



## Review Article

# An Overview of *Cassia Tora*

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### ABSTRACT

*Cassia tora* Linn. is an important medicinal plant that is widely used in traditional systems of medicine for the management of skin diseases, liver disorders, and metabolic ailments. The plant contains several bioactive constituents, including anthraquinones, flavonoids, glycosides, and sterols, such as emodin, chrysophanol, rhein, obtusin, cassiaside, and ononitol monohydrate. Various pharmacological studies have reported hepatoprotective, antioxidant, antimicrobial, antifungal, and antitumor activities in different parts of the plant. This review summarizes the botanical characteristics, phytochemical constituents, and pharmacological properties of *Cassia tora* and highlights its therapeutic potential and scientific relevance.

### INTRODUCTION

*Cassia tora* Linn. (syn. *Cassia obtusifolia*) is a crucial medicinal plant, classified as a small annual herb, a small shrub, or a stout, erect, smooth, and half-woody annual, belonging to the family Fabaceae/ Leguminosae/ Caesalpinaceae [1,2,3]. The plant is well-known in India by vernacular names such as Foetida cassia, Sickle senna, and Chakramarda [2]. It is native to South-East Asia, Northern Australia, Africa, and Latin America, where it grows widely as a semi-wild annual herb or an important weed in waste grounds and along roadsides. In many regions, the leaves

of *C. tora* are consumed as an edible leafy vegetable by Asians. [4,5,6]

The plant's significance lies in its long history of use in traditional medical systems, including Ayurvedic, Chinese, and Unani medicine. [2,3,5,7] It has been utilized for ages to treat a wide array of human disorders, from simple ailments like cough and fever to more complex conditions such as hypertension and diabetes. The seeds and leaves, in particular, constitute a valuable remedy for skin diseases, ringworm, and itch. Globally, medicinal plants remain a primary source of healthcare, [2,4,6,8] with the World Health Organization (WHO) estimating that approximately 80% of people in

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developing countries still rely on traditional medicines. [9,10]

From a phytochemical perspective, *C. tora* is a recognized anthraquinone-containing plant, which is the main source of these chemical compounds. Numerous phytochemical components have been identified, including anthraquinones such as emodin, chrysophanol, rhein, and obtusin. Recent scientific investigations confirm the plant's biological potential, showing a variety of therapeutic and pharmacological effects. These documented activities include:

- Antimicrobial, Antifungal, and Antiseptic effects
- Antioxidant and Antimutagenic properties
- Antidiabetic and Antihypertensive activities
- Hepatoprotective, Antiulcer, and Anthelmintic actions
- Purgative, Diuretic, and Carminative effects [1,3,6,8]

#### VERNACULAR NAME:

**Table 1. Vernacular Name Of Cassia Tora**

<b>ARABIC</b>	Ashraq, Tukhme, Panwar [11]
<b>CHINA</b>	Chueh-ming-tzu, Jue-ming-zi [12]
<b>ENGLISH</b>	Coffee cassia, Sickle pod [11] Foetid Cassia, Sickle Senna, Stinking Cassia. [12]
<b>FRENCH</b>	Cassie Sauvage, Herbe Pistache. [12]
<b>GERMAN</b>	Gemiisekassie. [12]
<b>HINDI</b>	Talka, Chakunda, Chakawer [11] Chakavat, chakvad, Panevar, Panwar, Pavaad, Pavaar. [12]
<b>ITALY</b>	Cassia Selvatica [12]
<b>JAPAN</b>	Ebisugusa. [12]
<b>KANNADA</b>	Chakramarda, Gandha, Vanavarike [11]
<b>MALAYALAM</b>	Cakramardrakam, Chakramandrakam, [11] Takaraa. [12]
<b>MARATHI</b>	Rakala, Takla, Tankala [11] Tarota [12]
<b>PERSIAN</b>	Sang Saboyah, Sangsboyah [11]

<b>SANSKRIT</b>	Cakramarda, Chakramardah, Chakramardaka [11] Ayudham, Dadamardana, Dadrugna, Kharjugna, Mesalocana, Prabhoonata, Prabhunatha, Prapunda, Taga, Uranaksha. [12]
<b>TAMIL</b>	Appulantam, Cakamatti [11]



**Figure.1: Plant of Cassia Tora**

#### SOURCE AND DISTRIBUTION<sup>[1]</sup> :

*Cassia tora* Linn. (Family: Leguminosae) is an annual undershrub that grows throughout tropical regions, including India, Pakistan, Bangladesh, and western China, and it thrives in wastelands as a rainy-season weed. It occurs in low-lying coastal areas and along riverbanks and is abundant in waste and other moist habitats such as uncultivated fields at elevations of approximately 1,000 to 1,400 meters.

#### BOTANICAL DESCRIPTION<sup>[12]</sup> :

*Cassia tora* is an annual fetid herb attaining a height of 30-90 cm. The leaves are 7.5-10 cm long; the rachis is grooved, more or less pubescent, and bears a conical gland between each of the two lowest pairs of leaflets; the stipules are 1.3-2 cm long and linear-subulate in shape.

The leaflets occur in three pairs, opposite to each other, 2.5-4.5 cm long and 1.3-2.5 cm wide, obovate-oblong in shape, membranous, and glabrous or more or less pubescent. The lowest pair of leaflets is the smallest. The petiolules are pubescent and 2.5 mm long. The flowers are usually arranged in subsessile pairs in the axils of the leaves. The calyces are glabrous and divided to

the base into 5 mm long ovate spreading segments. The petals are five in number, pale yellow in colour, 8 mm long and 2.5 mm wide; they are oblong, obtuse, and spreading. The stamens are ten in number, with the three upper stamens reduced to minute staminodes and the remaining seven perfect and subequal in size. The pods are 12.5-20 cm long and 4-5 mm wide, markedly curved when young and obliquely septate. The seeds, 25-30 in number, are rhombohedral in shape, green in colour, with the long axis oriented in the direction of the pod.

### TAXONOMICAL CLASSIFICATION<sup>[3]</sup> :

**Table 2. Taxonomical Classification of Cassia Tora**

Kingdom	Plantae
Division	Magnoliophyta/Angiospermae
Class	Magnoliopsida/Dicotyledoneae
Order	Fabales
Family	Leguminosae/Fabaceae
Subfamily	Caesalpinioideae
Tribe	Cassieae
Sub-tribe	Cassiinae
Genus	Cassia
Species	Cassia tora
Botanical Name	Cassia tora L.

### MORPHOLOGICAL CHARACTERISTICS<sup>[3]</sup>

#### Leaves:

Leaves are morphologically complex and typically measure 7.5–10 cm in length. They bear three pairs of opposite leaflets, each averaging 2.5–4.5 cm. The leaf base is somewhat oblique, often rounded, with 6–10 conspicuous veins and divergent venation. The leaves are glaucous, obovate-oblong, membranous, glabrous, and more or less pubescent.

#### Seed:

The seed is smooth and lustrous, oblong or rhombohedral, firm, approximately 1 cm in length

and 3–4 mm in thickness. Both ends appear to be truncated at an angle. The cotyledons are rolled, folded, and twisted.

#### Root:

The external surface of the root is dark brown, whereas the internal surface is creamy in color and exhibits an extended longitudinal crack. In the region near the foot, the primary root is bent at an angle of approximately 30° degrees.

#### Fruit/ Pod:

Fruit is subtertragonous, with 15-23 cm long, obliquely septate pods with very broad sutures

### DESCRIPTION OF CASSIA TORA SEED<sup>[14]</sup>:

#### Macroscopic:

Seed hard, approximately 1 cm long and 3–4 mm thick, oblong or rhombohedral, with both ends appearing obliquely truncated, greenish-brown to brownish-black in colour, smooth and shiny, odourless, with a distinctly bitter taste.

#### Microscopic:

Seed shows seed coat consisting of longitudinally elongated cells, covered with thick, smooth cuticle, followed by palisade layer composed of closely packed, radially arranged, non-lignified, thickened columnar cells, and by a single layer of dumb-bell shaped, thick-walled, parenchymatous cells; a wide zone of thick-walled, parenchymatous cells forming inner layer of testa present, differentiated into outer 8 - 10 layers of tangentially elongated, parenchymatous cells and a single layer of broad cells which are squarish in shape; a few vascular bundles scattered in this zone; embryo consists of radicle, plumule and two cotyledons; epidermis of cotyledon consists of a single layer, externally covered with cuticle,

followed by two layers of palisade-like cells of mesophyll; mesophyll of ventral side composed of rectangular to polygonal cells filled with round to oval starch grain, measuring 8-12  $\mu$  in dia., a few vascular bundles and a few rosette crystals of calcium oxalate upto 49  $\mu$  in dia.; scattered in this region.

## DESCRIPTION OF CASSIA TORA ROOT<sup>[15]</sup>:

### Macroscopy:

**Shape and Size:** The roots are typically cylindrical and tapering, ranging in size from a few centimeters to several decimeters in length. They may vary in thickness, with some roots being relatively thin and others more robust

**Surface:** The surface of the root is generally rough and uneven, with a brownish to dark brown color. The outer surface may also show longitudinal striations or wrinkles.

**Texture:** The root has a fibrous texture, and when broken, it reveals a pale, woody interior. The break is typically fibrous and can be somewhat splintery.

**Odor and Taste:** The root has a faint, earthy odor and a slightly bitter taste.

**Internal Structure:** On a cross-section, the root shows a central core of xylem surrounded by phloem, with a visible bark layer on the outer side. The inner part is lighter in color compared to the outer surface. These macroscopic characteristics help in identifying the root of the Cassia tora plant in herbal medicine and botanical studies.

## DESCRIPTION OF CASSIA TORA STEM<sup>[15]</sup>:

### Macroscopy:

The stem of Cassia tora, also known as Senna tora or Foetid Cassia, displays distinct macroscopic features:

**Shape and Size:** The stem is typically erect, cylindrical, and varies in thickness depending on the age and part of the plant. It can grow to a height of 30 to 90 cm.

**Surface:** The surface of the stem is smooth or slightly ribbed, with a green to purplish-green color in younger stems. As the stem matures, it may become more brownish and develop fine longitudinal striations or ridges.

**Texture:** The stem is firm and somewhat brittle when young, becoming more rigid and woody as it ages. The younger parts of the stem are tender and succulent, while the older portions are tougher and harder.

## PHYTOCHEMISTRY:

### Leaves:

The leaves showed mainly the presence of Anthraquinone glycosides and Flavonoids. The Anthraquinone glycoside includes rhein, emodine, physion, chrysophanol (marker), Obtusin, chryso-obtusin, chryso-obtusin-2-O- $\beta$ -D-glucoside, obtusifolin and chryso-obtusifolin-2-O- $\beta$ -D-glucoside <sup>[16,17]</sup>

Sennosides, which are well known for their medicinal importance, have been detected in the leaves of the plant. The % of Sennoside content in the leaf of C. tora was found to be 0.14 <sup>[18]</sup>

Leaves also reported to contain Kaempferol-3 diglucoside (Flavonol glycoside). A potential hepatoprotective constituent, Ononitol monohydrate, was isolated from C. tora leaves <sup>[19]</sup>



**Seed:**

Seeds Contain Antihepatotoxic Naphthopyrone Glycoside, Cassiaside and Rubrofusarin-6- $\beta$ -gentiobioside [20]

Anthraquinones present in seeds are aurantioobtusin, chrysoohtusin, obtusin, chrysoobtusin- 2-O-  $\beta$ -D-glucoside, physcion, chrysophanol, emodin, obtusifolin, and obtusifolin-2-O-  $\beta$ -D- glucoside [21]

Seeds also contain phenolic triglucosides torachryson 8-O-[  $\beta$  -D-glucopyranosyl(1- > 3)-O- B-D-glucopyranosy (1- > 6)-O- $\beta$ -glucopyranoside) and toralactone 9-O-(  $\beta$ -D-

glucopyr anosyl-(1- > 3)-O-B-D-glucopyranosyl-(1- > 6)-O-B-D-glucopyranoside] [22]

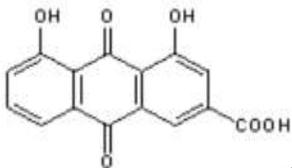
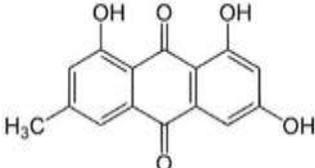
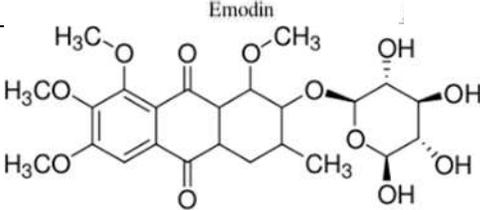
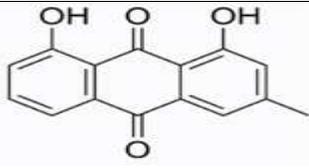
Rubrofusorin [23] alaternin, glucoobnasifolin, cassiaside, glucoaurmtioobtusin, cussi toroside, toralacione gentiobioside, chrysophanol triglucoside, questin and 2-hydroxyemodin 1-methylether [24]

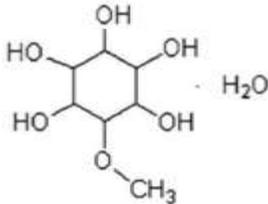
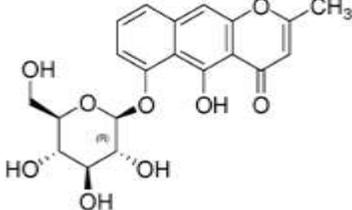
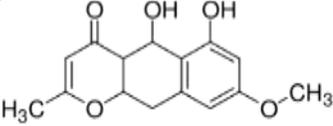
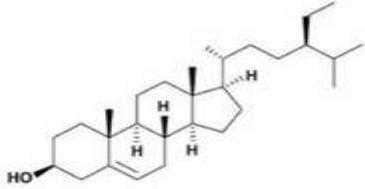
**Root:**

Root contain choline, 1,3,5-trihydroxy-6, 7-dimethoxy-2 methylanthraquinone, leucopelargonidin-3-O- $\alpha$  L-rhamnopyronaside [25] and  $\beta$ -sitosterol [26]

**CHEMICAL CONSTITUENT**

**Table 3. Chemical Costituents and Structures of Cassia Tora**

Sr. No.	Name Of Chemical Constituents	Structure Of Chemical Constituents
1	Rhein [3]	
2	Emodine [10]	
3	Chryso-Obtusin [8]	
4	Chrysophanol [8]	

5	Ononitol Monohydrate <sup>[3]</sup>	 <p style="text-align: center;">Ononitol monohydrate</p>
6	Cassiaside <sup>[6]</sup>	 <p style="text-align: center;">Cassiaside</p>
7	Rubrofusarin <sup>[27]</sup>	 <p style="text-align: center;">Rubrofusarin</p>
8	B-Sitosterol <sup>[27]</sup>	 <p style="text-align: center;">β-sitosterol</p>

## PHARMACOLOGICAL ACTIVITY:

### Hepatoprotective activity:

Ononitol monohydrate decreased the levels of serum transaminase, lipid peroxidation and TNF- $\alpha$  but increased the levels of antioxidant and hepatic glutathione enzyme activities. Compared with reference drug silymarin ononitol monohydrate possessed high hepatoprotective activity. Histopathological results also suggested the hepatoprotective activity of ononitol monohydrate with no adverse effect. Hence that ononitol monohydrate is a potent hepatoprotective agent. [28]

Rajan AV et al investigated hepatoprotective effects of methanolic extract of dried powder leaf

of *Cassia tora* against carbon tetrachloride induced liver damage in albino rats in both sexes approximately weighing 500 gm. This study demonstrated the hepatoprotective effect of *Cassia tora* because of the effective free radical scavenging property [29]

### Antifungal activity:

Mukherjee PK et al determined the antifungal activity of the de-alcoholized extract of *Cassia tora* leaves against different fungal organisms. Standard antifungal agent griseofulvin was used to compare the effect produced by leaf extract. Study showed the significant inhibition of growth of *C. albicans*, *A. niger*, *S. cerevisiae*, and *T. mentagophytes* when crude leaf extract was

tested by turbidity and spore germination methods in concentration dependent manner<sup>[30]</sup>

Isolated emodin, physcion and rhein showed fungicidal activities against *B. cineria*, *E. graminis*, *P. infestans* and *R. solani*. Also aloe-emodin showed strong fungicidal activities against *B. cineria* while moderate against *R. solani* and no activity against *E. graminis*, *P. infestans*, *P. recondite* and *Py. Grisea*<sup>[31]</sup>

#### **Antioxidant activity:**

The methanolic extract of seeds of *C. tora* (MECT) shows stronger antioxidant activity. It was found that MECT exhibits stronger antioxidant activity as compared to Alpha-tocopherol. Emodin was demonstrated as antioxidant component of MECT<sup>[32]</sup>

#### **Antiproliferative activity:**

The antiproliferative activity of *Cassia tora* methanolic leaf extract with Cisplatin, anticancer drug was studied using human cervical cancer cells<sup>[33]</sup>

#### **Antimicrobial activity:**

Antimicrobial activity of ethanolic extract (0.15mg) and aqueous extract (0.31mg) of *Cassia tora* leaves were investigated by Sarika Sharma et al against *Pseudomonas aeruginosa*, *Lactobacillus*, *Salmonella typhi*, *P. vulgaris*, *Bacillus subtilis*, *Staphylococcus aureus*, *Streptococcus pneumoniae*, *E. coli* and *Enterobacter* bacteria by using filter paper disc method. Ciprofloxacin was used as standard reference. Aqueous Extract showed maximum activity against *Staphylococcus aureus* and *Lactobacillus* and minimum activity against *Bacillus subtilis* and *Escherichia coli* but no activity against *Salmonella typhi*. Ethanolic extract show less activity as compared to aqueous extract but show maximum activity against

*Staphylococcus aureus* and *Lactobacillus* as comparative to standard ciprofloxacin<sup>[34]</sup>

#### **Antitumour:**

Emodin (1, 3, 8-trihydroxy methylanthraquinone) is a naturally occurring anthraquinone present in the roots and barks of *C. tora* as an active ingredient. At present, its role in combination chemotherapy with standard drugs to reduce toxicity and to enhance efficacy is pursued vigorously. Its additional inhibitory effects on angiogenic and metastasis regulatory processes make emodin a sensible candidate as a specific blocker of tumour associated events. Additionally, because of its quinone structure, emodin may interfere with electron transport process and in altering cellular redox status, which may account for its cytotoxic properties in different systems. This biological property of emodin molecule is offering a broad therapeutic window, which in future may become a member of anticancer<sup>[35]</sup>

#### **CONCLUSION:**

*Cassia tora* Linn. is a widely recognized medicinal plant with a rich ethnomedicinal background and broad geographical distribution. Detailed pharmacognostic and phytochemical investigations have revealed the presence of several important bioactive constituents, particularly anthraquinones, flavonoids, and glycosides, which are considered responsible for its diverse biological activities. Experimental studies have validated its traditional uses by demonstrating significant hepatoprotective, antioxidant, antimicrobial, antifungal, antitumor, and antiproliferative properties. Among its therapeutic potentials, hepatoprotective activity appears particularly promising, primarily due to the presence of ononitol monohydrate and other antioxidant constituents. Despite the extensive pharmacological evidence currently available,

further studies are required to isolate novel compounds, elucidate their mechanisms of action in detail, and establish robust clinical efficacy and safety profiles through well-designed trials. Overall, *Cassia tora* represents an important medicinal resource with considerable potential for future drug development and herbal therapeutics and therefore warrants more systematic research and standardization to ensure its effective and safe medicinal applications.

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