

**FARMACOGNOSTICAL STUDIES ON THE SOUTH INDIAN MARKET SAMPLE OF  
KARKATASRINGI (KADUKKAIPOO) –  
TERMINALIA CHEBUL (GAERTN. LEAF GALL)**

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**ABSTRACT:** *Pharmacognostical studies on the South Indian market sample of Karkatasringi (Terminalia chebula leaf galls) were carried out along with comparative studies on Pistacia integerrima which is the accepted source of Karkatasringi. The galls of T. chebula are also known as Kadukkai Poo in Siddha system.*

## INTRODUCTION

**Karkatasringi** is an important ayurvedic drug used in preparations like the **Dasamularista**, **Cyavanaprasa** and **Shringyadi curna** which are used in the treatment of diseases like **swasa** (asthma), **yakshma** (tuberculosis), **ajeerna** (indigestion), **hydroga** (heart diseases), **jwara** (fevers) and **yakrt roga** (liver disorders) to mention a few (Anonymous 1969, 1978). The acceptable source of the drug **Karkatasringi** are the galls of **Pistacia integerrima** Stew. Ex Brand. (Pistaciaceae) (Anonymous 1978).

During critical studies on the market sample of crude drugs in South India, the authors observed that a totally different material is used by the physicians as **Karkatasringi**. Systematic botanical identification (Gamble 1967) revealed that this drug belongs to the species **Terminalia chebula** (Gaertn.) Retz., of Combretaceae. The laminar portion gets infected and transforms into the galls which

along with the portion of petiole constitute the drug of commerce.

In the Siddha system of medicine, these galls are called as **Kadukkai poo** (Tamil) which are used in the preparation of **Pdaiga linga thubar** for the treatment of diarrhea and dysentery. **Kadukkai poo** is also used (eoneously)? As **Karkatasringi** in the preparations like **Karisalai legium**, **Venpoosunai nei**, **Gana tailam** and **Vazhai vagadam** which are used in the treatment of diseases like **Irumal** (Cough), **Iraippu** (Bronchial asthma), **Kazhichal** (Diarrhoea) **Ninakazhichal** (Dysentery). The accepted source of **Karkatasringi** in Siddha are the galls of **Rhus Sucedanea** L., but **P. integerrima** and **T. chebula** are generally used (Anonymous 1978a; Mudaliar 1951; Pillai 1931).

Literature review (Iyengar 1976; Roma Mitra 1985) revealed that no pharmacognostical studies have been carried

out on the leaf galls of **Terminalia chebula**. Hence the present work to understand the macro, microscopic and phytochemical details of this drug. A comparative study providing the main differences is also provided to differentiate **T. chebula** and **P. integerrima**.

## MATERIALS AND METHODS

The material under the name of **Karkatasringi** was procured from the local market and identified as the leaf galls of **Terminalia chebula** following Gamble (1967); it was fixed in 70% alcohol and microscopic studies carried out by taking free hand sections following Johansen (1940), Tease and Evans (1971) and Wallis (1967); microchemical studies were carried out as per Johansen (1940) and Wallis (1967). For preliminary physic-chemical analysis, determination of physical constants and fluorescence analysis, the drug was sieved through 60 mesh and analyzed following the **Indian Pharmacopoeia** (Anonymous 1966) and Chase & Partt (1949).

## BOTANICAL DESCRIPTION

**Terminalia chebula** (Gaertn.) Retz., is a medium – sized tree found in the sub Himalayan tracts from the Ravi eastwards to West Bengal and Assam up to an altitude of 1500 m in the Himalayas (Anonymous 1969). The bark is dark-brown and longitudinally cracked. Leaves are ovate or elliptic with a pair of large glands at the top of the petiole. The lamina gets infected and is transformed into the galls. Flowers yellowish – white, in terminal spikes (Fig. A). Drupes are ellipsoidal, obovoid and ovoid, yellow to orange-brown, 5 – ribbed on drying with hard, pale yellow seeds.

**Parts used:** Infected laminar galls along with portions of petiole colour and some of them show abundant reddish and blackish contents due to the presence of tannin. The lower few layers of cells are small, reddish-brown to blackish contents of tanniferous nature, star-shaped crystal idioblasts and few oil globules. The vascular bundles are conjoint, closed and found scattered in the ground tissue (Figs. 5, 6).

The measurements of cells in different tissues are provided in Table 1.

**TABLE 1**

### Measurements of different cells in tissues (in $\mu$ )

Tissue	Measurement
<b>Petiole:</b>	
Epidermis	25-35-45 x 20-30-40
Collenchyma	35-45-60 x 30-35-55
Parenchyma	20-30-45 x 15-25-40
Xylem	37-43-50 x 30-40-35
Phloem	10-20-30 x 5-15-25
Calcium oxalate crystal	25-30-50 (diameter)

Sclerenchyma	20-35-40 x 5-20-25
<b>Gall:</b>	
Epidermis	36-54-72 x 18-50-65
Parenchyma	72-90-108 x 54-72-90
Xylem	30-40-45 x 25-35-40
Phloem	15-20-25 x 5-15-20
Oil globule	5-12-25 (diameter)
<b>Macerate :</b>	
Parenchyma	40-45-60 x 35-40-50.3
Vessel	50-60-75 x 25-30-35
Fibre	75-90-98 x 10-15-20

Macerate of the exhibited thin walled parenchymatous cells with reddish yellow and blackish contents and star shaped crystal idioblasts (Fig. 7), vessels with helical thickenings (Fig. 8), long and slender fibres (Fig. 9).

Powder analysis: When the powder is treated with different acids like Sulphuric and Nitric, it turns black and reddish brown

to orange colour and with con. Hydrochloric, glacial acetic acid and iodine no change in colour was observed.

#### Physico-chemical details

Physical constants are provided in Table 2 following standard methods (Anonymous 1966).

**TABLE 2**

#### Physical constants (proximate analysis)

% loss on drying at 11°	.. 10.34
% total ash	.. 2.350
% water insoluble ash	.. 1.408
% acid insoluble ash	.. 0.450
% solubility:	
a. alcohol	.. 1.90
b. water	.. 2.85

% Extractive principles:	
a. petroleum ether (40-60 <sup>0</sup> )	.. 1.40
b. benzene	.. 0.60
c. chloroform	.. 1.85
d. ether	.. 0.50
e. alcohol	.. 3.50
f. water	.. 4.10
% volatile oil	.. NIL

### Organic constituents

Air dried powder of T. Chebula (galls) was extracted in soxhlet apparatus with petroleum ether (60 – 80<sup>0</sup>), chloroform and alcohol successively. These extracts were screened for steroids, tri-terpenoids, flavonoids, tanhins, saponins, sugars by colour tests; the results are provided in Table 3.

### Pharmacognostical evaluations

#### Macro and microscopic characters:

**Petiole :** Petiole measures 2.5 to 3 cm long and is light yellow to brown in colour.

T. S. of the petiole is almost circular in outline (Fig.1). The outermost epidermal layer consists of elongated parenchymatous cells with thick cuticle. The cortex is made up of 10 to 16 layers of cells, out of which 4 to 6 layers are collenchymatous and the remaining are thin walled, isodiametric parenchymatous cells with little intercellular space between them. Some of the cells in the cortex consists of crystals of calcium oxalate (Fig. 2). The vascular bundle with incurved ends in present in the central portion of the cortex (Fig. 3). Sclerenchymatous cells are present below the phloem.

**TABLE 3**

#### Tests for organic constituents

Constituents	Result
Steriods	++
Triterpenoids	--

Flavonoids	--
Phenols	++
Tannine	++
Sapponins	++
Sugars	++
Alkaloids	--

**Galls** (infected lamina) : The galls measure 1.5 to 4 cm long, flattened with smooth surface, light golden yellow (on drying), and irregular in Shape (Fig. B). Veins are prominent on the surface and filled with tannin contents in the hollow internal surface.

T. S. of the gall shows single layered elongated parenchymatous cuticular lower and upper epidermis; stomata is present on the lower epidermis and the cuticle is wavy (Fig. 4). Followed by upper epidermis,

many layered thin-walled oval to isodiametric parenchymatous cells with inter cellular spaces constitutes the ground tissue; the differentiation into palisade and spongy tissues is not clear; the few upper layers of cells are big, yellow in.

**Fluorescence Studies:**

The powdered drug was exposed under u.v. of different wave lengths and the results are provided in Table 4.

**TABLE – 4**

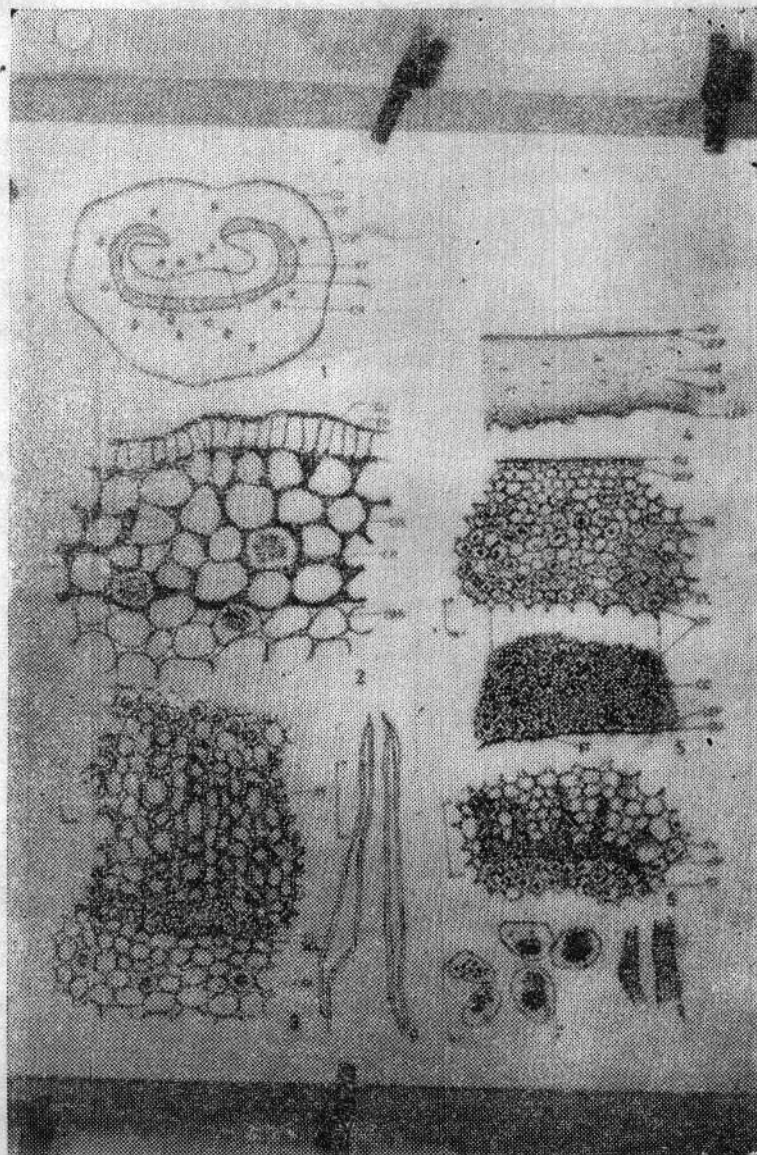
**Fluorescence studies**

Treatment	Visible rays	Ultra violet rays	
		Short wave (254 mμ)	Long wave (365 mμ)
As such	Greenish – yellow	Chocolate brown	Chocolate – brown
In methanol	Greenish-yellow	Yellowish	Greyish
In 1N. HaOH (MeoH)	Dark green	No fluorescence	No fluorescence
In 1N. HCL.	Yellowish green	No fluorescence	No fluorescence
In Ethanol	Yellowish	Yellowish	Grey



Figs. A - B: *Terminalia chebula*  
A - Twig with leaf & flowers. B - Market sample - leaf galls.





Figs. 1-9: Macro-, microscopic characters of *Terminalia chebula* (petiole and gall).  
 Figs. 1-3: Petiole (1) t. s. of petiole; (ground plan); (2) epidermis and cortex portion enlarged; (3) portion of vascular bundle enlarged; Figs. 4-6: Gall (4) t. s. of gall (ground plan); (5) portion enlarged; (6) vascular bundle enlarged; Figs. 7-9: Macerate (gall) (7) parenchymatous cells with idioblasts and cell content; (8) vessel with helical thickenings; (9) fibres.



### Comparative studies

The comparative study on the macro microscopic and Physicochemical differences between the galls of **T. chebula** and **Pistacia integerrima** are provided in Table.5

### Diagnostic characters of the drug

The balls of **T. chebula** can be recognized by the following diagnostic characters:

1. Presence of reddish – brown to orange or blackish contents of tannin;

2. Presence of tsar-shaped crystal idioblasts and oil globules;
3. Presence of clusters of crystals of calcium oxalate;
4. No differentiation into spongy and palisade tissue;
5. Vascular bundles many scattered in ground tissue.

**TABLE 5**

### Comparative Macro, microscopic and physic-chemical differences between the galls of **T. chebula** and **Pistacia integerrima**

S. No.	<i>T. chebula</i>	<i>P. integerrima</i> (Anonymous 1969)
1	Galls are laminar	Galls are petiolar
2	Galls are irregular shaped, laterally compressed, light golden – yellow in colour	Galls are horn shaped, hard rugose and hollow, reddish-brown in colour
3	Resin canals absent	Resin canals abundantly present
4	Star- shaped crystal idioblasts are present	Star-shaped crystal idioblasts are absent
5	Blackish cell contents of tanniferous nature are present	Reddish – brown cell contents of tanniferous nature are present
6	Volatile oil absent	Volatile oil present
7	Triterpenes absent	Trierpenes present
8	Saponin present	Saponin absent
9	Found throughout India	Confined to North India

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## Abbreviations

CC – cell content; COL – collenchyma; COR – cortex; CR – crystal; Cu – cuticle; EP – epidermis; GT – ground tissue; IT – idioblast; LEP – lower epidermis; OG – Oil globule; PAR – parenchyma; PH – phloem; SCL – sclerenchyma; St – stomata; Xy – xylem.

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