

Pharmacological effects of *Sesbania sesban* Linn : An overview

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ABSTRACT

Sesbania Sesban Linn (Family: Fabaceae) found all through the fields of India and ordinarily called as Jayanti. Herbs which shape a piece of our nourishment and give us an extra helpful impact are sought after and *Sesbania Sesban* Linn is one of such plant. The plant has got great restorative significance. Blooms contain cyanidin and delphinidin glucosides, Pollen and dust tubes contain alphaketoglutaric, oxaloacetic and pyruvic acids. The leaves of *Sesbania* is additionally found to have hepatoprotective and powerful hostile to oxidant and against urolithiatic action. The ethanolic and fluid extraction of various parts of *Sesbania*. The present survey outlines the different pharmacological activities of *Sesbania sesban* Linn.

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

INTRODUCTION

The World Health Organization (WHO) appraises that around 80% of individuals living in developing nations depend only on conventional drugs for their essential medicinal services needs. India is essentially a herbarium of the world. *Sesbania sesban* Linn. is outstanding restorative plant very much circulated all through India and other tropical nations it is found all through the fields of India. *Sesbania sesban*, normally known as 'Egyptian sesban' is one of the six types of class *Sesbania* which is generally observed to be developed in tropical locale of India. The plant is broadly developed for its nitrogen settling capacity and as wind shades. As indicated by ethno restorative claims the poultice of leaves of *S. sesban* advances suppuration of boils and abscesses and retention of provocative rheumatic swellings.

Plant Profile :

Kingdom : Plantae
(unranked) : Angiosperms
(unranked) : Eudicots
(unranked) : Rosids
Order : Fabales
Family : Fabaceae
Genus : *Sesbania*
Species : *S.Sesban*

Common names

Arabic : sesaban

Bengali : jainti, jayant

English : common sesban, Egyptian rattle pod, frother, river bean, sesban, sesbania

Hindi : jainti, jait, rawasa

Sanskrit : jayanti, jayantika

BOTANY:

Sesbania is an erect, branched, stout, shrubby plant, 2 to 3 meters in height. Leaves are 10 to 20 centimeters long, with 9 to 20 pairs of leaflets. Leaflets are oblong, 2 to 3 centimeters long. Flowers are few, yellow, about 1.5 centimeters long, borne on axillary racemes about 10 centimeters in length. Pods are subcylindric or somewhat flattened, slightly twisted, pendulous, about 20 centimeters long, 3 millimeters wide, and depressed between the seeds.

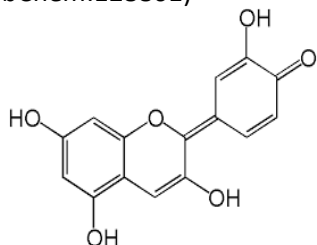


Fig: *Sesbania sesban* Linn.

PHYTOCHEMICALS

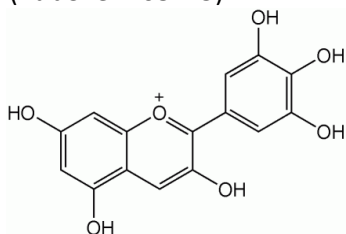
Preliminary phytochemical screening uncovered the presence of triterpenoids, starches, vitamins, amino acids, proteins, tannins, saponins glycosides and steroids. Blossoms contain cyanidin and delphinidin glucosides. Dust and dust tubes contain alpha-ketoglutaric, oxaloacetic and pyruvic acids. Leaf and unit contains ampesterol cholesterol, beta-sitosterol, triterpenoids, proteins and tannins. Bark and stem contains glucose, fructose, erythryol, arabinitol, myo-inositol. Different sorts of lignins made out of guaiacyl, syringyl and P-hydroxyphenylpropane building units and furthermore antitumor vital kampferol disaccharide.

Cyanidin: (PubChem:128861)



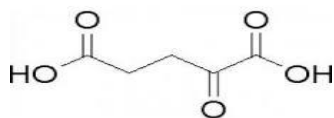
Uses: Various effects in cells, most of which can be described as being anti-diabetic and possibly slightly benefit other parameters associated with 'metabolic syndrome' (anti-inflammatory, anti-oxidant, etc.)

Delphinidin: (PubChem:68245)



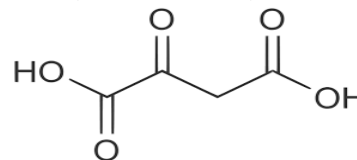
Uses: Same as Cyanidin.

Alpha ketoglutaric acid (PubChem:51)



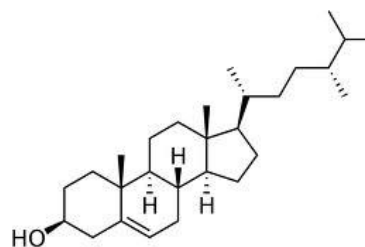
Uses: Known for its nitrogen carrying and its antioxidant activities.

Oxaloacetic acid (PubChem:970)



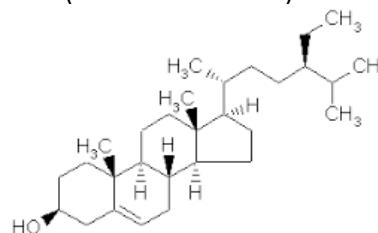
Uses: Helps in gluconeogenesis, fatty acid synthesis and amino acid synthesis.

Campesterol (PubChem:173183)



Uses: It is a precursor of anabolic steroids and also used in Cardiovascular diseases. The main adverse effects are decrease of lycopene levels and beta carotene, some rare cases of haemolytic anaemia can also be observed.

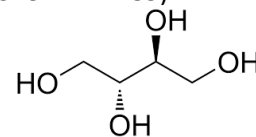
Beta-sitosterol (PubChem:222284)



Uses: High cholesterol. Taking beta-sitosterol significantly lowers total and bad (LDL) cholesterol levels, but it does not raise good (HDL) cholesterol levels.

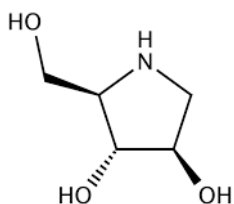
Trouble urinating because of an enlarged prostate, or "benign prostatic hyperplasia" (BPH).

Erythritol (PubChem:222285)



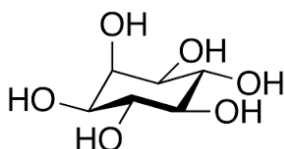
Uses: Used as a natural sweetener, **erythritol** is about 60 – 80% as sweet as sucrose (sugar). It is used primarily in chewing gum, baked goods and beverages and occurs naturally in pears, soy sauce, wine, sake, watermelon and grapes.

Arabinitol (PubChem:94154)



Uses: It is a reagent for organic tests

Myo-inositol (PubChem:892)



Uses: Inositol is used for diabetic nerve pain, panic disorder, high cholesterol, insomnia, cancer, depression, schizophrenia, Alzheimer's disease, attention deficit-hyperactivity disorder (ADHD), autism, promoting hair growth, a skin disorder called psoriasis, and treating side effects of medical treatment with lithium.

Inositol is also used by mouth for treating conditions associated with polycystic ovary syndrome, including failure to ovulate; high blood pressure; high triglycerides; and high levels of testosterone.

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 also as anti microbial agent.

Antioxidant activity: Saponin, Tanin, Phenolic compound, Anthocyanins were extracted with methanolic and acidified methanol from the *Sesbania sesban* flower petals and their antioxidant properties were investigated. DPPH scavenging activity or the Hydrogen donating capacity was quantified in presence of stable DPPH radical on the basis of Blois method. Compounds from *Sesbania sesban* flower petals exhibited a dose dependent free-radical scavenging activity against DPPH radical, superoxide anions and hydroxyl radical.

Anti inflammatory activity: The leaves of *Sesbania sesban* evaluated the topical antiinflammatory 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 was used as reference drug. Study showed the topical formulation of crude saponins extract showed significant anti-inflammatory activity, comparable to the activity of the reference drug, diclofenac. Crude saponin extract showed significant anti-inflammatory activity in in vivo and in vitro models. Effect may be contributed to by the crude saponin with its triterpenoid and steroidal moiety which protect inflammatory mediators.

Anthelmintic activity: The anthelmintic activity of aqueous extracts from 14 plants species from 7 families in the Sudanese flora was evaluated using the free living nematode, *Caenorhabditis elegans* as test organism. Extracts of *Balanites aegyptica* and *Sesbania sesban* were the most effective (LC50 0.8 and 8.0 mg/mL respectively). Study evaluated the hydroalcoholic and aqueous leaf extract of *Sesbania sesban* against *Moneizia expansa* and Paramphistomes. Both extracts were found effective against the two organisms, but the hydroalcoholic extract was more effective than the aqueous extract.

Hypolipidemic activity: Study shows that the aqueous leaves extract of *Sesbania sesban* was evaluated for its antidiabetic potential on normal and streptozotocin 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 as standard i.e. 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 standard glibenclamide.

Anti fertility 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 -D-glucuronide spermicidal activity.

Spermicidal activity: Oleanolic acid 3-B-D-glucuronide (OAG), an active principle isolated from the root extracts of *Sesbania sesban* exhibited significant dose-dependent spermicidal activity.

CNS Stimulant Effect: In this 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 drug.

Antimicrobial effect: Study evaluated extracts of bark for antimicrobial activity and cytotoxic activity. Results showed zones of inhibition against most of the test bacteria and fungi. The extracts showed various degrees of cytotoxicity on brine shrimp lethality bioassay.

Neuroprotective activity: Study evaluated the attenuating effect of *S. sesban* aqueous extract of leaves in STZ-induced diabetic rats. The extract significantly increased tail flick latency, reduced superoxide anion and total calcium levels. Results suggest attenuation of diabetic neuropathy in STZ-induced diabetic rats and may be beneficial in preventing the progression of diabetic neuropathy.

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Antinociceptive activity: Study evaluated the various extracts of the wood of the plant for antinociceptive activity. Petroleum ether, chloroform, and ethyl acetate extracts showed significant and dose-dependent antinociceptive activity in the hot plate and acetic acid-induced writhing tests in mice. The antinociceptive activity was blocked by naloxone, suggesting involvement of opioid receptors.

Sleeping Aid: In a study of seven edible herbs used as sleeping aid, melatonin was found in six of the seven herbs. *Sesbania sesban* yielded 8.7 ng/g dry sample weight. In comparison, *P. nigrum* yielded 1092.7 ng/g of dry sample weight.

Mosquito Repellent: Washing bodies of animals with water extract is reported to protect against mosquito bites (Vadivel et al., 2012). Leaf decoction used for cattle drench to repel tsetse fly.

CONCLUSION

The scientific research on *Sesbania sesban* suggests a huge biological potential of this plant. It is believed that detailed information as presented in this review on the phytochemical and various pharmacological properties and uses 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. 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.

↓ REFERENCES

1. 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*, 2012, 2(1) 190-201.
2. 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*, 2011, vol.3 (1), 37- 43

3. Gomase P. *Sesbania* Linn. A review on its ethnobotany, phytochemical and pharmacological profile, *Asian journal of biomedical and pharmaceutical sciences*, 2012, 2:(12): 11-14.
4. Wagh VD. Preliminary investigations of *Sesbania grandiflora* in development and evaluation of ocular dosage form. District level poster presentation con-test on Recent Trends in Pharmaceutical Sciences, 2009, 323.
5. Kirtikar KR and Basu BD. *Indian Medicinal Plants*, 2nd Edition, Bishen Singh and Mahendra pal Singh, Allahabad, 2:084-1087, 1995.
6. C.S.I.R. (Council of Scientific and Industrial Research), *The wealth of India*. 11 vols. New Delhi, 1948–1976.
7. Ibrahim A M, Anthelmintic activity of some sudanese medicinal plants, *Phytotherapy Research*, Volume 6, Issue 3, pages 155–157, May/June 1992, DOI: 10.1002/ptr.2650060312.
8. Singh SP, Fertility Control of Female Through *Sesbania* Seeds *The Journal of Research and Education in Indian Medicine*, Oct-Dec 1990, 9(4), p.27-32.
9. Payal R. Dande, Vikram S et al., Evaluation of crude saponins extract from leaves of *Sesbania* (L.) Merr. for topical anti-inflammatory activity, *Int. J. Res. Pharm, Sci.* Vol-1, 2010, Issue-3, 296-299.
10. Mekoya A, Oosting SJ, Fernandez-Rivera S et al, Effect of supplementation of *Sesbania* to lactating ewes on milk yield and growth rate of lambs, *Livestock Science*. v. 121(1). p. 126-131.
11. Peters K J, Tall A, Nutritional Value of *Sesbania*, *ILCA Annual Report*, 1988.
12. *Sesbania* (L.) Merr. (accepted name) / Chinese names / *Catalogue of Life*.
13. Manjusha, Aggarwal N, Nitesh, Gupta P, Effect of petroleum ether extract of *Sesbania* (Merr.) roots in streptozotocin (STZ) induced diabetes in mice, *Asian Pacific Journal of Tropical Biomedicine*, 2012, S1254-S1260.
14. Nirmal SA, Bairagi JH, Patil AN, Pal SC, Upasani CD, Mandal SC, Antinociceptive activity of *Sesbania* (Linn) wood extracts, a preliminary study. *Indian journal of experimental biology* 50:1 2012 Jan pg 61-64.
15. Zerihun N and Getachew A, *Sesbania* (L.) Merrill: Potential uses of an underutilized multipurpose tree in Ethiopia, *African Journal of Plant Science*, Vol 7(10), pp 468-475, October 2013 / DOI: 10.5897/AJPS2012.0716.
16. Anil U, Tatiya, Payal R. Dande, Rakesh E. Mutha and Sanjay J. Surana, Effect Of Saponins From *Sesbania* L.(Merr) On Acute And Chronic Inflammation in Experimental Induced Animals, *Journal of Biological Sciences*, 2013,13: 123-130.
17. Das Nilanjana, Chandran Poornima and Chakraborty Smrithinath, Potent spermicidal effect of oleanolic acid 3-beta-d-glucuronide, an active principle isolated from the plant *Sesbania* Merrill, *j.contraception*.2010, pg-05-09.
18. Patil R B, Nanjwade B K and Manvi F V, Effect of *Sesbania grandiflora* and *Sesbania sesban* Bark on Carrageenan-induced Acute Inflammation and Adjuvant-Induced Arthritis in Rats, *Pharma Science Monitor*, 2010, Vol 1, Issue 1 pg-18-21.
19. Arif Ahmed, Md. Sariful Islam Howlader, Shubhra Kanti Dey, Arpona Hira, Md. Hemayet Hossain Phytochemical screening, antimicrobial and cytotoxic activity of different fractions of *Sesbania* bark, (*IJBMS*), Vol 3, No 1, 2013.
20. 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* (L) Merr.
21. Kathresh M., Suganya P., Saravanakumar M. Antioxidant effect of *Sesbania* flower extract. *International Journal of pharmaceutical Sciences*, 2011,3(2), 1307-1312.
22. Rastogi RP, Mehrotra BN, *Compendium of Indian Medicinal Plants*, 1st ed., Vol. II, Central Drug Research Institute, Lucknow, 62(1993).
23. Evans D.O. and Rotar P.P. *Sesbania* in agriculture. Westview Press, Boulder, Colorado, U.S.A., 231 1987 V23 pp16-pp21.
24. Naik NN. Tare HL. Sherikar AK., Deore SR. and Dama GY; Central nervous system stimulant effect of extracts obtained from the barks of *Sesbania*; *International journal of Institutional Pharmacy and Life Sciences*; 2011; 1(1); 77-92.
25. Nadkarni KM, *Indian Materia Medica*, 3rd ed., Vol. I, Popular Prakashan, Bombay, 1130(1982).
26. 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; 2012; 4(1); 481-494
27. The Wealth of India (Raw Material), Council of Scientific and Industrial Research Publication, New Delhi, 1980, 9: 295-298.
28. Laladhas KP, Cheriyan VT, Puliappadamba VT, Bava SV, Unnithan RG, Vijayammal PL, Anto RJ. A Novel Protein Fraction from *Sesbaniagrandiflora* Shows Potential Anticancer and Chemo preventive Efficacy, in vitro and in vivo. J Cell Mol Med.2009, 83-88.
29. Mythili T. and Ravindran R. Phytochemical Screening and Antimicrobial Activity of *SesbaniaSesban(L.)* MERR. / Asian Journal of Pharmaceutical and Clinical Research 2012; 5(4); 18-23.