

**Pharmacognosy, Phytochemistry & Pharmacology of *Cassia Javanica* Linn. : A Review****\*Aditi Sharma, Shoaib Ahmad, S. L. Harikumar**

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**ABSTRACT**

*Cassia javanica* Linn. is a small and medium sized tree, belongs to the plant family Leguminosae (Fabaceae). It blossoms in the spring season, mainly from the month of April to September. It is commonly known as the apple blossom cassia, pink lady, apple blossom shower and java shower. It is widely cultivated in the tropical regions of Asia. The plant consists of descending branches and it produces mass of gorgeous flowers. The fruits ripen in the fall. Studies have shown the presence of various phytochemical constituents mainly anthraquinone glycosides, flavonoids, alkaloids, sterols, tannins, saponins and reducing sugars in different parts of the plant. *C. javanica* possesses various pharmacological activities - antidiabetic, antioxidant, anticancer and antimycotic activities. It has long been used in traditional medicine to cure various diseases. It has been used as antipyretic, laxative and antimalarial drug. It is known to decrease virulence of pathogenic organisms. It is used in the treatment of gastric pain and cold. Due to complex nature of the disease there is a worldwide need for an ideal drug therefore, there are many antidiabetic herbs recommended in traditional medicaments. The presented review summarizes the information concerning the morphology, chemical constituents, uses and pharmacological activities of the plant.

**Keywords:** Antioxidant, antidiabetic, anthraquinone glycosides, *Cassia javanica*

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**INTRODUCTION**

Leguminosae is the third largest family of angiosperms. It comprises of 740 genera which have a total of 19400 species [1]. Ranging in habit from annual herbs to large trees, the family is well distributed throughout temperate and tropical regions of the world [2].

*Cassia javanica* Linn. is an important member of this plant family. It has several common names such as pink cassia, pink shower, rainbow shower and white shower due to the presence of typical pink to crimson flowers. *C. javanica* is distributed naturally from India to Malaysia, Sumatra, Indonesia, Southern China and the Phillipines. It is also cultivated in the tropical regions of Asia. It is known to be used as antidiabetic, anticancer, antifungal and antioxidant drug [3].

**Botanical Description**

*C. javanica* grows fast and reaches upto 25 meters height. Trunk diameter of the tree may near 35 cm.

**Fig. 1: Street view of the Plant**

The leaves are paripinnate, made up of 12 pairs of leaflets. Pale rose to crimson flowers are arranged in racemes. It produces typical hanging, thin, cylindrical legumes (pods) which are dark colored. The legumes are 30 to 40 cm long and upto 1.5 cm in diameter. Each fruit contains numerous seeds (6.5 mm to 8.9 mm long and 5.6 mm to 7 mm wide). The seeds are obovate in shape and ventrally flattened. The seed coat is dark brown in color and has characteristic fracture lines [3].

#### Taxonomical Status [4]

The taxonomical status of the plant has been documented (Table 1).

**Table 1: Taxonomical Status of *C. javanica* Linn.**

Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Fabales
Family	Fabaceae (Leguminosae)
Genus	<i>Cassia</i> L.

Species	<i>Cassia javanica</i> Linn.
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#### Vernacular Names

Hindi : Javaniki- Rani [5]

English : Java Cassia [6]

Tamil : Kondrai [7]

#### Synonyms [8]

*Cassia agnes* (de Wit) Brenan

*Cassia bartonii* F.M. Bailey

*Cassia nodosa* Roxb.

#### Microscopy

The microscopic study of *C. javanica* leaves revealed the presence of secondary vascular bundles with pericyclic fibres present in separate regions outside the phloem. The cortical sclerenchyma is absent. Cluster crystals are confined to cortical cells and dense multicellular trichomes are also present [9].

#### PHYTOCHEMISTRY:

*C. javanica* is a rich source of numerous phytoconstituents particularly the anthraquinones. The phytoconstituents are found in almost all parts of the plant. The constituents associated with individual plant organs have been mentioned in (Table 2).

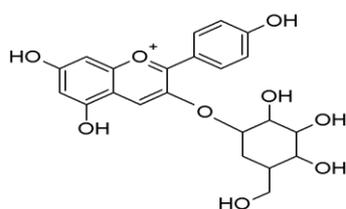
**Table 2: Phytoconstituents of *C. javanica* Linn.**

PLANT PART	SECONDARY METABOLITES
Leaves	Reducing sugars, proteins, alkaloids, tannins, glycosides, sterols, flavonoids, and saponins [6]; heptacosane, octacosane, hentriacontane, ceryl alcohol, octacosanol and hentriacontanol [10]. 1,3,4,6-tertrahydroxy-5-dimethoxy-2-methylantraquinone and 1,3,5,8-tetrahydroxy-6-methoxy-2-methylantraquinone; quercetin, emodin, chrysophanic acid, aloe-emodin, chrysophanol, physcion and its glucoside [11]. Nonacosane, triacontane, behenic acid, $\beta$ -amyrin, emodin, kaempferol-3-O- $\beta$ -D glucosyl-6-O- $\alpha$ -L-rhamnopyranose; methyl mehenate, tetracosane, javanin [12]. ent-Epiafzelechin-(4 $\alpha$ →8)-epiafzelechin [13]. Flavone rhamnoside 'javanin' [14].
Heartwood	Hentriacontane, $\beta$ -sitosterol, cerotic acid and $\beta$ -sitosterol-D-glucoside [10].
Stem bark	n-octacosanol and $\beta$ -sistosterol [10]; 1,2-dihydro-1,3-dihydroxyl-6,8-dimethoxy-2-methylantraquinone; 1,3,5,8-tetrahydroxy-6-methoxy-2-methylantraquinone; 1,3,4,6-tetrahydroxy-5,8-dimethoxy-2-methylantraquinone; 1,4-dihydroxy-6,7,8-trimethoxy-2-methylantraquinone; 1-hydroxy-3,6,7,8-tetramethoxy-2-methylantraquinone; 4,4'bis(1,5-dihydroxy-7-hydroxymethyl-2-methyl-3-methoxy)antraquinone [11].
Seeds	Chrysophanol, physcion; 1,5-dihydroxy-4,7-dimethoxy-2-methylantraquinone-3-O- $\alpha$ -rhamnopyranoside; 1,3,6,7,8-pentahydroxy-4-methoxy-2-methylantraquinone and galactomannans [15].
Flowers	Flavonoid glycosides (leucocyanidin-4'-O-methylether-3-O- $\beta$ -d-galactopyranoside; dihydrorhamnetin-3-O- $\beta$ -d-glucopyranoside; quercetin-

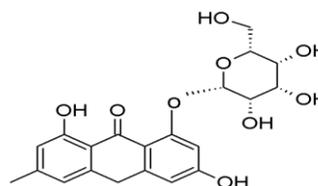
	3',4',7-trimethylether-3-O- $\alpha$ -l-rhamnopyranoside; kaempferol-3-rhamnoglucoside) alongwith quercetin [16]. 5,3-dihydroxy-2-phenyl-4-chrome-7,4-diguloside; naringenin-7-glucoside; 3-glucoside of pelargonidin. Paeonidin-3-O- $\alpha$ -L(-)-rhamnopyranoside [12] and glactomannans [17].
Root	Emodin-8-rhamnoside, 5-hydroxyemodin-8-rhamnoside; 1,3- dihydroxy-5, 6,7-trimethoxy-2-methylanthraquinone; 1,4-dihydroxy-8-methoxy-2-methylanthraquinone-3-O- $\beta$ -D-glucopyranoside; 1,8-dihydroxy-6,7-dihydroxy-2-methylanthraquinone [11]. 3',6' dihydroxy-4-methoxychalcone, 1,6-dihydroxy~ and 1,5,6-trihydroxy-3-methylanthraquinone. 8-O- $\alpha$ -L-rhamnopyranoside. [12].
Bark	Proanthocyanidins containing flavan-3-ol (epiafzelechin and epicatechin) [18].

The anthraquinones are found in leaves in free as well as glycosylated form. Additionally, leaves contain sugars, flavonoids and isoprenoid compounds.

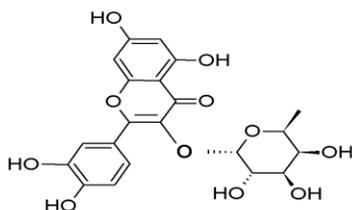
Roots, heartwood and seeds are rich in anthraquinones. Flowers contain a variety of flavonoids in free and glycosylated forms.



**Pelargonidin-3-glucoside**



**Emodin-8-rhamnoside**



**5-hydroxy emodin-8-rhamnoside**

#### PHARMACOLOGICAL STUDIES:

*C. javanica* possesses variety of pharmacological actions some of which are as follows:

##### Hypoglycaemic activity

The aqueous ethanolic and chloroform extracts of leaves showed hypoglycaemic activity on laboratory-bred male Wistar albino adult rats [6].

##### Anticancer and antimycotic activity

The anticancer and antimycotic activities of honey samples from flowers of Egyptian *C. javanica* against colon, breast and liver tumor cell lines (HCT-116, HTB-26 and HepG2) and over clinical dermatophytes (*Tricophyton*, *Microsporium* and *Epidermophyton*) have been evaluated [19].

##### Antioxidant activity

Antioxidant potential of methanolic extract of leaves was evaluated in superoxide anion radical scavenging assay and it revealed a strong antioxidant potential of 50.4% at a concentration of 300 $\mu$ g/ml [20].

##### Antimicrobial activity

Propelargonidin from *C. javanica* is fungitoxic [21]. *C. javanica* is fungitoxic to *Rhizoctina solani* [22].

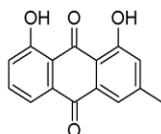
##### Antiviral activity

Ent-epiafzelechin-(4 $\alpha$ →8)-epiafzelechin (EEE) found in the fresh leaves of *C. javanica* Linn. was subjected to *in vitro* testing against anti-Herpes Simplex Virus-2 (HSV-2) using 2,3-Bis-(2-methoxy-4-nitro-5-sulphophenyl)-2H-tetrazolium-5-carboxanilide (XTT) and plaque reduction assays. EEE was found to prevent

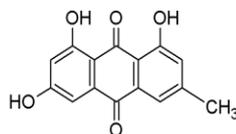
penetration of cells by HSV-2 and also negatively affected HSV-2 replication in a dose dependent manner [13].

### Haemolytic activity

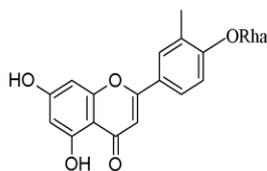
The saline extract of seeds showed haemagglutinating and haemolytic activity against RBCs [14].



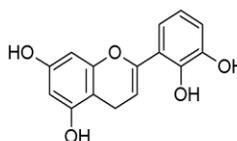
Chrysophanol



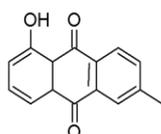
Emodin



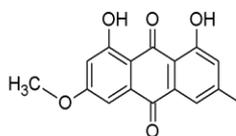
Javanin



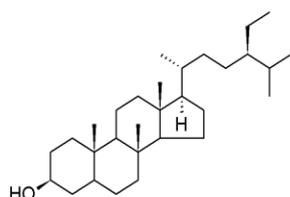
Quercetin



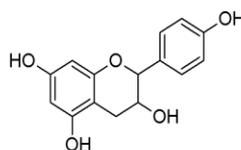
Chrysophanic acid



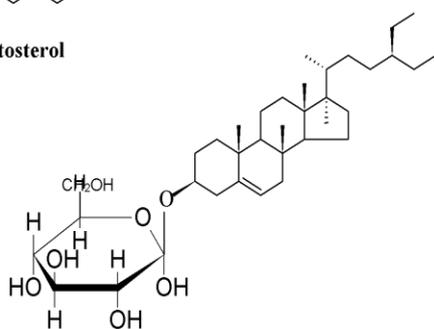
Physcion



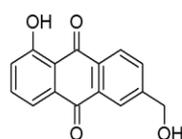
$\beta$ -sitosterol



ent-Epiatzelechin(4 $\alpha$   $\rightarrow$ 8)epiizelechin



$\beta$ -sitosterol-D-glucoside



Aloe-emodin

### CONCLUSION

*C. javanica* Linn. is an important medicinal plant of Leguminosae. It belongs to *Cassia* - a genus known for anthraquinones with laxative/purgative action. The plant or its extracts have exhibited numerous activities (such as hypoglycaemic, anticancer, antiviral and antimycotic actions) possibly due to the presence of flavonoids, anthraquinones and sterols. Elementary

studies suggest a therapeutic potential exists for this plant beyond the traditional uses.

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