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# Cassia Tora: A Review

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**ABSTRACT:** In Asian countries, *Cassia tora* Linn, a small annual plant or underbrush, is a common weed. It spreads like a weed over India. It is used to treat varieties of ailment in many traditional medicines. According to reports, this plant has hepatoprotective, antiproliferative, hypolipidemic, immunostimulatory, anticancer, and antimutagenic qualities. This plant has been used to make anthraquinones, chrysophanol, emodin, rhein, euphol, bassetol, palmitic, isosteric, behenic acid, and other compounds. This plant species is well known for its potential application in conventional medicine for the treatment of a variety of ailments, from simple coughs to diabetes and hypertension. Science has recently learned about its phytochemical and biological abilities. Among other medical advantages, *C. Tora* has been demonstrated to have antibacterial, antioxidant, antihypertensive, antidiabetic, and antimutagenic effects. This green vegetable is popular among Asians. Since ancient times, several *C. tora* components have been employed in Indian and Chinese medicine. This plant has been used to extract a variety of chemical substances, including phenolic compounds, naphthopyrone glycosides, flavonoids, glycosides, anthraquinone, etc. that are used as blood purifiers for kids, worm infections, and fever during teething. Leprosy, body itch, itching, dermatomycosis, eczema, and psoriasis can all be successfully treated with *Cassia tora*. Along with these, it has hepatoprotective, immunostimulatory, antigenotoxic, antipsoriatic, antinociceptive, antifeedant, larvicidal, antiproliferative, hypolipidemic, and antimutagenic qualities. It also helps with constipation, dyspepsia, and gas because of its mild diuretic and laxative effects. Use its decoction to cleanse and treat wounds. It is advised to use 1-3 grams of seeds in powder form for therapeutic purposes. The adjacent villages may easily make use of it. It is now only being consumed at a very low pace, though. To enhance public acceptability of its consumption, nutritional education and marketing might boost its importance in diet. Leaves can be used to make potent ayurvedic formulations and medicines after being properly processed, identified, and free of any dangerous properties. Aqueous and organic extract from *Cassia Tora* may one day be employed to create beneficial phytochemical compounds for the pharmaceutical sector. The review that is being presented provides a summary of the knowledge on the botany, ethnopharmacology, phytochemistry, biological activity, and toxicity of the *Cassia tora* plant.

**KEYWORDS:** *Cassia tora* Linn., flavonoids, phytochemistry, antioxidants, micronutrients and anthraquinone glycosides.

## I. INTRODUCTION

*Cassia Tora* Linn. in India and other tropical countries is a well-known herbal remedy that is frequently used [33]. Several therapeutic properties of this plant have been connected to it in Indian traditional medicine from *C. tora*. Also several anthra-quinones have been found in their seeds [41] [37]. The plants' leaves contain sennosides, which are widely known for their medicinal uses [28]. Various skin conditions, rheumatic illnesses, and laxatives have all been treated using tora formulations [18][27][30]. It has been discovered that tora leaf extract has significant hepatoprotective and anti-inflammatory properties [4] [30].

Chinese medicine has used *C. tora* seeds as aperients, antiasthmatics, diuretics, and to improve visual function. It is a little annual underbrush or plant that spreads like a weed throughout Asia.

In India, it is a weed that primarily grows in Himachal Pradesh, Orissa, Bihar, Chhattisgarh and Uttar Pradesh. It is used in Ayurvedic medicine. "Dadhughnavati" is one of the most potent antifungal formulations [2][17]. The 1.2 m tall herbs have complex, paripinnate leaves with three pairs of leaflets. Flowers are axillary, brilliant yellow, and typically come in pairs. Long, thin, and obliquely separable pod, 15–25 cm long; green rhombic-herbal seed [40]. *C. tora* has several different names in India, including Foetida cassia, Sickie senna, Sickie, Coffee pod, Chakvad, Ktanta, Charota, and Chakramarda. An annual plant with a height of one meter or less that is robust, upright, smooth, and half-woody. The stipules are linear lanceolate and fall off early. The leaves are alternate, even-pinnate, and 1-2 cm long. The leaflets



are in 2–4 pairs, oblong-ovate to obovate, 3–4 cm long, acute, and attenuate at the base. Between the leaflets, the major rachis is coated in glands. The top leaves are 1.5 cm wide, and the blooms are clustered 1-2 in the axils of them. They are showy, fairly regular, 5-merous, yellow, and have 10 stamens with 7 fertile and 3 abortive anthers arranged in pairs. Fruits are linear, 10-cm-long pods with 4-angled sides [45]. The seeds are composed of hull (27%), endosperm (32%), and germ (41%), which are all flattened in the same direction as the pods [9–10]. A well-known herb in India is *Cassia tora* Linn. (Family Leguminosae), commonly known as "Chakunda" in Bengali and "Chakramarda" or "Prabunatha" in Sanskrit [12]. In Ayurvedic medicine, *C. tora* has a solid reputation for treating numerous skin conditions [32] [5]. The leaves have some aperients properties. The seeds and the leaves are both efficient remedies for skin issues, including ringworm and itching [27]. The leaves act as an iodine tincture when applied to wounds and are helpful for eczema [4]. Anthraquinones, chrysophanol, emodin, obtusifolin, obtusin, chryso-obtusin, aurantio-obtusin, and their glycosides are all present in *cassia tora* (CT). rubrofusarin, naphthopyrones, norrubrofusarin, entriobiosideToracryson and trolactone Beta-sitosterol and 1, 3,5-trihydroxy-6-7-dimethoxy-2-methylanthroquinone are both present in the roots. While Chrysophonic acid-9-anthrone, Chrysophanol, Physcion, Emodin, Rubrofusarin, and Naptho-alpha-pyrone-toralactone are present in Seeds. Emodin, tricontan-1-0l, stigmaterol, beta-sitosterol-beta-D-glucoside, freindlen, palmitic, stearic, succinic, and d-tartaric acids, as well as uridine, quercitrin, and isoquercitrin, are all present in leaves [10][8]. In India, organic agriculture uses species of *Cassia* as a natural pesticide. Coffee can be substituted with roasted seeds, like tephrosia seeds. The pet food industry is the one that uses *Cassia* species powders the most frequently. For usage in mining and other industrial processes, it is blended with guar gum. *Cassia* species extracts have been used to treat a variety of skin disorders, rheumatic illness, and as a laxative. [21] [30].

## II. CASSIA SPECIES GEOGRAPHIC ORIGIN AND DISTRIBUTION

In full tropical areas (including India, Pakistan, Bangladesh, and West China), *cassia* species are annual under shrubs that thrive as weeds during the rainy season [21]. It grows at elevations between 1000 and 1400 meters in low-lying coastal regions, along riverbanks, in waste areas, and in other moist environments like untamed fields. It is referred to as "Chakramard" in Ayurveda, "Panwar" in Unani, and "Jue Ming Zi" in Chinese medicine. It is most popularly referred to as "Sickle pod" because of the Sickle form of the pods [36]. Although the exact number of *Cassia* species is unknown, there are hundreds of them here. *Senna* and *Chamaecrista*, with which it forms the *Cassiinae*, are among the *Cassieae* in general that have historically been used as a taxonomic dumping ground. Some *Cassia* plants are used as herbal medicines based on where they are native, whereas other *Cassia* species are listed in the Red Data Book [43].

### 2.1 Botanical description and ethnopharmacology:

A common weed in Asian countries is the tiny annual plant or undershrub *Cassia tora* Linn. (Caesalpinaceae). All over India, it spreads like a weed, but Himachal Pradesh, Bihar, and Orissa are where it is most prevalent. Ayurvedic medicine named "Dadhughnavati" is one of the effective antifungal compositions.

The plants have a height of 1.2 meters. Three pairs of leaflets make up the complex, paripinnate leaves. Flowers are axillary, bright yellow, and typically found in pairs. Pods are obliquely parted, long (15–25 cm), and thin. Rhombohedral seeds in green. It is a well-known Ayurvedic herb used to treat leprosy, ringworm, bronchitis, cardiac problems, ophthalmic and skin conditions, cough, hepatic disorders, liver tonics, and haemorrhoids. According to some reports, CT seeds can operate as antioxidants and contain several active substances, including chrysophenol, emodin, rhein, and others. According to [31], this design has been connected to several therapeutic properties, including as antibacterial, antihepatotoxic, and antimutagenic activities.

### 2.2 PHYTOGRAPHY:

It has plantae kingdom; Magnoliophyta Division; Magnoliopsida Class; Fabales Order; Fabaceae Family; Caesalpinioideae Subfamily; Cassieae Tribe; Cassiinae Subtribe; *Cassia* Genus and *C.tora* Species. It is an annual foetid herb that is 30–90 cm tall. The leaves are green, pinnate, up to 8 cm long, and have three pairs of opposing, petioled leaflets that are oval, oblong, and oblique at the base. Flowers are nearly sessile and pale yellow in colour, growing in the leaf axils. The highest petal, which has five petals, is densely packed. These brown, oblong, rhombohedral seeds are contained in subteret or 4-angled, exceedingly slender, 6- to 12-inch long, incompletely separate, membrane-covered pods [30].

## III. FOLK AND TRADITIONAL MEDICINE APPLICATIONS INCLUDE

Many plant parts, including leaves, seeds, and roots, are recognized to have medicinal properties. According to folklore, *C. tora's* leaves possess anti-rheumatic qualities. The leaves' decoction is used as a laxative [27]. Its seeds have been



employed in Chinese medicine as diuretics, aperients, and anti-asthmatics. It is also used to cure liver disorders and enhance visual function (eye diseases). In Korea, a heated seed extract is taken orally to protect the liver, the seeds and leaves are used to treat ringworm and itching, two skin conditions. Stem bark extract is used as a laxative, to treat a number of rheumatic illnesses, and to cure various skin ailments [32]. The herb is used in Ayurvedic treatments including "DadrughaniVati" and "PamariTaila." [46]

#### IV. PHYTOCHEMISTRY

TLC-based phytochemical screening of plant extracts identified glycosides, flavonoids, and anthrone, as well as callus extracts, in these extracts. The main source of the spicy flavor and scent is the 1-2 percent volatile Cassia oil. The main chemical components of cassia include cinnamaldehyde, gum, tannis, mannitol, coumarins, and essential oils (aldehydes, eugenol, and pinene). It also contains sugars, resins, and mucilage [42].

##### 4.1 Roots:

The ethyl acetate fraction of *Cassia obtusifolia* contained eight different chemicals, including betulinic acid, chrysophanol, physcion, stigmasterol, 1-hydroxy-7-methoxy-3-methyl-anthraquinone, 8-O-methylchrysophanol, 1-O-methylchrysophanol, and aloe-emodin [42]. The roots include anthraquinones, beta-sitosterol, and trace amounts of chrysophanic acid, myricyl alcohol, 9-anthrone, naphthopyrone, physcion, rubrofusarin, toralactone, leucopelargonidin-3-O-L-rhamnopyranoside, and 6-gentiobioside [5].

##### 4.2 Seeds:

Juemingzi, the Chinese name for *Cassia tora* L. (Leguminosae) seeds, is a well-known traditional Chinese medicine that is included in the Chinese Pharmacopoeia [49]. Its antibacterial, antidiuretic, antidiarrheal, antioxidant, antihepatotoxic, and antimutagenic qualities have been employed to improve visual acuity [35][22]. This plant contains bioactive substances called anthraquinones, including 1-desmethylaurantio-obtusin, 1-desmethylchryso-obtusin, aurantio-obtusin, chryso-obtusin, obtusin, and others. This plant contains bioactive substances called anthraquinones, including 1-desmethylaurantio-obtusin, 1-desmethylchryso-obtusin, aurantio-obtusin, chryso-obtusin, obtusin, and others. Chrysophanol, emodin, and rhein are just a few of the bioactive anthraquinones (AQs) chemicals found in *Cassia tora* seeds; these compounds are principally accountable for the pharmacological action ascribed to them [11] [50].

Gum, the most effective suspending agent for calomel, kaolin, and talc<sup>18</sup>, is found in the seeds in a concentration of 7.65%. In a specifically made Soxhlet apparatus, petroleum ether (b.p. 60–80°C) was used to extract the dried and crushed seeds, producing oil that contained 5.0 percent brownish yellow. Later, this oil was used to isolate chrysophanic acid. Hot water was used to remove the seeds' mucilage (25.8%) [13].

The seeds of *Cassia tora* (Leguminosae) were used to isolate polyphenolic compounds glycosides, including novel compounds, such as torachrysonetetraglucoside, nor-rubrofusarin-gentiobioside, demethylflavasperone-gentiobioside, torachrysonegentiobioside, rubrofusarin-triglucoside and triglucoside,

The hull, endosperm, and germ all make up 27% of a *C. Tora* seed 41 percent. A gum prepared from the seeds of *C. Tora* is known as "Panwar gum." It is a mannose and galactose neutral heteropolysaccharide (i.e., galactomannans). Panwar gum mucilage has a pH of about 7 [23]. The protein content of *C. Tora* seeds is about 23.2%, and they are particularly abundant in tryptophan and methionine, two essential amino acids [36].

##### 4.3 Leaves:

The leaves were rich in flavonoids and anthraquinone glycosides. Anthraquinone glycosides include rhodamine, emodine, physcion, chrysophanol (marker), chryso-obtusin-2-O-D-glucoside, obtusifolin, and chryso-obtusifolin-2-O-D-glucoside<sup>103</sup> [42]. Researchers evaluated the leaf's antioxidant and antiproliferative capabilities after discovering polyphenols in their initial phytochemical testing [38]. The primary substances in the leaves are myricyl alcohol, anthraquinone glycosides, D-mannitol beta-sitosterol, and flavonoids. *Cassia tora* Emodin, tricontan-1-ol, stigmasterol, D-glucoside of sitosterol, Freundlen, palmitic, stearic, succinic, and D-tartaric acids, uridine, quercitrin, and isoquercitrin were also present. Kaempferol-3-diglucoside is also present in the leaves [41][37]. *C. tora* was used to isolate ononitol monohydrate, a possible hepatoprotective component leaves of the tora [19]. The leaves typically measure 7.5–10 cm long and have three pairs of opposing leaflets that are 2.5–4.5 cm wide. They have a transverse venation, 6-10 prominent veins, and are obovate-oblong, glaucous, membranous, glabrous, and pubescent [25][1].



#### 4.4 Other Parts:

Pods are abundant with sennosides. The presence of kaemferol and leucopelargonidine in flowers has been discovered. Leucopelargonidine, 1, 3, 5 trihydroxy-6, 7 dimethoxy-2-methyle anthraquinone, and -Sitosterol were found in the roots of *C. Tora*[24][15]. Arachidic acid, isostearic acid, linoleic acid, palmitic acid, marginic acid, behenic acid, phenolics including rhein and emodine, hexahydroxy flavones, and a hydroxycoumarin (Aurapterol) are all present in the stem bark of this plant [47]. The stem also contains D-mannitol, myricyl alcohol, -sitosterol, glucose, tigonelline, 1-stachydine, and choline. Ethyl arachidate, behenic acids, marginic and palmitic acids, euphol, aurapterol, basseol, and rhein are all present in the stem bark. Hexahydroxy flavones 3, 5, 8, 3, 4, and 5 [26].

### V. THERAPEUTICAL OUTLINES

#### 5.1 Antitumor effects:

The root and bark of *C. tora* contain the anthraquinone-emodine, which possesses anti-tumor properties. The angiogenic and metasis regulating pathways are inhibited by it. Emodine's quinine-like structure may alter cellular redox status and interfere with electron transport, which could account for its cytotoxicity [7].

#### 5.2 Antibacterial characteristics

On *E. coli* K12, *Pseudomonas aeruginosa* PA 01, and many *Staphylococci aureus* strains, the effects of phenolic glycosides, aglycones, and numerous other chemical compounds with structurally similar compounds were examined. With a minimum inhibitory concentration of 264g/ml, torochryson, torolactone, aloe-emodine, rhein, and emodine, among others, have demonstrated a substantial antibacterial effect against four strains of methicillin-resistant *Staphylococcus aureus* [16] [44].

#### 5.3 Antioxidant properties:

Due to their ability to combat free radicals, herbal antioxidants play a significant role in the prevention of diseases including cancer, cataracts, brain disorders, and rheumatoid arthritis [29]. With an IC<sub>50</sub> of 8.0 g/mL, ethanol extract displayed 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity [3]. Low density lipoprotein was revealed to be better protected from oxidation by the ethyl acetate component of the methanol extract in a concentration-dependent manner [51]. Alaternin outperformed the other two gentiobiosides that researchers identified from the seeds of *C. tora* in terms of their ability to scavenge DPPH radicals [7].

#### 5.4 Anti-inflammatory properties:

The anti-inflammatory effect of methanolic extract of *C. tora* leaves was investigated in rat hind paw edema caused by carrageenan, histamine, serotonin, and dextran. It significantly reduced inflammation when exposed to these compounds [30].

#### 5.5 Anti-mutagenic characteristics

A *Salmonella typhimurium* test was used to demonstrate the methanolic extract of roasted *C. tora* seeds' antimutagenic effectiveness against aflatoxin-B<sub>1</sub> (AFB<sub>1</sub>). The number of relevant per plate decreased significantly when the extract was added to the test technique using *Salmonella typhimurium* TA100 and/or TA98 35 [39].

#### 5.6 Anti-fertility properties:

*C. Tora* leaf extract (200 mg/100 mg/Kg body weight) had the strongest antifertility efficacy in female rats. Oestrogenic activity has been connected to the medication's antifertility effect [6].

#### 5.7 Hypo-lipidemic characteristics:

A triton-induced hyperlipidemic profile was tested to see how the ethanolic extract and its ether and water-soluble fractions affected the level of lipids. Triglyceride and total LDL cholesterol levels were decreased, whereas different amounts of HDL cholesterol were increased. Soluble fibers isolated from seeds showed hypolipidemic levels due to their remarkable rheological qualities and lipid metabolism. Because soluble fibers significantly lower blood levels of total cholesterol and triglycerides, they have a significant hypolipidemic effect [14] [35].

#### 5.8 Wound healing properties:

Using ointment base as a control and nitrofurazone ointment as a reference standard, the effects of an ethanolic extract of the leaves on wound healing in a rat excision wound model were examined. The extract's ability to constrict wounds



was significantly greater than that of the control, which was comparable to that of the reference standard Nitrofurazone ointment, since it contained active terpenes, alkaloids, and flavonoids [20].

#### 5.9 Antiulcer activity:

Using an ethanol-induced stomach ulcer model, albino rats were used to investigate the antiulcer effectiveness of a hydroalcoholic extract of leaves. Using omeprazole as the reference standard, the extract showed dose-dependent antiulcer action, with the maximum efficacy at 500 mg/kg body weight [48].

#### 5.10 Anti-nutritional activity:

It was examined how different processing techniques affected the concentrations of the seeds' antinutritional substances, including oxalic acid, phytate phosphorus, and lannin. According to the findings, all processing methods significantly reduced the amount of oxalic acid [34].

## VI. TOXICITY

A crude extract of *C. tora* leaves was evaluated for toxicity on Swiss mice. It has been demonstrated that 200mg/kg given orally is lethal. Doses of 100 mg/Kg were lethal when given intravenously and intraperitoneally. When a meal containing at least 0.5 percent of *C. tora* seed was continuously administered for 13 weeks, myeloid hyperplasia with peripheral leukocytosis, thrombocytosis, and mild /moderate anaemia were the results [9]. Dealcoholized extract and raw extract of leaves were dangerous in mice. Rats were fed a diet containing same amount of *cassia tora* for same period showing same results [40].

## VII. CONCLUSION

Research and scientific studies on *C. tora* suggest this plant has enormous biological potential. Clinical and pharmacological studies utilizing standardized extracts and isolated components are necessary to explore this plant's unrealized potential. Research on *C. tora* has a lot of potential, and it might one day provide the pharmaceutical industry with important phytochemical substances. There is little doubt that this plant is a treasure trove of potentially useful chemical elements that can be employed as treatments, new leads, and clues for the manufacture of existing drugs. Location and season have an impact on the phytochemical alterations and therapeutic properties of *C. tora*. It is necessary to standardize *Cassia tora*'s hazardous traits and carry out in-depth clinical study.

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