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Sesbania grandiflora – Phyto Pharmacological Review

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Abstract

Sesbania grandiflora is commonly called as vegetable humming bird, hummingbird tree, it is small tree in the genus of sesbania. Sesbania grandiflora is a fast-growing perennial, deciduous or evergreen legume tree, up to 10-15 m high. Its lifespan is about 20 years. Its roots are heavily nodulated and some floating roots may develop in waterlogged conditions. The trunk is straight with few branches. The leaves, up to 30 cm long, are pinnately compound with 20-50 oblong leaflets, 1-4 cm long and 0.5-1.5 cm broad. The flowers are white, yellowish, pink or red and borne in axillary racemes. The pods are 50-60 cm long, glabrous and indehiscent, and hang vertically. They contain 15 to 50 dark brown seeds, 5 mm long and 2.5-3 mm broad. Here focus of the plant of *sesbania grandiflora* medicinal potency, phytochemistry and pharmacological activity.

Keywords
Sesbania grandiflora, perennial, branches, medicinal potency, phytochemistry.

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INTRODUCTION:

Sesbania Grandiflora - Agathi keerai in Tamil, scientific name is *sesbania grandiflora* and in English the spinach variety is called as august tree leaves or humming bird tree leaves.

It is a fast-growing tree. The leaves are regular and rounded and the flowers white, red or pink. The fruits look like flat, long, thin green beans. The tree thrives under full exposure to sunshine and is extremely frost sensitive.

Fig: *Sesbania grandiflora* (Tree)

It is a small soft wooded tree up to 3–8 m tall. Leaves are 15–30 cm long, with leaflets in 10–20 pairs or more and an odd one. Flowers are oblong, 1.5–10 cm long in lax, 2–4 flower racemes. The calyx is campanulate and shallowly 2-lipped. Pods are slender, falcate or straight, and 30–45 cm long, with a thick suture and approximately 30 seeds 8 mm in size.

Fig: *Sesbania grandiflora* (Flower)

It is indigenous from South East Asia (Malaysia , Philippines, Brunei) to Northern Australia, and is cultivated in many parts of India and Sri Lanka. It has many traditional uses.[5] It grows where there is good soil and a hot, humid climate.
The leaf extract may inhibit the formation of advanced glycation end-products.[6] The leaf extract contains linolenic acid[7] and aspartic acid,[8]which were found to be the major compounds responsible for the anti-glycation potential of the leaf extract.
The flowers of S. grandiflora are eaten as a vegetable in South Asia and Southeast Asia, including Laos, Thailand, Java in Indonesia, Vietnam, Maldives, Sri Lanka, and the Ilocos Region of the Philippines.

Fig: *Sesbania grandiflora* (Seed)

Sesbania grandiflora (L.) Pers. is a small, erect, fast-growing, and sparsely branched tree belonging to the Leguminosae family. This plant is native to tropical Asia and is widespread in Malaysia, Indonesia, Philippines, and India. The Malay names of this plant are turi and geti.

- Botanical name **:** *Sesbania grandiflora*
- Family : Papilionaceae
- Actions : Astringent, Febrifuge, Vermifuge, Antidote.
- Common name : Corkwood tree, hummingbird tree
- Types : Agathi, agathi and sevvagathi or red agathi.
- Parts utilized : Leaves, flower, bark, root.
- Taste : Slightly bitter and sour.
- Property of the leaves: Coolant, purgative, kills worms.

Scientific classification:

Kingdom	: Plantae
Subkingdom	: Tracheobionta
Superdevision	: Spermatophyta

Division	:Magnoliophyta
Class	:Magnoliopsida
Subclass	: Rosidae
Order	: Fabales
Family	: Fabaceae
Genus	: Sesbania
Species	: *Sesbania grandiflora*
Binomial name	: *Sesbania grandiflora (L)Poiret*

Nutritional value

Protein	**:** 1.28 g (per 100 g)
Calcium	**:** 19 mg (per 100 g)
Energy	**:** 27.01 Calories (per 100 g)

Medicinal potential:

All parts of *S. grandiflora* have been used empirically as a traditional remedy in folk medicine to treat various diseases such as catarrh, dysentery, fevers, headaches, smallpox, sore throat, and stomatitis (1,2).

Previous phytopharmacological study on the leaves, flowers, and aerial parts of this plant had isolated sterols, saponins, and tannins (3). These chemical constituents are well known for their potential health benefits and have been reported to possess valuable biological activities such as antibacterial and antifungal (4), antioxidant (5,6,7), antiurolithiatic (7), anticonvulsant and anxiolytic (8), and hepatoprotective properties (9). In a more recent study, it was found that the supplementation of *S. grandiflora* leaves could also afford a significant hypolipidemic effect against Triton-induced hyperlipidemia in rats (10). Even though *S. grandiflora* was extensively studied by other researchers for its phytopharmacological potential, especially the leaves, flowers, and aerial parts of the plant, no phytochemical and pharmacological studies have been performed on the root of *S. grandiflora*.

Siddha Medicinal Uses:

- The intake of the leaf of this medicinal herb can remove the intestinal worm. Siddhar Agasthiyar has described in his verses about the importance of this herb as Antidote. It also nullifies the effect of Idumarunthu or philters
- 1 to 2 drops of leaf juice are used as nasal drops to cure intermittent fever, sinusitis and headache.
- For fever the paste of the leaf can be externally applied over the body.
- Small doses of decoction of the bark of this plant are given in the initial stages of eruptive fevers like small pox.
- The flowers also possess similar properties like leaves.

The common variety is white flower august tree leaves. Taste of agathi leaves is bitter but has bunch of healthy values. The edible parts in this variety are flower and leaves of the tree. Leaves, stem, root and flower of august tree leaves are used for medicinal purposes. The agathi leaves can be consumed in the form of juice, cooked spinach or medicine. The thin stem is used as an ingredient for good health medicines in siddha and ayurveda. It is advisable to take agathi leaves two to three times in a month.

It's believed that *Sesbania grandiflora* is named after the Vedic sage, Agastya. Considered the father of Tamil literature, Agastya likely lived between 6 and 7thcentury BC, and he specialized in siddha medicine, spirituality and lyric and grammar of Tamil language. In India, the plant grows in abundance throughout many states, including Tamil Nadu, Andhra Pradesh, Kerala, Assam, Gujarat, and Bengal. They thrive in hot, humid areas and can grow like weeds in close quarters.

They manage a humble existence growing in the banks near major crops, and in gardens. Sometimes, bunches of the leaves appear in local produce stalls, likely to appease the older generation who insist on the plant's numerous health benefits.

It is a fast growing tree. Leaves are regular and opposite foliate leaves with round tip and the flowers are white or red according to species. The fruits look like flat long and thin green beans. The tree thrives under full hot sunlight and extremely frost sensitive. Leaves are 15 to 30 cm long, leaflets 10 to 20 pairs oblong. racemes 2 to 4 flowers. Suture thick seeds. pods slender

The vernacular names of Agathi Tree are as follows:

In Hindi Gaach munga in Malayalam Akati in Kannada adase in Telegu Avisi

In Marati Hadga flowers in Bengali.

Agathi leaves taste bitter, sour, and mildly tart. Most cooks counteract this bitterness with coconut milk, and some swear by the addition of garlic to combat

the stomach pain arising from consuming too much agathi.

The flowers are also bitter and astringent, but the white are less so than the red. It's possible to reduce the bitterness by removing the stamen. The flower's texture is mildly crunchy and fibrous, but pressure cooking or steaming for ten minutes will soften it. It's also best to choose the flowers that have not yet bloomed, as these too will be softer and less leathery.

The leaves are an excellent source of calcium and iron. The abundance of these nutrients is one reason for its reputation as a bone strengthener. the leaf is also an anthelmintic, diuretic, laxative, and can aggravate pitta. It has the potential to treat toxicosis, itching, and excess kapha. The flowers are acrid, bitter, and astringent. Local healers use the flowers to treat night blindness, headaches, catarrh, cough, and fever.

Medicinal Uses:

Strong bones are the main contribution of agathi leaves. The vitamins and rich calcium, iron content in the keerai or spinach supplies strength to bones. By consuming the juice of agathi leaves prevent the weak bones of older agers and patient of arthritis. It strengthens optical nerves.

When we cook these leaves for food, you should add garlic and little jaggery. It has the side effect of indigestion and stomach pain. So check this spinach by eating little.

If it is digestable to you, you can eat more but at intervals. Constipation, Complication caused by drinking more cups of coffee and tea, feeling of burning in palms, heart and foot, body heat are controlled by taking agathi leaves at frequent intervals.

The burning sensation of body, eyes, stomach, legs and feet are drastically reduced by adding agathi leaves in your diet.

Agathi leaves are boiled fully and added to the mother of new born baby for healthy breast feeding.

It has a power of throwing out the stomach worms and leaves your stomach happy for a long time. The high content of vitamin A and calcium is the reason behind this health benefit.

It has a unique power of healing wounds, itches and bruises and sprains fastly with the help of antibacterial properties. The root of the agathi leaves are used to cure malaria

The leaf of agathi supplies all the nutrition that makes strong body, healthy blood, and healthy functions of all organs of the body. But it is strictly warned that it has to be consumed monthly twice or thrice.

It is prescribed in siddha medicine as a good spinach variety which reduces the fever.

It is prescribed in siddha medicine as a good spinach variety that reduces the fever as well as it has a unique power of reducing the effect of poison and medicine.

To cure night blindness, the extract of humming bird tree leaves is used as a medicine.

Add small onions with these Sesbania leaves leaves for good functions of intestine Store the water used for boiling the agathi leaves and consume it as the soup. It has all the vitamin and mineral content of the agathi leaves.

Pharmacological screening *Sesbania grandiflora*:

Rajit Kumar *et al* (2015) evaluated the Evaluation of antidiabetic activity of alcoholic extract of flower *Sesbania grandiflora* in alloxan induced diabetic rats. 70% alcoholic extract of flower possesses an antidiabetic activity in dose dependent manner in diabetic rats. (11)

P. Sarasu Packiyalakshmi et al (2016) analyzed in different solvent systems. Antibacterial activities of leaves of Sesbania grandiflora was analyzed through well diffusion technique. The ethanol extract showed the maximum activity against Staphylococci species. (12)

IshwerKale *et al* (2012) screened the hepatoprotective potential of ethanolic and aqueous extract of flowers of *Sesbania grandiflora* (Linn) induced by CCl_4. The ethanolic extract at doses of 250 and 500 mg/kg, p.o. and aqueous extract at a dose of 500 mg/kg, p.o. of *Sesbania grandiflora* (Linn) flower have significant effect on the liver of CCl_4 induced hepatotoxicity animal models. (13)

Rajneeta Roy *et al* (2013) screened the apoptotic and Autophagic Effects of *Sesbania grandiflora* Flowers in Human Leukemic Cells. anti-proliferative effect of a fraction is isolated from *S. grandiflora* flowers in cancer cells and delineate the underlying involvement of apoptotic and autophagic pathways. (14)

Dayananda Bhoumik *et al* (2016) evaluated the gastric Anti-Ulcer Potency of Ethanolic Extract of *Sesbania Grandiflora Linn Leaves in Experimental Animals. Ethanolic extract of Sesbania grandiflora possesses anti-ulcer effect as well as ulcer healing properties, which might be due to antisecretory properties. (15)*

Shreya Kothari *et al* (2017) evaluated the anti-diabetic activity of Sesbania grandiflora - alpha amylase inhibitory effect. A maximum inhibition of 81% was observed at 1000µg/ml which was compared with that of standard Acarbose that showed 93% inhibition. The IC50 of the extract was

found to be 50.95µg/ml and for Acarbose 34.83 uM. (16)

Mallik Arunabha et al (2014) investigate the immunomodulatory activity of Sesbania grandiflora on cellular and humoral immunity. The methanolic extract (400mg/kg) of S. grandiflora possesses potential immunomodulatory activity. (17)

Nafisa Binte Arfana *et al* (2016) studied the Thrombolytic, Membrane stabilizing, Antidiarrhoeal, and Antimicrobial Properties of Bioactive Compounds Isolated from leaves of *Sesbania grandiflora* Naturally Growing in Bangladesh. The ethanolic extract of S. grandiflora leaves was partitioned into ethyl acetate soluble fraction (ESF), petroleum ether soluble fraction (PSF), carbon tetrachloride soluble fraction (CTSF), chloroform soluble fraction (CSF), and aqueous soluble fraction (AQSF). The extracts were evaluated for their thrombolytic, membrane stabilizing, antimicrobial and antidiarrhoeal activities. (18)

Bindhu Tene *et al* (2017) studied the Pharmacological Evaluation of *Sesbanina Grandiflora* for Anticolon Cancer Activity in 1, 2 Dimethylhydraine Induced Colon Cancer. The Sesbaina grandiflora at a dose of 400mg/kg body weight can significantly reduce the formation of aberrant crypt foci (ACF) and number of aberrant crypts and improved histopathological changes in colon cancer bearing rat. (19)

Thiyagarajan Ramesh *et al* (2015) designed to evaluate the restorative effects of *Sesbania grandiflora* on oxidative damage induced by cigarette smoke exposure in brain of rats. S. grandiflora could have rendered protection to the brain by stabilizing their cell membranes and prevented the protein oxidation, probably through its free radical scavenging and anti-peroxidative effect. (20)

Mir Muhammad Nasir Uddin *et al* (2014) evaluated analgesic and neuro pharmacological investigations on *sesbania grandiflora*. Methanolic extract of *Sesbania grandiflora* displayed a significant and dose dependent analgesic activity, the percent inhibition was 68.13%, 85.56% respectively in the test group (250 & 500 mg/kg b.w.). (21)

Ishwer Kale *et al* (2012) studied Hepatoprotective potential of ethanolic and aqueous extract of flowers *Sesbania grandiflora* Linn induced by CCl_4. The ethanolic extract at doses of 250 and 500mg /Kg, per oral and aqueous extract at a dose of 500mg /kg per oral of *sebania grandiflora* flower have significant effect on the liver of CCL_4 induced hepatotoxicity animal models. (22)

Sunil S. Jalalpurea *et al* (2006) evaluated in Vitro Antihelmintic Property of Various Seed Oils. *Sesbania grandiflora* showed the highly significant antihelmintic activity in both the parameters (paralysis and death), Piperazine citrate (10 mg/ml) was included in the assay as standard reference drug. (23)

John Paul Matthew Domingo Guzman *et al* (2018) studied the Antibacterial and Antibiofilm Activities of Sesbania grandiflora Against Foodborne Pathogen Vibrio cholera. Sesbania grandiflora was tested for its antibacterial and antibiofilm activities against the pathogenic Vibrio cholerae. S. grandiflora was able to yield growth inhibition at 7.81 mg/mL and was bactericidal at 15.63 mg/mL. However, it was only able to start to actively inhibit growth at 125 mg/mL. S. grandiflora ethanolic extract was also able to significantly inhibit biofilm formation at concentration as low as 0.98 mg/mL. Hence, the results showed the concentration-dependent antibiofilm activity of S. grandiflora that it was able to inhibit biofilm formation without completely eradicating the microorganism at lower concentrations. (24)

Phytochemistry of Sesbania grandiflora (L) Poiret:

Three isoflavanoids, isovestitol, medicarpin, and sativan, along with another known compound, betulinic acid, were isolated from the root of *Sesbania grandiflora*. (28)

Shanmukha I *et al* (2012) studied Spectroscopic Determination of total Phenolic and Flavonoid Contents of Sesbania Grandiflora (Linn) Flower. 70% alcoholic extract of flowers of *Sesbania grandiflora* using Catechol and Quercetin as reference standard. It was observed that, 70% alcoholic extract of flowers of *Sesbania grandiflora*(Linn) showed 64.0mg/G of total phenol equivalent to catechol and 28.80mg/G of flavonoidal content equivalent to quarcetin standard. (25)

Arun. A et al (2014) evaluated the qualitative phyto compounds were screened in *S.gradiflora*, according to the results alkaloids, flavanoids, glycosides, tannin, steroid, proteins and carbohydrates are present. (26)

GC-MS Investigation of Sesbania grandiflora:

A. Zahir Hussain et *al* (2014) eighteen compounds were identified in *Sesbania grandiflora.* by GC – MS analysis. The GC – MS analysis revealed that the methanolic extract is mainly composed of oxygenated hydrocarbons and predominantly phenolic hydrocarbons. 3,4,5-Trimethoxyphenol (2.5 %), Erucic acid (2.8 %), 2-Furancarboxaldehyde (2.8 %), Vitamin E acetate (3.13%), 4-methyloxazole (5 %), Palmticacid (11.8 %), 9-hexadecenol (9.0 %), Dioctyl ester (10.1 %) are major compounds. (27).

CONCLUSION:

Sesbania grandiflora is native to Asia and is now widespread in most humid tropical regions of the world. The leaves, flowers and pods of *Sesbania grandiflora* are eaten as a vegetable in Southeast Asia. The plant contains the phyto constituents like alkaloids, flavanoids, glycosides, tannin, steroid, proteins isoflavanoids, isovestitol, medicarpin, and sativan. The plant having the medicinal potency of antibacterial, antipyretic, antidiabetic, anticancer, anthelmintic, immuno modulator and hepatoprotective effect also. In this review it will use for further researcher.

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