

REVIEW ON CASSIA FISTULAChauhan Neelam^{1*}, Bairwa Ranjan¹, Sharma Komal¹, Chauhan Nootan²¹School of Pharmaceutical Sciences, Jaipur National University, Jaipur, India²Govt. Polytechnique College, Garhwal Srinagar, Uttarakhand, India

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ABSTRACT

Cassia fistula Linn. commonly known as the Golden Shower, Indian Laburnum. It is native to India, the Amazon and Sri Lanka and diffused in various countries including Mexico, China, Mauritius, South Africa, East Africa, and West Indies. Medicinally it has been various pharmacological activities like antifungal, antioxidant, antimicrobial, anti-inflammatory, anti-tumor, hepatoprotective, hypoglycemic activities. Further, studies reveal the presence of various phytochemical constituents mainly carbohydrates, proteins, fats, secondary metabolites. In traditional medicine, it is used in the treatment of hematemesis, pruritis, intestinal disorders, leucoderma, diabetes, & as antipyretic, analgesic & laxative. Its medicinal properties are recognized in Ayurvedic system of medicine. The herb *Aragvadha* is first mentioned in Charaka Samhita, and the action of *Aragvadha* as *Kandughna* and is *Kusthaghna* also firstly mentioned in the same classic.

KEYWORDS: Antimicrobial, Hepatoprotective, Antidiabetic, Antioxidant, *Cassia fistula*, Anthraquinone glycosides.

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INTRODUCTION

Cassia fistula Linn. (family-caesalpinaceae) commonly known as the Golden Shower Indian Laburnum.¹ It is an Indian medicinal plant. It is native to India, the Amazon and Sri Lanka and diffused in various countries including Mexico, Mauritius, South Africa, East Africa, West Indies, China.³ Medicinally it has been various pharmacological activities like antimicrobial, antifungal, antipyretic, analgesic, larvicidal, anti-inflammatory, antioxidant, anti-tumor, hepatoprotective, hypoglycemic activities. *Cassia fistula* is a moderate sized deciduous tree, distributed throughout India. It is 8-15m to 24m in height, with greenish grey smooth bark when young & rough, dark brown when mature. Leaflets 8.12 pair, flowers yellow, long drooping racemes. Pod cylindrical & pulpy. Seeds light brown, hard & shiny. Ayurvedic medicine recognizes the seeds as antibilious aperitif, carminative and laxative.^{4,5}

Taxonomical classification

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Rosidae
Order: Fabales

Family: Fabaceae

Subfamily: Caesalpinaceae

Genus: Cassia

Species: *Cassia Fistula***Other names**

Hindi: Amaltas

English: Golden shower

Gujarati: Garmaalo

Kannada: Heggake

Malayalam: Vishnu Konnai, Katkonna

Marathi: Bahava

Punjabi: Sumalu

Tamil: Komare, Konrai

Telugu: Railkayaa

Bengali: Sonali, Bandarlatti, Amltas, Rakhalnadi.⁶**Plant description**

A tropical ornamental tree with a trunks consisting of hard reddish wood, growing up to 40 feet tall. The wood is hard and heavy. It has showy racemes, up to 2" long, with bright, yellow, fragrant flowers. These flowers are attractive to bees and butterflies. The fruits are dark-brown cylindrical pods, also 2' long, which also hold the flattish, brown seeds (up to 100 in one pod) these seeds are in cells, each containing a single seed. *Cana fistula* is

a fast-growing, medium-sized, deciduous tree which grows to about 9 meters in height. Leaves are compound, with 4-8 pairs of opposite leaflets. It produces flowers which are golden yellow and hang in showering bunches of up to 40 cm long earning its common name of "golden shower tree." The ensuing pods are one inch thick, and can reach lengths of 24 inches. *Cassia fistula* is semi-deciduous after flowering.⁷ It is an upright, rather narrow tree with an open top, and slightly drooping branches. *Cassia fistula* is a moderate sized deciduous tree, distributed throughout India. It is 8-15m to 24m in height, with greenish grey smooth bark when young & rough, dark brown when mature. Leaflets 8 to 12 pair, flowers yellow, long drooping racemes. Pod cylindrical & pulpy. Seeds light brown, hard & shiny.⁸

Botanical description

Leaves

Leaf arrangement: alternate

Leaf type: even-pinnately compound

Leaf margin: entire, undulate

Leaf venation: pinnate

Leaf type and persistence: deciduous

Leaf blade length: 4 to 8 inches

Leaf shape: elliptic (oval)

Leaf type and persistence: deciduous

Leaf color: green

Fall color: no color change

Fall characteristic: not showy

Flowers

Five bright yellow, widely spaced petals, about 2 inches wide with 10 stamens. Flower cluster held on pendent, terminal racemes.

Seeds

Seeds are oval shape, attach with sticky brown pulp, poisonous.

Fruit

Fruit shape: pod or pod-like, elongated, hanging

Fruit length: 12 inches or more

Fruit diameter: 1 inch

Fruit covering: dry or hard

Fruit color: purple

Fruit characteristics: does not attract wildlife; showy.⁹

PHYTOCHEMICAL STUDIES

The plant is rich in phenolic antioxidants such as anthraquinones, flavonoids and flavan-3-ol derivatives. *Cassia fistula* the results shows positive for alkaloids, terpenoids, reducing sugars, saponins, tannins, carbonyl, phlobatanin, and steroids.¹⁰ Two new aliphatic compound heptacosanyl-5-hydroxypentadec-2-enoate and octacosan-5,8-diol from the leaves of *Cassia fistula*.¹¹ Four new compounds, 5-(2-hydroxy phenoxymethyl) furfural (1), (2'S)-7-hydroxy-5-hydroxymethyl-2-(2'-hydroxypropyl)

chromone (2), benzyl 2-hydroxy-3,6-dimethoxybenzoate (3), and benzyl 2β-O-D-glucopyranosyl-3,6-dimethoxy benzoate (4), together with four known compounds, 5-hydroxymethylfurfural, (2'S)-7-hydroxy-2-(2'-hydroxy propyl)-5-methylchromone, and two oxyanthraquinones, chrysophanol and chrysophanein, were isolated and identified from the seeds of *Cassia fistula*.¹² Roots contain 7- methylphyscion, betulinic acid and sitosterol. The stem bark contains two flavanol glycosides and a xanthone glycosides.¹³ Sennosides A&B contains highest in new leaves.¹ The secondary metabolites are present in different plant part of *Cassia fistula*. [Fistucacidin (3,4,7,8,4'- pentahydroxyflavan Oxyanthraquinone, dihydroxyanthraquinone (-) epiafzelechin, (-) epiafzele chin-3-O-glucoside, (-) epicatechin, procyanidin B2, biflavonoids, triflavonoids, rhein, rhein glycoside, sennoside A, sennoside B, chrysophanol, physcion, Kaempferol, leucopelargonidin rhein, fistulin, alkaloids, triterpenes Rhein, volatile oil, waxy and resinous derivatives.¹⁴ Fistulic acid, Indoleacetic acid, 3-formyl-1 hydroxy-8- methoxy anthaquinone, 3B-hydroxy- 17-norpimar-8(9)-en-15-one Chrysophanol Rhamnetin-3-O-gentiobioside Proanthocyanidins, flavonoids¹⁵ and Gibberelic acid.¹⁶

PHARMACOLOGICAL STUDIES

Antioxidant activity

Total phenolic, proanthocyanidin, and flavonoid contents, and antioxidant activities, of fresh vegetative and reproductive organs was performed. High antioxidant activity of *Cassia fistula* may be contributed to its high phenolic and flavonoid content. Antioxidant activities of the aqueous (CFA) and methanolic extracts (CFM) of the *Cassia fistula* Linn. Both extracts exhibited significant antioxidant activity in DPPH, Nitric oxide and Hydroxyl radical induced invitro assay methods. Both extracts showed Dose-Dependent protective effect against lipid peroxidation and free radical generation in liver and kidney homogenates.^{17,18} Antioxidant activity of *Cassia fistula* (Linn.) flowers in alloxan induced diabetic rats.¹⁹

Fruit pulp powder of *Cassia fistula* was investigated for its antioxidant activity both in vitro and in vivo.²⁰

Antimicrobial activity

Antifungal activity of leaf extract of cassia fistula was reported.²¹

In-vitro Antibacterial Activity observed in Leaf and Root Extract of *Cassia fistula*.²²

Antibacterial and Antifungal activity from extract of *Cassia fistula* antibacterial activity of *Cassia fistula* was detected and reported.^{23,24}

Hepatoprotective activity

The n-heptane extract of *Cassia fistula* showed significant hepatoprotective activity which was comparable to that of a standard hepatoprotective agent. The ethanolic leaf extract on liver injury induced by diethylnitrosamine (DEN) was investigated and observed that ELE of *Cassia fistula* Linn. Protects the liver against DEN induced hepatic injury in rats.²⁵

Effect of *Cassia fistula* Linn. leaf extract on diethylnitrosamine induced hepatic injury in rats.²⁶

Aqueous Extract of Fruit Pulp Of *Cassia fistula* Against Carbon Tetrachloride (CCL4) Induced Liver Damage In Albino Rats was reported.²⁷

Ethanolic extract of bark of *Cassia fistula* was used in the hepatoprotective activity.²⁸

Antidiabetic activity

Aqueous extract of *Cassia fistula* (Linn.) flowers (ACF) was screened for its antioxidant effect in alloxan induced diabetic rats. And seeds of *Cassia fistula* were investigated for their hypoglycemic activity. They were found to have marked hypoglycemic activity on normal albino rats but not on alloxan produced diabetic albino rats.^{29, 30}

The mechanism of hypoglycemic and antidiabetic action of hydro alcoholic extract of *Cassia fistula* Linn. in rats.³¹

The antidiabetic potential of the total alcoholic extract & its ethyl acetate fraction of the bark of *Cassia fistula* was studied in alloxan induced diabetic rats. The ethyl acetate fraction exhibited significant reduction in blood glucose levels than alcoholic extract. The activity was found comparable with standard drug glibenclamide.³²

Anti-inflammatory

The anti-inflammatory property of aqueous extract of leaves and fruits of *Cassia fistula* was reported.³³

Antitussive activity

The methanol extract of *Cassia fistula* was investigated for its effect on a cough model induced by sulphur dioxide gas in mice. It exhibited significant antitussive activity when compared with control in a dose dependent manner.³⁴

Antiulcer activity

The ethanol leaf extract (ELE) of *Cassia fistula* Linn. (Caesalpinaceae) was evaluated for antiulcer activity against pylorus ligation-induced gastric ulcer.³⁵

Wound healing activity

C. fistula treated rats showed, better wound closure, improved tissue regeneration at the wound site, and supporting histopathological parameters pertaining to wound healing.³⁶

Antitumor activity

Effects of methanolic extract (ME) of *Cassia fistula* seed on the growth of Ehrlich ascites carcinoma (EAC) and on the life span of tumour bearing mice were studied. ME treatment showed an increase of life span, and a decrease in the tumour volume and viable tumour cell count in the EAC tumour hosts.³⁷

Hypolipidemic activity

The effect of 50% ethanolic extract of *Cassia fistula* Linn. Legume was assessed on serum lipid metabolism in cholesterol fed rats. The effect of 50% ethanolic extract of *Cassia fistula* legume was assessed on serum lipid metabolism in cholesterol fed rats.³⁸

Protease - inhibitory activity

The *Cassia fistula* seed PI is homologous to the family of plant defensins (γ -thionins), which have four disulfide linkages at highly conserved locations. The *Cassia fistula* PI inhibits trypsin and is the first known example of a plant defensin with protease inhibitory activity, suggesting a possible additional function for some members of this class of plant defensive proteins.³⁹

Antileishmanial activity

Hexane extract from the fruits showed significant antileishmanial activity against the promastigote form of *Leishmania L. chagasi*.⁴⁰

CNS activity

The methanol extract of the seed of *Cassia fistula* was tested for different pharmacological actions in mice. A depressant action of ME was also evident from the behavioural studies on mice. These results contribute with novel antiprotozoal compounds for future drug design studies.⁴¹

Antiparasitic activity

The fractionation through bioguided antileishmanial activity of the dichloromethane extract of *Cassia fistula* fruits (Leguminosae) led to the isolation of the active isoflavone biochanin A, identified by spectroscopic methods.⁴²

Anti-itching activity

Vicharchika (eczema) is a chronic skin disease with no permanent cure in modern medicine. Raised serum IgE level is the commonest immunological marker for eczema. This study suggests of significant efficacy of Aragvadhya on the patients of Vicharchika (eczema).⁴³

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