

ORIGINAL RESEARCH ARTICLE

**Detailed Pharmacognostical and Phyto-Chemical Investigation of  
*Aragwadha Phalamajja (Cassia fistula L.)***

**Vikram Kumar\*<sup>1</sup>, Thakar A.B<sup>2</sup>, Harisha C.R<sup>3</sup>, Shukla V.J<sup>4</sup>**

<sup>1</sup>Ph.D. Scholar, Department of Panchakarma, IPGT & RA, Gujarat Ayurved University, Jamnagar, Gujarat, India – 361 008

<sup>2</sup>Associate Professor and Head, Department of Panchakarma, IPGT & RA, Gujarat Ayurved University, Jamnagar, Gujarat, India – 361 008

<sup>3</sup>Head, Pharmacognosy Lab. IPGT & RA, Gujarat Ayurved University, Jamnagar, Gujarat, India – 361008

<sup>4</sup>Head pharmaceutical Lab. IPGT & RA Gujarat Ayurved University, Jamnagar, Gujarat, India – 361008

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**ABSTRACT**

*Aragwadha (Cassia fistula Linn)* of Caesalpiniaceae family is commonly used herb in Ayurvedic system of medicine. Various parts of this plant, having vivid actions is utilised in various disorders. *Phalamajja* (fruit pulp) of this plant is having purgative action and is utilised in *Virechana karma*. In *Sharangadhara samhita* its purgative action is referred as *Sramsana*. In the present study pharmacognostical, phytochemical analysis along with High Performance Thin Layer Chromatography of the *Aragwadha phalamajja* has been performed. The drug was also characterized for its physico-chemical properties. The presence of Fibre, Mesocarp cells with yellow brownish pigments, Prismatic and Clusture crystals of calcium oxalate, Fragments of epicarp, Aleurone green cells, Fragment of lignified fibre, Fragment of epicarp containing group of stone cells were the characteristic features observed in the microscopy of the drug. Pharmaceutical analysis gave ash value 8.32% w/w and water soluble extract 49.20% w/w. Phytochemical analysis indicated presence of anthraquinone glycosides and tannins. The present study provides the details of *Aragwadha phalamajja*, its pharmacognostical and phyto-chemical characters which may help in putting down a standard protocol for future research works.

**Key words:** *Aragwadha*, *Phalamajja*, Pharmacognosy, Phytochemistry.

**INTRODUCTION**

*Aragwadha* is moderate sized deciduous tree, 8-15m in height with greenish grey smooth bark when young and rough when old, exfoliating in hard scales. Leaves are pinnately compound, leaflets 4-8 pairs, ovate acute, bright green, glabrous above, paler and silvery-pubescent beneath when young, main nerves numerous. Flowers are bright yellow in lax pendulous racemes <sup>[1]</sup>. Fruits are many seeded pods (**Plate1, Fig A**).

A) *Aragwadha* Plant with matured fruits



The fruit pulp is traditionally used in India as anti-inflammatory, antipyretic, antimicrobial, abortifacient, demulcent, purgative, refrigerant, in chest complaints, eye diseases, heart diseases, liver ailments and in rheumatism <sup>[2-6]</sup>.

*Aragwadha phalamajja* is used in various conditions and a wide reference about the same is found in ayurvedic samhitas. *Aaragwadha* has been taken as one of the essential fruit (*phalini pradhana dravya gana*) in panchakarma treatment <sup>[7]</sup>. It is also considered as an essential drug in purgative drugs group (*virechaka dravya gana*) <sup>[8]</sup>. *Aaragwadha phalamajja* is used as a purgative drug in jwara along with milk <sup>[9]</sup>. *Kwatha* of fruitpulp along with other ingredients is used as *basti* in the management of fever <sup>[10,11]</sup>. *Majja* of *Aragwadha* along with *madhu* and *sharkara* is used as purgative in the management

of *raktapitta*<sup>[12]</sup>. *Majja* of *Aragwadha* with milk is administered for *virechana* in *pittodara rogi*<sup>[13]</sup>. *Majja* of *Aragwadha* along with *trikatu* is used in management of *kaphaja pandu roga*<sup>[14]</sup>. *Sharangadhara samhita* referred its purgative action as *Sramsana*<sup>[15]</sup>. In *Charaka samhita kalpasthana* there is a separate chapter called *Chaturangula kalpa*, in which various purgative preparations of *Aragwadha phalamajja* are described. It has been depicted as a safe purgative for children, aged and persons with tender body constitution due to its mild purgative action<sup>[16]</sup>.

#### AIMS AND OBJECTIVES

Evaluation of pharmacognostical and phyto-chemical characteristics of *Aragwadha phalamajja*.

#### MATERIALS AND METHODS

##### Collection, identification and authentication of raw *Aragwadha phalamajja*

*Aragwadha phalamajja* was collected from the Pharmacy, I.P.G.T & R.A. Gujarat Ayurved University, Jamnagar, identified and authenticated by Pharmacognosy laboratory of I.P.G.T & R.A, Jamnagar.

##### Fruit Morphology:

Morphology of fruit and its *majja* were scientifically studied and results were drawn.

Fruit is many celled, indehiscent pod, 35-60 cm long and 18-25 mm diameter, nearly straight and sub cylindrical, chocolate-brown to almost black in colour, pod surface smooth to naked eye, but under lens showing minute transverse fissures, both dorsal and ventral sutures evident, but not prominent, short stalk attached to base of fruit and rounded distal end mucronate, pericarp thin, hard and woody, fruit initially divided by transverse septa about 5 mm, apart, each containing a single seed attached to ventral suture by a long dark, thread-like funicle about 8-12 by 6-8 mm, circular to oval, flattened, reddish-brown, smooth, extremely hard and with a distinct dark brown line extending from micropyle to base, seed is embedded in a black viscid pulp consisting of black, thin, shining, circular disc like masses having central depression of seed on both surfaces or as broken pieces adhered with each other, when dipped in water makes yellow solution which darkness to brownish-yellow to dark brown, on keeping, pulp fills the cell but shrinks on drying and adheres to both sides of testa, seeds often lie loose in their segments<sup>[17]</sup> (Plate1: Fig B & C).

##### B) Pod transversely cut



##### C) Fruit pulp with seed inside the pod



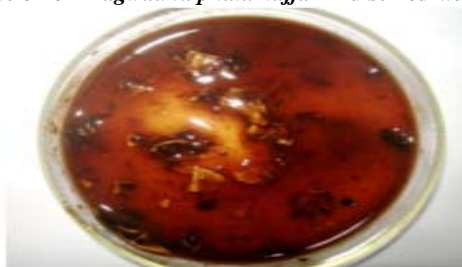
##### Organoleptic characters

Organoleptic characters ie. taste, colour and odour were recorded as per sensory organs.

##### Pharmacognostical evaluation

One gram of *Aragwadha phalamajja* was dissolved in distilled water, (Plate 1: Fig D) taken in glass slide 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 were taken by using Carl Zeiss binocular microscope attached with camera.

##### D) Solution of *Aragwadha phalamajja* in distilled water



##### Phyto-chemical assay of drug

*Aragwadha phalamajja* was analyzed by using qualitative and quantitative parameters at Pharmaceutical Chemistry Laboratory, Institute of Post Graduate Teaching & Research in Ayurveda, Gujarat Ayurved University, Jamnagar. All Physico-chemical parameters such as Loss on Drying, Ash value, pH, Water soluble extract, Methanol soluble extract, Acid-insoluble ash, were determined<sup>[18]</sup>.

##### High performance thin layer chromatography (HPTLC)

Methanol soluble extract of *Aragwadha phalamajja* was used for High performance thin layer chromatography (HPTLC) study. Methanol



extract of *Aragwadha phalamajja* was spotted on pre coated silica gel GF 60254 aluminium plates as 10mm bands by means of Camag Linomate V sample applicator fitted with a 100 $\mu$ L Hamilton syringe. Chloroform and Methanol in the ratio 8.5:1.5 was used as mobile phase. The development time was 30 minutes. After development, Densitometry scanning was performed with a Camag TLC scanner III in reflectance absorbance mode at 254nm and 366 nm under control of Win CATS software (V1.2.1. Camag) [19, 20]. Then the plate was sprayed with Vaniline sulphuric acid, dried in hot air oven and then visualized in day light.

## RESULTS AND DISCUSSION

### Pharmacognostical evaluation

#### Organoleptic parameters

The Organoleptic characters of the *Aragwadha phalamajja* are tabulated in the (Table 1).

**Table 1: Organoleptic characters of *Aragwadha phalamajja***

S. No	Parameters	<i>Aragwadha phalamajja</i>
1	Texture	Viscid pulp
2	Colour	Dark brown to black
3	Odour	Characteristic (Pleasant)
4	Taste	Sweet

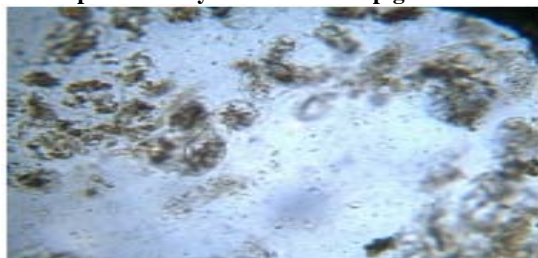
#### Phala Majja evaluation

Diagnostic characters of the *Aragwadha phalamajja* 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 (Plate 1: Fig E - M)

#### E) Fibre



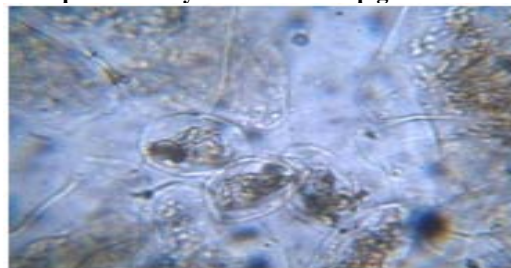
F) Mesocarp cells with yellow-brownish pigments



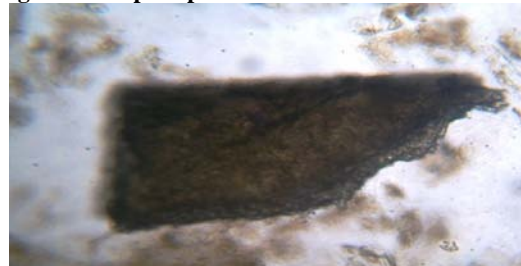
G) Prismatic and Clusture crystals



H) Mesocarp cells with yellow brownish pigments



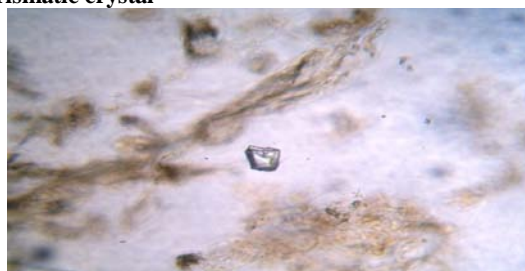
I) Fragments of epicarp



J) Aleurone green cell



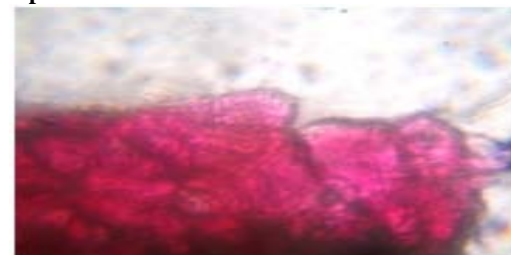
K) Prismatic crystal



L) Fragment of lignified fibre



M) Group of stone cells



#### Physico-chemical parameters

*Aragwadha phalamajja* was evaluated for various physico-chemical parameters. The results are shown in the (Table 2).

**Table 2: Physico-chemical parameters of *Aragwadha phalamajja***

S. No	TEST	RESULTS
<i>Aragwadha phalamajja</i>		
1	Loss on drying at 110° C	18.29 % w/w
2	Ash value	8.32 % w/w
3	pH (5% V/W Aqua Solution)	5.0
4	Water soluble extract	49.20 % w/w
5	Methanol soluble extract	32.40 % w/w
6	Acid-insoluble ash	0.26 % w/w

**Qualitative tests**

Qualitative tests indicated the presence of Anthraquinone glycosides and tannins. Details are shown in the (Table 3).

**Table 3: Functional groups of *Aragwadha phalamajja***

Functional groups	Results
Anthraquinone glycosides	+
Tannins	+
Saponin	-
Alkaloids	-

**High performance thin layer chromatography (HPTLC):**

HPTLC of *Aragwadha phalamajja* (methanol extract) at 254nm showed 9 spots at R<sub>f</sub> 0.04, 0.30, 0.35, 0.41, 0.46, 0.52, 0.57, 0.79, 0.92 and at 366nm showed 5 spots at R<sub>f</sub> 0.30, 0.35, 0.41, 0.46, 0.52, (Table 4, Plate 2 & 3)

After spraying with Vaniline Sulphuric acid followed by heating and then visualizing in daylight showed 4 prominent spots at R<sub>f</sub> 0.06, 0.13, 0.25, 0.39 (Table 5 & Plate 2)

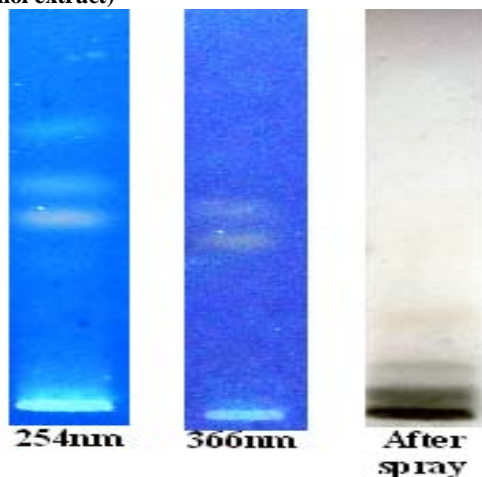
**Table 4: The findings of HPTLC at 366nm and 254nm UV light *Aragwadha phalamajja* (Methanol Extract)**

Wavelength	No. of Spots	R <sub>f</sub> value
254 nm	09	0.04,0.30,0.35,0.41,0.46,0.52,0.57,0.79,0.92.
366nm	05	0.30,0.35,0.41,0.46,0.52.

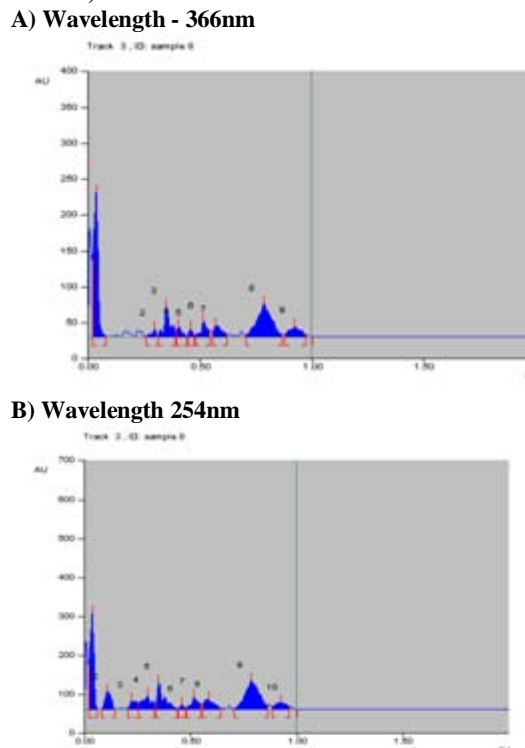
**Table 5: HPTLC of *Aragwadha phalamajja* (Methanol Extract) after spraying Vaniline sulphuric acid**

Spray	No. of Spots	R <sub>f</sub> value
Vaniline sulphuric acid	4	0.06, 0.13, 0.25, 0.39

**Plate 2: HPTLC photographs of *Aragwadha phalamajja* (methanol extract)**



**Plate 3: Densitogram of *Aragwadha phalamajja* (Methanol Extract) at 366nm and 254nm**



**CONCLUSION**

On record there is no concrete frame work for analysis of *Aragwadha phalamajja*. The pharmacognostical and phyto-chemical analysis of fruit pulp provides substantial information for the proper identification, authentication, and scientific evaluation of the drug. On the basis of observations made and results of experimental studies, this study may be beneficial for future researchers and can be used as a reference standard in the further quality control researches.

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