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ORIGINAL RESEARCH ARTICLE

Pharmacognostic and Phytochemical Investigation of *Kigelia africana* (Lam.) Benth. Fruits

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ABSTRACT

Objective: *Kigelia africana* (Lam.) Benth. fruits were selected to screen pharmacognostic and phytochemical studies.

Materials and Methods: Plant material was collected from a street in Eluru, West Godavari District , Andhra Pradesh, India. *Kigelia africana* (Lam.) Benth. is a rare medicinal plant, which has been valued in ancient systems of medicine for the treatment of constipation, piles, analgesic, anti-inflammatory, anti-plasmodial activity, syphilis and gonorrhea. . The fruit extracts of various solvents were subjected to pharmacognostical and phytochemical analysis. Variable fluorescence nature of the plant was also noted against day and UV light.

Results: Fruits contains many pharmacognostical parameters like parenchymatous cell,aleurone grains, calciumoxalte crystals etc. and extracts contain alkaloids, steroids, terpenoids, flavonoids, saponins, phenolic compounds, tannins, cardiac glycosides etc.

Conclusion:-Fruit contains alkaloids, steroids, terpenoids, flavonoids, saponins, phenolic compounds, tannins which could be a reason for the plants pharmacological activity. These observations would be of great value in the authentification of this plant in its crude form.

Key words: Fluorescence analysis, phytochemical screening, *Kigelia africana* (Lam.) Benth. fruit, pharmacognosy**.**

INTRODUCTION

The *Kigelia africana* (Lam.) Benth. is a fairly wide spreading, deciduous, about 10 meters in height, widely grown in the tropics and is introduced in India, and regarded as sausage tree. It contains leaves, flower, fruits and seeds are bigger . In view of its medicinal importance and taxonomic confusion, pharmacognostic studies, morphological characters, chemical analysis were carried out. The leaves are in groups of three at the ends of the branches and are 12-20 cm long with 3-7 leaflets. The inflorescence is a panicle, 35-75 cm long [1]. The tubular flowers are dark red with yellow veins, and have an unpleasant smell. The fruits are sausage-shaped, 30-80 cm long and 6.5-19 cm in diameter. Both ripe and unripe fruits are poisonous to humans but the fruits can be dried and fermented. Leaves are sometimes used to prepare a general tonic for improved health and growth. Aqueous fruit preparations are applied as a wash or rub to promote weight gain in infants, analgesic activity [2]. The roots, bark, leaves, stems, twigs and fruits are used to treat digestive disorders. The roots bark and ripe or unripe fruits are taken as a laxative or emetic, to treat chronic and acute digestive disorders and against gastric infections. Remedies containing the fruits of *Kigelia africana* are taken internally to relieve constipation or haemorrhoids, antiinflamattory, antimalerial, antidiarrhoeal and syphilis. Stem bark showing antibacterial activity. Despite a long tradition of use, no work has been carried out to justify its traditional claims, specially, analgesic activity properties. It is cultivated in widespread across tropical Africa by using seeds. It is best grown in warm areas, due to cold intolerance. Seeds are pressed into seedling trays filled with pure river sand, covered with a shallow layer of sand or compost, and kept moist. Germination commences within 10–25 days. It is commonly in Hindi: Balam khira, Jhar fanoos Kannada:

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Aanethoradu Kaayi, Mara Sowthae while in Telugu: Enuga thondamu, Kijili, Naagamalle . The objective of the present study is to evaluatevarious pharmacognostic standards like macroscopy of fruit, ash values, extractive values, and preliminary phytochemical analysis of *Kigelia africana* (Lam.) Benth. fruits.

MATERIALS AND METHODS

Collection, identification and authentication of raw *Kigelia africana* (Lam.) Benth.

Fresh fruits of *Kigelia africana* (Lam.) Benth. were collected in a street in Eluru, west godavari district, Andhra pradesh, India. In july and authenticated by department of botony, Acharya Nagarjuna university, guntur, India. A herbarium is maintained in sir crr College of Pharmacy, Eluru, Andhra Pradesh , India. The fresh fruits were separated and use for the study of macroscopy, powder microscopy and microscopical characters where as dried fruits powder material was used for the determination of ash values, extractive values, fluorescence analysis and phytochemical constituents. All the reagents used were of analytical grade obtained from Sigma Chemical Co, St. Louis, USA or Fine Chemicals Ltd., Mumbai, India.

RESULTS AND DISCUSSION

Macroscopical characters (**Fig 1**)

Color: grey-brown.

Size: pendulous berry up to 100 cm × 18 cm and up to 12 kg in weight, with peduncle up to 100 cm long.

Characteristic odour and intense bitter taste.

Extra feature: The fruit pulp is fibrous and pulpy, and contains numerous seeds, indehiscent, wall woody, surface heavily marked by lenticels.

Microscopical evaluation

One gram of *Kigelia africana* (Lam.) Benth. Was dissolved in distilled water, taken in glass slide[3] covered with cover slip and observed under the Carl Zeiss microscope with stain (Phloroglucinol and Conc. HCl) and without stain, to study the characters. The microphotographs [4] were taken by using Carl Zeiss binocular microscope attached with camera.

Diagnostic characters of the *Kigelia africana* (Lam.) under the microscope were fibre, mesocarp cells with yellow brownish pigments, prismatic and clusture crystals, fragments of epicarp, aleurone green cells, fragment of lignified fibre, fragment of epicarp containing group of stone cells (**Fig A - E**)

Histochemical color reactions

The different histochemical color reactions were performed on the fruit transverse sections to differentiate the different cell compositions and Identification[5] and results were given in (**Table 1**).

Behavior of powder with chemical reagents

Behavior of fruit powder with different chemical reagents was studied to detect the presence of phytoconstituents with color changes under daylight by reported method[6] and the results were shown in (**Table 2**).

Ash values

Total ash, acid-insoluble ash and water-soluble ash values of the fruit powder were done as per the reported methods [7]and the results are tabulated in (**Table 3**).

Extractive values

Extracts were prepared with various solvents by reported method[8]. Percentages of the extractive values were calculated with reference to air-dried drug (**Table 4**). Color and consistency[6] of extracts are given in **(Table 5**).

Qualitative phytochemical screening

Freshly prepared fruit extracts were tested for the presence of phytoconstituents using reported methods[9] and the results are given in (**Table 6**).

Fluorescence analysis of extracts

All the fruit extracts are examined in day light, short and long UV to detect the fluorescent

compounds by the reported method[8]. The observations are given in (**Table 7**).

Fig A: Sclerenchymatous stone cells

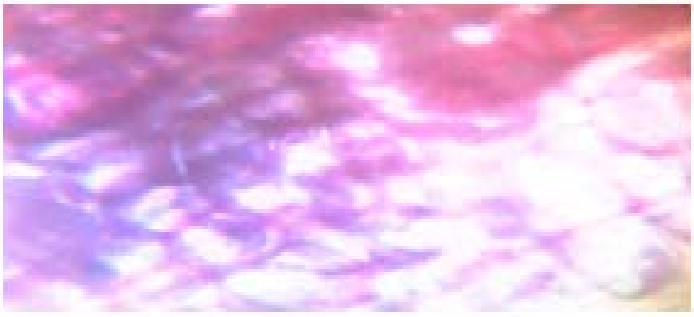

Fig B: oil globules

Fig C: Aleurone green cell

Fig D: Parenchymatous cells

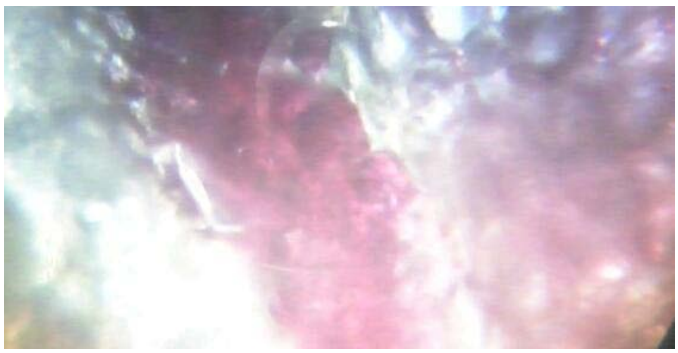

Fig E: prismatic and Clusture crystals

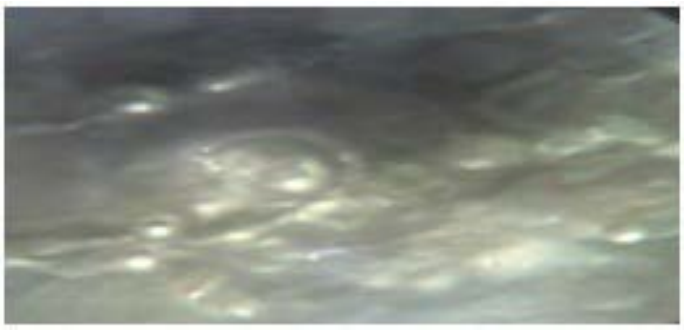

Table 1: Histochemical color reactions of *Kigelia africana* (Lam.) Benth

Reagents	Constituent	Color	Histological zone	Degree of intensity
Phloroglucinol + HCl	Lignin	Pink	Xylem, Sclerenchyma	+++
Conc. H2SO4	Cellulose	Green	mesocarp	+
Weak Iodine solution	Starch	--	--	--
Picric acid 10%		yellow	Aleuron grains	+++

+++ High, ++ Moderate, + Slight, - Negative.

Table 2: Behavior of *Kigelia africana* (Lam.) Benth fruit powder with different chemical reagents

Regents	Color/ppt	Constituents
Picric acid	precipitations	Alkaloids present
Conc. H2SO4	Reddish brown	Steroids/triterpenoids present
Aq. Fecl3	Greenish black	Flavonoids present
Iodine solution	Purple to black	Starch present
Ammonia present	No change	Antroquinone glycosides absent
5% Aq. KOH	No change	Antroquinone glycosides absent
Spot test Stains	Stains observed	Fixed oils present
Aq. AgNo3	White precipitation	Proteins present
Aq. NaoH	Yellow	Flavonoids present
Dragendroff's reagent	ppt	Alkaloids present
Aq. Lead acetate	White precipitations	Tannins present
Liberman Burcherd's test	black	Steroids and tannins are absent

Table 3: Ash value *Kigelia africana* (Lam.) Benth fruit

Types of ash value	% w/w
Total ash	8.0
Water soluble ash	5
Acid insoluble ash 1.0	2

Table 4: Extractive value of Kigelia africana *(Lam.) Benth* fruit

Type of solvent	%w/w
Pet. Ether	0.97
Ethyl acetate	2.3
Ethanol	3..7
Aqueous	10.56

Table 5: A consistency, color, and fluorescence character of successive extract of *Kigelia africana* (Lam.) Benth fruit

Parameter	Extracts			
	Pet. Ether	Ethyl acetate	Ethanol	Aqueous
Consistency	Viscous	Viscous	Viscous Sticky	Viscous Sticky
Color (day light)	Yellowish brown	Yellowish	Light Brownish	Brownish black
Short light	Yellowish	Light Yellowish	Yellowish red	Yellowish brown
Long light	Pale yellow	Yellowish	Reddish	Brown

Table 6: Qualitative phytochemical analysis of *Kigelia africana* (Lam.) Benth fruit

Constituents	Pet. Ether	Ethyl acetate	Ethanol	Aqueous
Alkaloids	+	+	+	+
Carbohydrates	-	+	+	+
Flavonoids	+	+	+	+
Fixed oils	-	+	+	+
Glycosides	+	+	+	+
gums and resins	-	+	+	-
Mucillages	-	-	+	-
Proteins and amino acids	+	+	+	+
Saponins	-	-	+	+
Steroids and sterols	-	-	-	-
Tannins	+	+	+	+
triterpenoids	-	-	+	+

+ present; – absent

Table 7: Fluorescence analysis of *Kigelia africana* (Lam.) Benth fruit

Color reaction	Day light	Uv light 365nm
Powder + NaOH	Yellow color	Yellow fluorescence
Powder+Methanol+nitrocellulose	Reddish brown	Yellowish green fluorescence
Powder + nitrocellulose	Reddish brown	Strong yellow fluorescence
Powder + NaOH in water	Yellow	Faint yellow fluorescence
Powder + nitrocellulose +Hcl	Reddish grayish	Faint green color
Powder + Hcl	Yellowish grey	Dark brown fluorescence
Powder + H2SO4	Blackish	Black
Powder + HNO3	Reddish	Black

CONCLUSION

Pharmacognostical properties such as organoleptic and physicochemical characters and features exhibited under fluorescence analysis were worked out. Also the phytochemical screening process shows the presence of biologically active phytochemicals in the fruit extracts of *Kigelia africana* (Lam.) Benth. The medicinal properties of this plant may be due to the presence of phytochemicals like tannins, flavonoids, terpenoids and steroids. Further studies are in progress in our laboratory to isolate the active components which are responsible for analgesic activity and antioxidant activity**.**

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