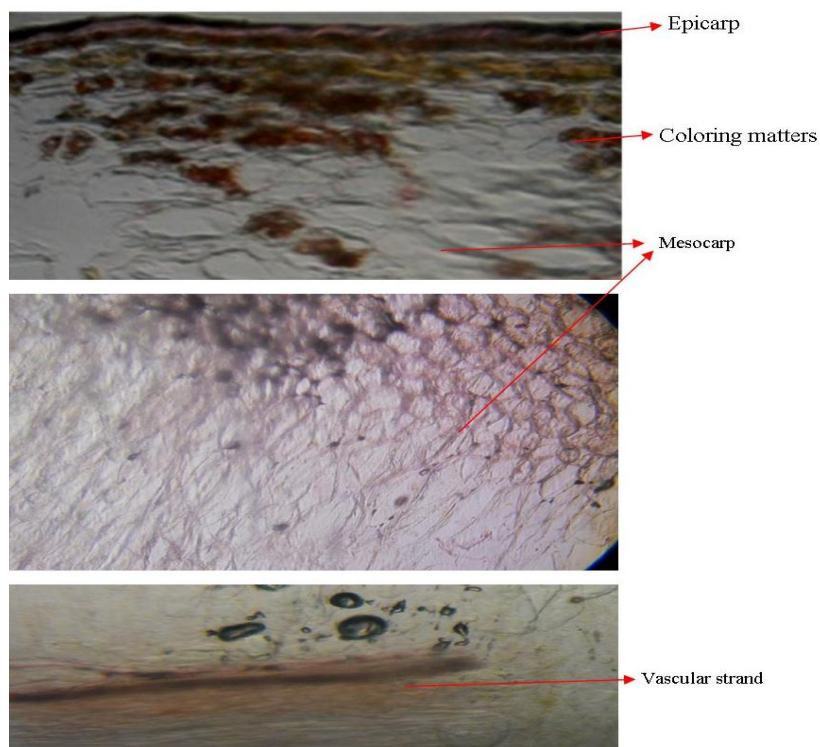


Fig. 2 Microscopical characteristics of *G. arborea* fruits pericarp (Excluding endocarp)

Fruits powder characteristics: It is dark brown color, acid taste and characteristic odor. Fruits powder microscopical characteristics are reported in Fig 3.

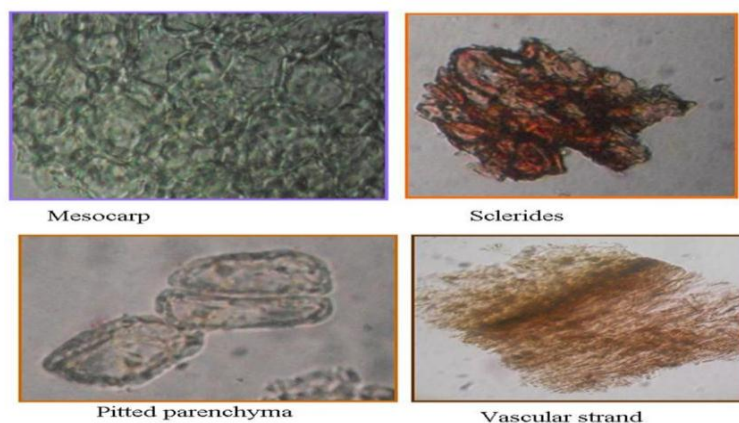


Fig. 3 Microscopical characteristics of fruits powder of *G. arborea*

Fluorescence analysis

Table 1 Fluorescence analysis of powder *G. arborea* fruits with various reagents

Reagents	Visible light	U V light (254nm)
Drug powder as such	Brownish	No Fluorescence
Powder +5 %NaOH (aqueous)	Light Brownish	Light yellow Greenish
Powder + 5 % NaOH (aqueous)	Light yellow	Golden Yellowish-green
Powder + Hydrochloric acid	Light reddish brown	Light green brown
Powder + Sulfuric acid	Reddish brown	Brownish red
powder + Nitric acid	Light yellowish-brown	Greenish yellow
Powder + Acetic acid	Light brown	Yellow green
Powder + NH ₃	Dark brown	Brownish
Powder + Water	Light brown	Light yellowish brown
Powder + Alcohol	Light reddish brown	Light yellowish brown

Physico-chemical constant:

The physicochemical constants are reported in table 5. The values given here are expressed as percentage of air dried material. Each value is average of three determinations.

Table 2 Physicochemical parameter of fruits of *Gmelina arborea*

Parameter	% w/w (n=3)
Foreign matter	0.8 %
Total Ash	5.35 %
Acid-insoluble ash	0.25%
Alcohol-soluble extractive	28.2%
Water-soluble extractive	35.3 %
Loss on drying	8.0 %

Phytochemical screening: Methanolic extract showed the presence of alkaloid, sterols, proteins saponins, carbohydrates and phenolic compounds.

Herbal medicines have been used for thousands of years. Medicinal plants are important sources for pharmaceutical manufacturing. Medicinal plants are widely used in pharmaceutical market. Quality, safety and efficacy of herbals drugs are most important criteria for herbal dug industry. Standardization of herbal drugs is a very challenging task for herbal drug industry because of complex nature and variation of chemical constituents. Microscopical evaluation is a one of the simplest method for identification of drugs.¹⁴⁻¹⁵ There is no pharmacognostic work reported on fruits of this plant. So the present work was undertaken for development of pharmacognostic standard of fruits of *G. arborea*.

CONCLUSION

Phytochemical study showed that the presence of secondary metabolites like alkaloid, phenolic compound and saponin. Physicochemical studies revealed the presence of total ash; 5.35%, acid insoluble ash; 0.25%, alcohol soluble extractive; 28.2% and water soluble extractive; 35.3 %. The pharmacognostic and phytochemical parameter established in the present study could be useful in identification and preparation of monograph of fruits of *Gmelina arborea*.

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