



Sesbania sesban Linn: A Review on Its Ethnobotany, Phytochemical and Pharmacological Profile

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ABSTRACT

Sesbania sesban Linn (Family: Fabaceae) is well known plant widely distributed in India and other tropical countries. The World Health Organization (WHO) estimates that about 80% of people living in developing countries rely almost exclusively on traditional medicines for their primary health care needs. Different parts of the plant (Leaves, seed, and pods) are reputed for their medicinal value. The leaves of *Sesbania sesban* has traditionally been used as purgative, demulcent, maturant, Anthelmintic and for all pains and inflammation. Preliminary Phytochemical screening revealed the presence of several chemical compounds such as triterpenoids, carbohydrates, vitamins, amino acids, proteins, tannins, Saponins glycosides and steroids. Flowers contain cyanidin and delphinidin glucosides. Pollen and pollen tubes contain alpha-ketoglutaric, oxaloacetic and pyruvic acids. Reports suggest that, previous phytochemicals investigations of the plant led to the isolation of oleanolic acid. The present review summarizes the scientific information of various aspects of *Sesbania sesban* Linn plant used in traditional system of medicine for variety of purpose.

Keywords: *Sesbania sesban* Linn, Pharmacology, Phytochemistry, medicinal plant.

INTRODUCTION

The World Health Organization (WHO) estimates that about 80% of people living in developing countries rely almost exclusively on traditional medicines for their primary health care needs.^[1] India is virtually a herbarium of the world. In India, we are using plants and herbs as the basic source of medicine because we are rich in them. Herbals which form a part of our nutrition and provide us an additional therapeutic effect are in demand and *Sesbania sesban* Linn is one of such plant.

Sesbania sesban Linn is well known medicinal plant commonly found in India and other tropical countries it is found throughout the plains of India.

Sesbania sesban, commonly known as 'Egyptian sesban' is one of the six species of genus *Sesbania* which is commonly found to be grown in tropical region of India. The plant is widely grown for its nitrogen fixing ability and as wind shades. The plant has got good medicinal

importance. According to ethno medicinal claims the poultice of leaves of *S. sesban* promotes suppuration of boils and abscesses and absorption of inflammatory rheumatic swellings. Juice of fresh leaves is credited with Anthelmintic properties^[2].

Plant Profile^[4]

| | |
|------------|--------------------|
| Kingdom | : Plantae |
| (unranked) | : Angiosperms |
| (unranked) | : Eudicots |
| (unranked) | : Rosids |
| Order | : Fabales |
| Family | : Fabaceae |
| Genus | : <i>Sesbania</i> |
| Species | : <i>S. sesban</i> |

Common names

| | |
|------------|---|
| Arabic | : sesaban |
| Bengali | : jainti, jayant |
| Burmese | : yay-tha-kyee, yethugyi |
| English | : common sesban, Egyptian rattle pod, frother, river bean, sesban, sesbania |
| Hindi | : jainti, jait, rawasan |
| Indonesian | : janti, jayanti, puri |
| Javanese | : janti |
| Luganda | : mubimba, muzimbandeya |
| Sanskrit | : jayanti, jayantika |
| Spanish | : Añil francés, tamarindillo |
| Tamil | : champai, chithagathi, karunchembai |
| Thai | : sami, saphaolom |
| Vietnamese | : dien-dien |

Leaves

Leaves paripinnate, compound 12-18cm long made up of 6-27 pairs of leaflets. long, narrow; leaflets in many pairs, rounded or oblong, usually asymmetric at the base, often glaucous; stipules minute or absent³.

Flowers

The raceme has 2-20 flowers which are yellow with purple or brown streaks on the corolla Flowers attractive, yellow, red, purplish, variegated or streaked, seldom white, large or small on slender pedicels, solitary or paired in short axillary racemes, usually unpleasantly scented; all petals long clawed, standard orbicular or obovate³.

Pods

Pods pale yellow, linear, usually 10-20 cm long, cylindrical or compressed, rarely oblong; up to 40 seeds are found in a pod; seeds oblong or sub quadrate, brown or dark green mottled with black.

Two subspecies are recognized within *S. sesban*, namely ssp. *Punctata* (restricted to northern portions of sub-Saharan Africa) and ssp. *sesban*.



Figure 1 *S. sesban* Flowers

Figure 2 *S. sesban* Branches



Figure 3 *S. sesban* Pods

Figure 4 *S. sesban* Leaves

Traditional Use

Uses

Sesban is mostly used as fodder and for soil improvement; its wood is used only to a lesser extent⁴.

Fodder

The leaves and tender branches of *sesban* are high in protein (20-25% crude protein) and have high digestibility when consumed by ruminants, such as cattle and goats. Anti-nutritional factors are suspected to be present in *sesban* fodder. Feeding *sesban* fodders to monogastric animals (such as chickens, rabbits, and pigs) is not recommended.

Reports of feeding *sesban* to ruminant's conflict.

Trials in Australia feeding *sesban* to heifers showed live weight gains, but trials with young goats in Samoa found a lack of weight gain. Until further research provides clear guidelines, caution should be used in feeding ruminants with *sesban* fodder at more than 10-20 percent of diet.

Soil improvement

Sesban establishes quickly and grows rapidly. In Africa it is often allowed to grow scattered throughout annual crop fields for the nitrogen it provides. It has been used in experimental alley cropping systems to provide mulch and green leaf manure to intercrops. *Sesban* can be somewhat shallow rooted, and may compete with adjacent crops.

Wood

Sesban's wood is light in weight compared to the woods of *Calliandra* and *Leucaena*, but it is often harvested for firewood in Africa and India. It has been used in India to make charcoal. The wood is not durable and should not be considered for timber use. The branches have been used as poles in temporary structures such as sheds and mud daub huts. Because *sesban* grows so rapidly, it has potential for pulpwood production. Plantings at about 10,000 trees/ha have produced 15-20 tons of woody biomass (dry weight) in one year.

Food

Flowers of *sesban* are known to be added to stews and omelets in some regions, perhaps mainly as a decorative element.

Other uses

Various medicinal uses for *sesban* have been recorded in Africa and Asia^{4, 5}. The leaves and flowers are used in medicinal poultices and teas, which are said to have the effect of astringency, or contraction of body tissues. Bark exudates from *sesban* produce a gum of medium commercial quality.

The leaves of *Sesbania sesban* has traditionally been used as purgative, demulcent, maturant, anthelmintic and for all pains and inflammation.

PHYTOCHEMICAL

Preliminary Phytochemical screening revealed the presence of triterpenoids, carbohydrates, vitamins, amino acids, proteins, tannins, Saponins glycosides and steroids. Flowers contain cyanidin and delphinidin glucosides. Pollen and pollen tubes contain alpha-ketoglutaric, oxaloacetic and pyruvic acids. Reports suggest that, previous phytochemical investigations of the plant led to the isolation of oleanolic acid, stigmasta-5, 24(28)-diene-3-ol-3-O- β -D-galactopyranoside, fatty acids and amino acids. Various types of lignins composed of guaiacyl, syringyl and P-hydroxyphenylpropane building units and also antitumor principal kaempferol disaccharide^{6,7}.

PHARMACOLOGICAL PROFILE

Seed, bark and leaves of the plant are used in traditional medicine. Seeds are used in diarrhea, excessive menstrual flow, to reduce enlargement of spleen and in skin disease. Leaves are used in inflammatory rheumatic swelling and as Anthelmintic^{8,9}.

Antioxidant Activity

Anthocyanins were extracted with methanolic and acidified methanol from the *Sesbania sesban* flower petals and their antioxidant properties were investigated. Anthocyanins from *Sesbania sesban* flower petals exhibited a dose dependent free-radical scavenging activity against DPPH radical, superoxide anions and hydroxyl radical^{10,11}.

Anti inflammatory Activity

The leaves of *Sesbania sesban* evaluated the topical anti-inflammatory activity of the crude saponins extract by carrageenan induced rat paw edema method by preparing the gel formulation. The activity was carried on Wistar albino rats, receiving two strengths of crude saponin gel at a concentration of 1% w/w and 2%w/w respectively and Diclofenac sodium gel (1%w/w) was used as reference drug. The crude saponins extract in 2% w/w gel formulation showed significant anti-inflammatory¹².

The effects of exogenous administration of Petroleum ether, Chloroform and Methanol extracts of bark of *Sesbania sesban* and *Sesbania grandiflora* in carrageenan induced inflammation model, the result of anti-inflammatory activity of extracts of above plants showed that petroleum ether extracts of bark of *Sesbania sesban* and *Sesbania grandiflora* were having better anti-inflammatory activity as compare to other extracts in carrageenan induced paw oedema in rats.

Adjuvant-induced arthritis in the rat

Oral administration of petroleum ether extracts of bark of *Sesbania sesban* (300mg/kg p.o. b.w.) twice each day during the 21 days of adjuvant induced arthritis showed a significant decrease in injected paw oedema from 12th day

till 21st day in petroleum ether extracts of bark of *Sesbania sesban* and arthritis paw oedema maximum reduction was from 14th day till 21st day in all above plants extracts. In Non- injected paw all above plants extracts showed decrease in paw oedema was observed in arthritis and maximum decrease was on 12th day till 21st day. Body weight, spleen and thymus weight were observed¹³.

Attenuating effect

The attenuating effects of *Sesbania sesban* leaves aqueous extract in streptozotocin (STZ)-induced diabetic rats at dose of 250 and 500 mg/kg per day was given to diabetic rats for 12 weeks. Cold and hot water tail immersion tests, photoactometer and Rota-rod tests were performed to assess degree of colder, thermal spontaneous motor activity and motor co-ordination changes respectively at different time intervals i.e., week 0, 4, 8 and 12. Tissue superoxide anion and total calcium levels were determined after 12 weeks to assess biochemical alterations. Histopathological evaluations of sciatic nerve were also performed. *S. sesban* was increased tail flick latency significantly in diabetic rats also reduced superoxide anion and total calcium levels⁶.

Antidiabetic Activity

The aqueous leaves extract of *Sesbania sesban* was evaluated for its antidiabetic potential on normal and streptozotocin (STZ)-induced diabetic rats at the doses of 250 and 500 mg/kg body weight per day for 30 days. The fasting Blood Glucose Levels (BGL), serum insulin level and biochemical data such as glycosylated hemoglobin, Total Cholesterol (TC), Triglycerides (TG), High Density Lipoproteins (HDL) and Low Density Lipoproteins (LDL) were evaluated and all were compared to that of the known anti-diabetic drug glibenclamide (0.25 mg/kg b.w.). The statistical data indicated significant increase in the body weight, liver glycogen, serum insulin and HDL levels and decrease in blood glucose, glycosylated hemoglobin, total cholesterol and serum triglycerides when compared with glibenclamide⁷.

Potential antifertility Activity

The different doses of *Sesbania sesban* seed powder inhibit the ovarian function, change the uterine structure and prevent the implantation, thus, control the fertility of female albino rats. The root extracts of *Sesbania sesban* showed oleanolic acid 3- β -Dglucuronide spermicidal activity^{14,15}.

CNS Stimulant Effect

In his study *Sesbania sesban* was intended to evaluate the CNS stimulant activity of crude drug extract. The activity was carried out on albino mice. Caffeine was used as a reference drug. The crude extract showed significant CNS

stimulant activity in comparison to control group and result were comparable to the activity shown by reference drug¹⁶.

CONCLUSION

The scientific research on *Sesbania sesban* suggests a huge biological potential of this plant. It is strongly believed that detailed information as presented in this review on the phytochemical and various biological properties of the extracts might provide detailed evidence for the use of this plant in different medicines. The phytochemical variations and efficacy of the medicinal values of *Sesbania sesban* is dependent on geographical locations and seasons. There is a demand to standardize the toxic properties of *Sesbania sesban* and their detailed clinical trials. After proper processing, identification they may be utilized to prepare a good, Ayurvedic Formulations and Preparations. At the same time, the organic and aqueous extract of *Sesbania sesban* could be further exploited in the future as a source of useful phytochemical compounds for the pharmaceutical industry.

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REFERENCES

- Dabriyal, RM, Narayana, DBA, Ayurvedic Herbal Raw Material, The Eastern Pharmacist, 31-35(1998).
- Kirtikar, K. and Basu, B. Indian Medicinal Plants. 2nd edition, India International book distributors, Dehradun, 1996.
- <http://ebookbrowse.com/sesbania-sesban-pdf-d309089996> (On Dated 11-08-2012)
- Evans, D. O., and Macklin, B. (eds), Perennial sesbania production and use. Nitrogen Fixing Tree Association. 41(1990).
- Evans, D. O., and Rotar, P. P. Sesbania in agriculture. Westview Press, Boulder, Colorado, U.S.A1987.
- Pandhare R.B., Sangameswaran B., Mohite P.B., Khanage S.G. Attenuating effect of Sesbania sesban (L) Merr. extract on neuropathic pain in streptozotocin-induced diabetic rats: an evidence of neuroprotective effects. *Phytopharmacology*, 2(1) 190-201(2012).
- Pandhare R.B., Sangameswaran B., Mohite P.B., Khanage S.G. Antidiabetic Activity of Aqueous Leaves Extract of Sesbania sesban (L) Merr. in Streptozotocin Induced Diabetic Rats. *Avicenna Journal of Medical Biotechnology*, vol.3 (1),37-43(2011).
- Nadkarni KM, Indian Materia Medica, 3rd ed., Vol. I, Popular Prakashan, Bombay, 1130(1982).
- Rastogi RP, Mehrotra BN, Compendium of Indian Medicinal Plants, 1st ed., Vol. II, Central Drug Research Institute, Lucknow, 62(1993).
- Kathresh M., Suganya P., Saravanakumar M. Antioxidant effect of Sesbania sesban flower extract. *International Journal of pharmaceutical Sciences*,3(2), 1307-1312(2011).
- Mani RP, Pandey A. , Shambaditya G.,Tripathi P., Kumudhavalli, Phytochemical Screening and In-vitro Evaluation of Antioxidant Activity and Antimicrobial Activity of the Leaves of Sesbania sesban (L) Merr.
- Dande PR. Talekar VS. Chakraborty GS., Evaluation of crude saponins extract from leaves of Sesbania sesban (L.) Merr. for topical anti-inflammatory activity. *Int. J. Res. Pharm. Sci.*1 (3), 296-299(2010).
- Patil RB., Nanjwade BK., Manvi FV. Effect of Sesbania grandiflora and Sesbania sesban bark on carrageenan induced acute inflammation and adjuvant-induced arthritis in rats. *International Journal Of Pharmaceutical Sciences*,1(1),75-89, 2010.
- Singh S.P., Fertility control of female through *Sesbania sesban* seeds, *The Journal of research and education in Indian Medicine*. 9(4), 227-32(1990).
- Priya G., Saravanan K., Renuka C. Medicinal plants with potential antifertility activity- A review of sixteen years of herbal medicine research (1994-2010). *International Journal of PharmTech Research*. 4(1), 481-494, 2012.
- Naik NN. Tare HL. Sherikar AK., Deore SR., Dama GY., Central nervous system stimulant effect of extracts obtained from the barks of *Sesbania sesban*. *International journal of Institutional Pharmacy and Life Sciences*.1 (1), 77-92(2011).

Conflict of Interest: None Declared