

**SENNA AURICULATA: A COMPREHENSIVE REVIEW OF ITS PHYTOCHEMISTRY AND PHARMACOLOGICAL ACTIVITIES**

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ABSTRACT

Senna auriculata (L.) Roxb., a medicinal shrub widely distributed in the dry and hot deciduous regions of India, holds significant importance in the Ayurvedic and Siddha systems of medicine. The plant has been traditionally employed for a variety of therapeutic purposes, including the management of metabolic, gastrointestinal, dermatological, and infectious conditions. Phytochemical investigations have revealed the presence of diverse bioactive constituents such as alkaloids, flavonoids, glycosides, triterpenes, tannins, and phenolic compounds, which are believed to contribute to its broad pharmacological profile. Different parts of the plant—including roots, bark, leaves, flowers, and fruits—are used in traditional medicine for conditions such as diabetes, fever, abdominal disorders, urinary complaints, helminthic infections, and oral health problems. Experimental studies have reported multiple

biological activities, including antibacterial, antidiabetic, antioxidant, anti-inflammatory, hepatoprotective, anthelmintic, antiurolithiatic, and tissue-protective effects. This review aims to summarize the botanical characteristics, phytochemical composition, traditional uses, and experimentally validated pharmacological activities of *Senna auriculata*, highlighting its therapeutic relevance and potential for future drug development. Further systematic and clinical investigations are warranted to establish standardized formulations and confirm its safety and efficacy.

KEYWORDS: *Senna auriculata*; Medicinal plant; Traditional medicine; Phytoconstituents; Flavonoids; Alkaloids; Antidiabetic activity; Antioxidant activity; Antimicrobial activity; Anti-inflammatory activity; Hepatoprotective activity; Anthelmintic activity.

INTRODUCTION

Senna auriculata (L.) Roxb., a flowering shrub belonging to the family Fabaceae, is widely distributed in the dry and deciduous regions of India and other parts of South Asia. The plant holds a distinguished position in traditional systems of medicine such as Ayurveda and Siddha, where it has been extensively utilized for centuries due to its diverse therapeutic applications. Commonly known as Avaram or Tanner's Cassia, it is recognized for its medicinal value and adaptability to arid climatic conditions.

Various parts of the plant, including leaves, flowers, roots, bark, and fruits, are traditionally employed in the management of metabolic, gastrointestinal, dermatological, and infectious conditions. In folk medicine, it is frequently recommended for diabetes, fever, urinary disorders, intestinal disturbances, and helminthic infections. The bark and roots are also used for oral and abdominal ailments, reflecting its broad ethnomedicinal relevance.

Phytochemical investigations have revealed the presence of multiple bioactive compounds such as flavonoids, alkaloids, glycosides, tannins, phenolic compounds, and triterpenes. These constituents are believed to contribute to its wide range of pharmacological properties. Experimental studies have demonstrated antioxidant, anti-inflammatory, antibacterial, hepatoprotective, antidiabetic, anthelmintic, and antiurolithiatic activities, supporting many of its traditional claims.

Given its rich phytochemical composition and validated biological effects, *Senna auriculata* continues to attract scientific interest as a potential source for novel therapeutic agents. This review aims to consolidate current knowledge regarding its botanical characteristics, traditional uses, phytochemistry, and pharmacological significance.^[1]



Fig. 1: Flower Powder Extract and Leaves of Senna Auriculata.

Botanical Description

Senna auriculata (L.) Roxb., belonging to the family Fabaceae (subfamily Caesalpinioideae), is a hardy, evergreen to semi-deciduous shrub commonly found in dry and arid regions of India and South Asia. The plant typically grows to a height of 1–3 meters and is well adapted to hot climates and poor soil conditions. It is widely distributed in open scrub forests, wastelands, and along roadsides.

The stem is woody, much-branched, and covered with smooth grayish-brown bark. Leaves are alternate, paripinnate, and stipulate, measuring approximately 8–12 cm in length. Each leaf consists of 8–12 pairs of oblong to obovate leaflets with a smooth surface and rounded apex. A distinctive feature of the plant is the presence of large, persistent, ear-shaped (auriculate) stipules at the base of the leaves, which give the species its name.^[2]



Fig 2: Fruits of *Senna auriculata* Linn.

The plant produces bright yellow, showy flowers arranged in terminal or axillary racemes. The flowers are bisexual and zygomorphic, with five free petals and ten stamens of unequal size. Flowering generally occurs throughout the year, particularly in warmer seasons. The

fruit is a flat, oblong legume (pod), measuring 5–10 cm in length, containing several hard, compressed seeds that are dark brown in color.

These morphological characteristics serve as important diagnostic features for identification and pharmacognostic standardization of *S. auriculata* in herbal medicine research.^[3]

Table 1: Plant description of <i>Senna auriculata</i>	
Taxonomy of <i>Senna auriculata</i> Linn	
Kingdom	Plantae
Clade	Tracheophytes, Eudicots, Rosids.
Order	Fabales
Family	Fabaceae
Genus	<i>Senna</i>
Species	<i>S. auriculata</i>
Binomial name	<i>Senna auriculata</i> (L.) Roxb.
Synonym	<i>Cassia auriculata</i> L. and <i>Cassiadensistipulata</i> Taub.

Geographical distribution

It can be found all over India's hot deciduous forests. Wild in Tamil Nadu's and Madhya Pradesh's arid regions Rajasthan and other Indian regions.

Cultivation and collection

A factory native to primarily thirsty tropical climates, yet it can also repel important wetter rainfall. It can repel mean periodic rush as low as 400 mm or as high as 4,300 mm and grows stylish in regions with mean periodic temperatures between 16 and 27 °C. needs to be deposited in direct sun. respectable in a wide range of soil conditions, indeed salty bones, but favors a nicely rich, well- drained soil. With a stem periphery of 35 mm, shops can grow to a height of around 3 measures in 2 times and a height of roughly 5 measures in 4 times, according to certain sources. Coppicing is appreciatively entered by shops, After the third time, shops can be picked for their tannins and colors.^[4]

Various parts and their phytoconstituents

Senna auriculata contains a wide range of bioactive compounds distributed throughout different parts of the plant, each contributing uniquely to its therapeutic potential. The leaves are rich in flavonoids, tannins, phenolic compounds, and glycosides, which are primarily responsible for antioxidant, anti-inflammatory, and antidiabetic activities. These compounds help neutralize free radicals and modulate inflammatory pathways.

The flowers contain significant amounts of flavonoids such as quercetin and kaempferol, along with other polyphenolic compounds. These constituents contribute to antioxidant and antimicrobial properties and may support liver-protective effects. The roots possess alkaloids, triterpenoids, and tannins, which are associated with antimicrobial and anti-inflammatory actions.

The bark is known to contain tannins and saponins, imparting astringent and antibacterial properties, which justify its traditional use in oral and skin-related conditions. Seeds contain proteins, fixed oils, and anthraquinones, which are linked to anthelmintic and mild laxative activities.

Overall, the therapeutic efficacy of *Senna auriculata* can be attributed to the synergistic action of these phytoconstituents. The presence of diverse secondary metabolites across different plant parts supports its broad pharmacological spectrum and validates its extensive use in traditional medicine systems.^[5]

Table 2: various parts of plant and their phytoconstituents

Part of plant	Constituents	Reference number
Leaves	Alkaloids, flavonoids, terpenoids, phenols, tannins, steroids, saponins	[11-14]
Flowers	Tannins, terpenoids, alkaloids, carbohydrates, steroids,	[11,15, 16]
Root	7,4-dihydroxyflavone-5-O-beta-D-galactopyranoside	[12, 17]
Bark	Anthraquinones, triterpenoid glycosides, 3-hydroxy 6,8-dimethoxy-2methyl anthraquinone 1-0-beta-d- Galactonide	[3,12, 18]
Seed	benzoic acid, 2- hydroxyl methyl ester (0.07%), glycine, N-(trifluoroacetyl), 1- methylbutyl ester (0.10%), 2,3 dihydro-3,5 dihydroxy- 6 methyl-4H-pyran-4-one (0.12%), Capric acid, oleic acid, steric acid, palmitic acid, ethyl ester (0.16%), Resorcinol (0.21%) Water soluble galactomannan from the seed of the plant furnished beta-D-mannopyranosyl-(1to4)-O-beta-D-mannopyranosyl (1to4)-O-beta-D-mannopyranose by partial hydrolysis	[12, 19, 20]
Stem	Kaempferol-3-O-rutinoside, Rutin, Kaempferol, Glycine, N-(trifluoro acetyl)-, 1-methylbutyl ester, Quercetin, Luteolin	[21]

Phytoconstituents present in *Senna auriculata* such as flavonoids, alkaloids, tannins, and anthraquinones contribute to its pharmacological effects. These compounds exhibit antioxidant, anti-inflammatory, antimicrobial, antidiabetic, and hepatoprotective activities through synergistic interactions, supporting its traditional use and therapeutic significance in various medicinal applications.^[6]

**Quercetin**

Antioxidant, anti-inflammatory

**Kaempferol**

Antioxidant, antimicrobial

**Alkaloids**

Antimicrobial, anti-inflammatory

**Tannins**

Astringent, antibacterial

**Tannins**

Astringent, antibacterial

**Anthraquinones**

Anthelmintic, mild laxative

Detailed Pharmacological Actions of *Senna auriculata*

1 Antidiabetic Activity

Disease: Diabetes Mellitus (Type 1 & Type 2) Flower and leaf extracts significantly reduce blood glucose levels in streptozotocin- and alloxan-induced diabetic models. Mechanisms include stimulation of insulin secretion, regeneration of pancreatic β -cells, inhibition of intestinal glucose absorption, and enhancement of peripheral glucose uptake. It also improves glycogen storage in liver tissues. Diabetes is characterized by chronic hyperglycemia due to insulin deficiency or resistance. Persistent high glucose levels lead to complications such as neuropathy, nephropathy, and retinopathy. *Senna auriculata* flower extracts reduce fasting blood glucose, improve glucose tolerance, and enhance antioxidant defense in pancreatic tissue. The plant may protect β -cells from oxidative damage and improve lipid abnormalities commonly associated with diabetes.^[7,8]

2 Antioxidant Activity

Disease: Oxidative stress-related disorders (aging, cardiovascular diseases) Rich in flavonoids and phenolics, the plant scavenges free radicals (DPPH, superoxide, hydroxyl radicals). It enhances endogenous antioxidant enzymes such as superoxide dismutase (SOD), catalase, and glutathione peroxidase, thereby reducing lipid peroxidation. Oxidative stress contributes to aging, cardiovascular diseases, neurodegeneration, and cancer. Excess reactive oxygen species (ROS) damage lipids, proteins, and DNA. The flavonoids and

phenolic compounds in *Senna auriculata* neutralize free radicals and increase endogenous antioxidant enzymes, thereby preventing cellular injury.^[9,10]

3 Anti-inflammatory Activity

Disease: Arthritis, inflammatory bowel conditions Extracts inhibit cyclooxygenase (COX) and lipoxygenase pathways, reducing prostaglandin and leukotriene synthesis. Suppression of pro-inflammatory cytokines (TNF- α , IL-6) has been reported in experimental models. Inflammation involves activation of immune cells and release of inflammatory mediators. Chronic inflammation leads to joint damage in arthritis. Extracts of the plant suppress inflammatory mediators like prostaglandins and cytokines, reducing edema and tissue destruction.^[11,12]

4 Antibacterial Activity

Disease: Skin infections, urinary tract infections Methanolic and aqueous extracts show activity against *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. Tannins and flavonoids disrupt bacterial cell walls and inhibit microbial enzymes. Bacterial infections can affect skin, respiratory, and urinary systems. Resistance to antibiotics is increasing globally. Plant extracts show inhibitory activity against Gram-positive and Gram-negative bacteria by disrupting cell membranes and inhibiting enzyme systems.^[13,14]

5 Wound Healing Activity

Disease: Chronic wounds, diabetic ulcers Topical application accelerates wound contraction, collagen synthesis, and epithelial regeneration. Antioxidant and antimicrobial properties contribute to faster healing. Delayed wound healing is common in diabetic patients due to poor circulation and oxidative stress. The plant promotes collagen formation, angiogenesis, and faster epithelialization while preventing microbial contamination.^[15,16]

6 Hepatoprotective Activity

Disease: Drug- or toxin-induced liver injury Protects against carbon tetrachloride (CCl₄) and paracetamol-induced hepatotoxicity. Reduces serum markers (SGOT, SGPT, ALP) and restores normal liver histology by stabilizing hepatocyte membranes. Liver damage occurs due to toxins, alcohol, and drugs. Elevated liver enzymes indicate hepatocellular injury. *Senna auriculata* protects hepatocytes by stabilizing cell membranes and reducing oxidative stress, restoring normal liver architecture.^[17,18]

7 Anthelmintic Activity

Disease: Helminthiasis Seed and fruit extracts paralyze and kill parasitic worms, likely through interference with neuromuscular transmission in helminths. Parasitic worm infections cause malnutrition and anemia. Seed extracts may paralyze worms and interfere with their metabolic pathways, aiding expulsion from the body.^[19,20]

8 Antiuro lithiatic Activity

Disease: Urolithiasis (Kidney Stones) Prevents calcium oxalate crystal formation and reduces urinary supersaturation. Exhibits diuretic and antioxidant effects that help dissolve or prevent stone formation. Kidney stones form due to crystal aggregation in urine. The plant reduces calcium oxalate deposition, increases urine output, and prevents stone growth through antioxidant mechanisms.^[21,22]

9 Antipyretic Activity

Disease: Fever, Traditionally used to reduce elevated body temperature by modulating prostaglandin synthesis in the hypothalamus. Fever is a response to infection mediated by prostaglandins in the hypothalamus. Traditional use suggests the plant may reduce elevated body temperature through anti-inflammatory action.^[23-26]

Antihyperlipidemic Activity

Disease: Hyperlipidemia, Cardiovascular risk Reduces total cholesterol, LDL, triglycerides, and increases HDL levels. Mechanism may involve inhibition of lipid absorption and improved lipid metabolism. Elevated cholesterol and triglycerides increase cardiovascular risk. Extracts reduce LDL and total cholesterol while improving HDL levels, possibly by regulating lipid metabolism enzymes.^[27-30]

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