



## PHARMACOGNOSTIC STUDY OF *CASSIA TORA* L.: A REVIEW

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### ABSTRACT

*Cassia tora* (*C. tora*) is a small shrub growing as weed in Asian and African countries. It is a known edible leafy vegetable taken up by Asians. It has been traditionally used in ringworm infection over the years. Leaflets and seeds are the primary parts used for medicinal purposes. Different parts of *C. tora* have found application in Indian and Chinese medicine. The medicinal effects are well documented in many publications. The present article is aimed to provide a broad overview of pharmacognosy, phytochemistry.

**Keywords:** Cassia tora, Pharmacognosy, Ayurvedic properties, Adulterations & Substitutes, Phytochemistry.

### INTRODUCTION

Herbal medicines and food supplement industry has seen quite phenomenal growth in the recent years. India has a wealth of flora with hundreds of the plants possessing medicinal or curative properties. Despite this wealth, India has a small share in medicinal plants trade in the world market. This dismal condition is attributable to several factors including non-identification of bioactive molecules, lack of uniformity in cultivation, processing, storage, transport, extraction and formulation processes.

### PLANT PROFILE

*Cassia tora* (*C. tora*) (sub-family: Caesalpinioideae; Family: Leguminosae/Fabaceae) is a small shrub which grows up in warm moist soil throughout the tropical parts of Asian and African countries. In Ayurvedic and Chinese medicine books, different medical usage is depicted (DESCRIBED) for different parts of *C. tora* plant. In traditional Ayurvedic and Chinese Medicine, its usage has been described as an antioxidant, antimicrobial, antihepatotoxic, antidiuretic, antidiarrhoeal and antimutagenic plant<sup>1</sup>.

### CLASSICAL NAMES

Chakramarda, Dadrugna, Edagaja, Meshalochana, Prapunnada, Chakri, Punnata, Padmaka<sup>2</sup>.

### VERNACULAR NAMES<sup>3</sup>

- English - Foetid Cassia, Ringworm plant
- Hindi - Chakvad,
- Marathi - Takla
- Gujarati - Kawario
- Punjabi - Chakunda, Panwar
- Rajasthan - Chakuada, Panwar.
- Bengali - Chakunda, Panevar
- Kannada - Taragasi, Gandutogache
- Malayalam - Chakramandaraka, Takara
- Tamil - Tagarai, Senavu

### SCIENTIFIC CLASSIFICATION

Kingdom : Plantae  
Divison : Magnoliophyta  
Class : Magnoliopsida  
Subclass : Rosidae  
Order : Fabales  
Family : Fabaceae/ Leguminosae  
Sub-family: Caesalpinioideae  
Genus : Cassia  
Species : tora

### BOTANICAL DESCRIPTION

Annual herbs or undershrubs, 1-2m high. Leaves compound, paripinnate leaflets 3-pairs, ovate-oblong. Flowers bright yellow, usually in pairs, axillary. Pods long, slender, obliquely septate, 15-25cm long. Seeds rhombohedra, green 25-30 in number. The plant bears flowers in the rainy season & fruits in the winter<sup>4</sup>.

### DISTRIBUTION

It is found as a weed throughout India ascending up to an altitude of 1550m in Himalayas, universally distributed in wild state in Himachal Pradesh, Bihar & Orissa, Bengal, Punjab, Rajasthan, on waste lands along side of Maharashtra, Karnataka & plains of Tamil Nadu<sup>5</sup>.

### PARTS USED

Leaf, Seed, Roots<sup>2</sup>.

### PROPAGATION & CULTIVATION

It can easily be propagated by seeds<sup>5</sup>.

### TRADITIONAL USES

Both leaves & seeds constitute a valuable remedy in skin diseases. Seeds steeped in the juice of *Euphorbia nerifolia* and then made into

the paste with cow's urine is an application to cheloid tumors; also useful in leprosy, psoriasis, etc., ground with sour buttermilk or lime juice and applied to ease the irritation of itch or skin eruptions. Root rubbed into paste with lime juice is a specific for ringworm, applied also for buboes in plague. Leaves are prescribed in decoction in 2 – ounce doses for children suffering from feverish attacks while teething; boiled in castor oil they are applied to foul ulcers; also inflammations caused by irritant. They are also used as poultice to hasten suppuration. It forms a warm remedy in gout, sciatica and pain in joints. In China, the seeds are used externally & internally for all sorts of eye diseases. Preparations are also given for liver complaints and boils<sup>6,7</sup>.

### AYURVEDIC PROPERTIES

Rasa : Katu(pungent)  
Guna : Laghu(lightness) , Ruksha(dryness)  
Veerya : Ushna (Hot)  
Vipaka : Katu(pungent)  
Doshagnata : Kapha –vatashamaka(subsides kapha – vaata)<sup>3</sup>

### ROGAGHANATA (Therapeutic uses)

Twakvikara (skin disorders), Dadru (ringworm), Vibandha (constipation), Gulma (tumor like growth), Krimi (worms), Arsha (haemorrhoids), Raktavikara (blood disorders), Hridaroga (heart diseases), Shwas (bronchial infections), Kaasa (cough), Medoroga (obesity), Aoupsargika roga(opportunistic infections)<sup>5</sup>

### DOSAGE<sup>2</sup>

Leaf powder : 1-3gm  
Seed powder : 1-3gm  
Leaf juice : 5- 10ml

### SUBSTITUTES & ADULTERANTS

*Cassia occidentalis* Linn. is sometimes used as a substitute for *Cassia tora* on account of linguistic similarity in regional names. *Cassia tora* seeds are used as substitute for coffee<sup>9</sup>.

### PHARMACOGNOSY

#### MACROSCOPY OF LEAF

Size	2.0-5.0cm
Shape	Lanceolate
Margin	Entire
Venation	pinnate veins, anastomosing towards margin
Apex	Acute
Base	Asymmetrical
Surface	pubescent with press marking
Texture	firm, flexible
Colour	pale green yellowish green
Taste	mucilaginous & bitter
Odour	faint
Attachment	Petiolate
Phyllotaxy	Opposite
General Appearance	entire & less broken

#### MICROSCOPY (Figure 1)<sup>10,13</sup>

The leaf is typically isobilateral, showing distinct differentiation in palisade and spongy tissue. The microscopy of the leaf reveals following anatomical features:

#### Upper epidermis

Single layered, few cells contain mucilage, epidermis is covered with cuticle.

#### Mesophyll

It is differentiated into palisade and spongy tissue.

Palisade in *Cassia tora* leaves is present on both sides of spongy parenchyma and is made up of single layered, elongated, compactly arranged, thin walled chlorenchymatous cells which continues over midrib region only in case of upper palisade, lower palisade doesn't continue in the midrib region. Spongy parenchyma are loosely arranged, thin walled parenchymatous cells with large intracellular spaces. This region shows presence of spheraphides.

Lower epidermis: It is similar to the upper epidermis.

Both the epidermii show presence of conical, unicellular, thick walled, covering trichomes.

#### Midrib

Midrib region shows presence of palisade parenchyma which is single layered. Crystal sheath, present on both dorsal and ventral side, made up of parenchymatous cells and containing calcium oxalate prisms. A sclerenchymatous sheath is present covering vascular bundle. The vascular bundle shows xylem towards the upper epidermis and phloem towards the lower epidermis. Towards the lower epidermis, midrib also shows presence of multi-layered, thick walled parenchyma cells containing cellulose.

Surface preparation of the leaves also showed presence of paracytic stomata.

### POWDER STUDY

#### Organoleptic characters

Colour: Grayish green to yellowish green

Taste: mucilaginous, extremely bitter

Texture: fine powder

Odour: faint, Characteristic

A few fragments of both upper and lower epidermii which are polygonal, paracytic stomata, unicellular trichomes, calcium oxalate crystals, prisms and fibres are observed.

### PHYSICOCHEMICAL ANALYSIS

Loss on drying: 4.5%

#### Ash values

Total ash	Not more than 9%
Water soluble ash	Not more than 6.5%

#### Extractive values

Water extractive value	Not less than 15%
Alcohol extractive value	Not less than 35%

#### Preliminary phytochemical screening

5 gm of powder was cold macerated (24 hours) with 25 ml of distil water to obtain the test solution. This test solution was subjected to various chemicals to detect the presence of secondary metabolites.

TEST	Aqueous Extract
Alkaloids	--
Steroids	--
Coumarins	--
Flavonoids	--
Tannins	--
Saponins	--
Cyanogenic glycosides	--
Cardiac glycosides	--
Antraquinone glycosides	+++
Proteins	--
Amino acids	--
Mucilage	+
Sugars	+

## CASSIA TORA - SEED

### MACROSCOPY

Colour: shiny brown  
 Odour: bitter  
 Taste: bitter  
 Size: Length: 4 – 5 mm  
 Thickness: 1 – 2 mm  
 Shape: elongated, ovoid, and obliquely pointed  
 Texture: smooth

### MICROSCOPY (Figure 2)<sup>10,13</sup>

#### Testa:

##### (A) Outer Integument :

**Epidermis** : single layer ,polygonal tabular cells with thin anticlinal walls filled with mucilage.

**Sub –epidermis** : one or two layers of cylindrical collenchyma

##### (B) Inner Integument :

**Sclerenchymatous layer** : Longitudinally elongated ,lignified sclerides,120-190  $\mu$  long and 14 – 17  $\mu$  wide ,thick walled ,pitted ,very small lumen.

**(Parenchymatous layer** : One or two layers , thin ,tangentially elongated, collapsed parenchymatous cells.

**Pigment layer** : single layer of flattened polygonal pigment cells with reddish brown contents.

**Endosperm** : Polyhedral,cellulosic parenchyma with oil globules and aleurone grains.

**Aleurone grains** : upto 20  $\mu$  in diameter with globoid crystals.

**Cotyledon** : Cells and cell contents are similar to endosperm.

### POWDER STUDY

#### Organoleptic characters

Colour: Brown  
 Odour: Faint  
 Taste: Mucilagenous, bitter  
 Powder shows presence of yellow coloured sclerenchymatous fibres with pitted walls and narrow lumen, fragments of collenchymatous hypodermis and polygonal epidermis filled with mucilage, aluerone grains and fatty oil globules, few cells from pigment layer shows square cells with yellow mass.

### PHYSICOCHEMICAL ANALYSIS

Loss on drying: 2%

#### Ash values

Total ash	Not more than 9%
Water soluble ash	Not more than 6.5%

#### Extractive values

Water extractive value	Not less than 30%
Alcohol extractive value	Not less than 40%

### Preliminary phytochemical screening

5 gm of powder was cold macerated (24 hours) with 25 ml of distil water to obtain the test solution. This test solution was subjected to various chemicals to detect the presence of secondary metabolites.

TEST	Aqueous Extract
Alkaloids	--
Steroids	--
Coumarins	--
Flavonoids	++
Tannins	--
Saponins	--
Cyanogenic glycosides	++
Cardiac glycosides	--
Anthraquinone glycosides	+++
Proteins	++
Amino acids	--
Mucilage	+
Sugars	--

### PHYTOCHEMISTRY

Various types of phytochemical investigations have been carried out for *Cassia tora*. All of these investigations explored novel compounds from the plant which is summarized below.3,5,8, 3',4', 5 – hexahydroxy flavone, hydroxycoumarin, auraptanol, euphol, bassetol, emodin, rhein, palmitic, isostearic, behenic acids,ethyl arachidate and  $\beta$ -sitosterol (stem bark); palmitic , stearic , linoleic acids, torosachryson,questine, glucose, galactose,xylose, raffinose, two lactones – isotractone and cassialactone , naphtho –  $\alpha$ - pyrone – torolactone, chrysophanol, physcion,emodin, rubrofurasin and chrysophanic acid -9-anthrone (seeds). methyl anthraquinone , emodin, triacontan-1-ol, stigmasterol,  $\beta$  – sitosterol-  $\beta$  –D-glucoside, fridelin, palmitic, stearic, succinic, d-tartaric acid, uridine, myoinositol, d-ononitol, kaempferol, isoquercitin (leaves) kaemferol glucoside (flowers); amino acids, fatty acids, aloe-emodin, chrysophanol, emodin, rhein, and sitosterol (seeds and leaves) mericyl alcohol, chrysophanic acid, its 9-anthrone derivative, 8hydroxy 3- methyl anthraquinone -1-  $\beta$ - gentiobioside, a naphtho –  $\alpha$ - pyrone physicon, rubrafusarin , its 6  $\beta$  gentiobioside , torolactone 1,3,5 – trihydroxy - 6,7- dimethoxy -2-methylanthraquinone,  $\beta$ - sitosterol, leucopelargonidin -3-0-  $\alpha$  – L-rhamnopyranoside physcion, rubrofusarin & chrysophanic acid (roots)<sup>5,23</sup>.

### FORMULATIONS & PREPARATIONS

Dadrughni vati, Dadrugajendrasingh rasa, Madhyammanjishthadi kwatha, Brihatmarichayadi taila, Somraji taila, Trinaka taila, Kandarpasara taila, Mahatrinaka taila, Sarvatobhadra taila<sup>5,25</sup>.

### CONCLUSION

The *Cassia tora* plant is native plant of Indian subcontinent. The pharmacological activities reported in this is present review confirm that the therapeutic value of *Cassia tora* is very high having a leading capacity for the development of a new, safe, effective and cheaper drug in future, but more pharmacological investigations, clinical trials and public awareness for the best utilization of its medicinal properties is required. Hence, pharmaceutical companies should also come forward with new concepts and methods towards the best use of this potential medicinal plant.

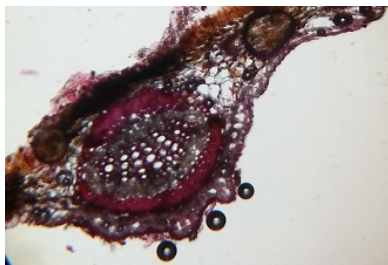


Figure 1 - T.S. of Leaf

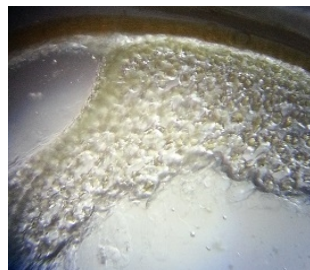



Figure 2: T.S. of seed

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