

Traditional Use, Phytochemistry and Pharmacology of Genus *Sesbania*: A Review

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ABSTRACT

Genus *Sesbania* has six different species, in which *Sesban* is a very common plant belonging to the family Fabaceae commonly available in India, Malaysia, Indonesia, Philippines, and other tropical countries. It is mostly grown over the dikes among rice paddies, beside roadsides and in backyard vegetable gardens depicted as soft, semi or vaguely woody 1 - 8 m high perennial nitrogen fixing trees. It can grow up to 8 m achieving a diameter of around 12 cm. Its growth is exceptionally rapid to reaching a height of 4 - 5 m in just 6 months. This plant is very common because of its rapid growth besides its use as medicine or as well as fuel wood. This plant also contains several chemical constituents, which are useful for medicinal purpose including triterpenoids, steroids, glycosides saponins, tannins, vitamins, protein, carbohydrates and amino acids. This component possesses lots of medicinal activities such as anti-fertility, hepato-protective, central nervous system (CNS) stimulant, antioxidant, anti-microbial, anti-diabetic, anti-inflammatory, and anti-nociceptive. In this review, such features are described according to the importance of plants-based natural products of human life.

KEYWORDS *Sesbania sesban*, Anti-oxidant, Anti-diabetic, Anti-nociceptive, Anti-fertility, CNS stimulant.

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INTRODUCTION

This genus *Sesbania* has six different species *Sesban* (Fig. 1) is very common plant belongs to the family Fabaceae and it is commonly present in India, Malaysia, Indonesia, Philippines, and other tropical countries. It is mostly grown over the dikes among rice paddies, beside roadsides and in backyard vegetable gardens and it is depicted as soft, semi or vaguely woody one to eight meter high perennial nitrogen fixing trees and it grows up to eight meter and achieve a diameter of up to 12 cm. Its growth is exceptionally rapid, or in just six months it can reach to the height of 4 to 5 meters. This plant is very common because of its rapid growth and its uses as medicine or as well as fuel wood. Its

common name is Egyptian sesban. According to world health organization almost 80 percent people who lived in developing countries generally and completely rely on the therapeutical medicine for the cure of primary health problems. Leaves, seeds, and pods are the plant parts that are used for the medicinal purpose its leaves are used as Laxative, demulcent or also in pains and inflammation. Or its poultice of leaves used to manage abscesses, boils & swelling to joints also the juice of their leaves shows anthelmintic characteristics.¹ It also contains different chemical compounds like steroids, glycosides saponins, tannins, protein, amino acids, vitamins, carbohydrates and triterpenoids. Glycosides delphinidin and cyanidin extracted from the flowers of sesbania while pollen and tubes shows presence of pyruvic acids, oxalo-acetic and α -ketoglutaric. Some investigations also suggested that it previously contains oleanolic acid as well. Overall, it is used as hepato-protective, central nervous system stimulant, anti-fertility, antinociceptive, antimicrobial, anti-inflammatory, antidiabetic and antioxidant. In this review we will discuss about traditional uses, chemical constituent and medicinal uses of the sesbania sesban.^{2,3}



Fig. 1: Sesbania sesban.

PLANT DESCRIPTION

This belongs to the kingdom plantae it has Fabales order and belongs to the family Fabaceae it has genus Sesbania and its species name is Sesbania sesban. Its leaves are paripinnate, compound 12-18 cm elongated, leaflets pairs are 6 to 27, asymmetrical base, rounded with narrow leaflets with stipules glucose which might be minute or absent. This plant also has flowers, and these are about two to twenty and these flowers presents in yellow color with brown and purple streaks, the flower of this plant shows different colors like red, purplish and yellowish, sometimes white, streaked, with small or large pedicles slender, racemes axillary short in paired or solitary, smells of this plant hostile, long clawed petals with orbicular standard. The pods of this plant are present in yellow pale color with the length of 10 to 20 cm. almost 40 seeds seen in the seeds pod which sub-quadrate or oblong with dark green or brown color and these are usually in compressed or cylindrical form.²

CHEMICAL CONSTITUENTS

It also contains different constituents like triterpenoids, carbohydrates, di-saccharide kaempferol, hydroxy-phenyl propane p, syringyl, guaiacyl (composition of lignin), fatty acids, galacto 3-ol3-o-beta-d pyranoside, 5-stigmasta, oleanolic acid, pyruvic acid, oxalo-acetic, α -ketoglutaric, glucosides delphinidin, cyanidin, steroids, glycosides saponins, tannins, protein, vitamin & amino acids.¹

TRADITIONAL USES

It is commonly used as fodder because their leaves have high content with protein which is about twenty to twenty five percent and when it is used by goats and cattle it acts as digestive or use for the upgradation of land as well. Its wood is also used because of its low weight. In Africa and India this tree is collected for firewood or use to made charcoal in India, but this wood is not suitable for kindling use, its branches are also used for making huts and sheds due to its rapid growth. Flowers of this plant are commonly included in omelets in few regions, possibly used as ornamental ingredients.¹

PHARMACOLOGICAL USES

It has numbers of medicinal uses mostly recorded in Africa and Asia. Like its seed are useful for diarrhea, extreme menstrual flow for the reduction of the size of enlarged spleen and use in skin ailments as well as in case of rheumatic

inflammatory swelling or anthelmintic the consumption of leaves is good. Further uses for this substance are explained below.³

Anti-Oxidant Activity

Flower petals of the Sesbania sesban's extract was obtained along with Anthocyanins with methanolic and acidified methanol & also possess anti-oxidant characteristics. From the flower's petals of sesbania anthocyanins important components obtained which possesses free radical dose dependent activities for DPPH, hydroxyl radical & anion superoxide.⁶

Anti-Inflammatory Activity

Leaf of this plant has topical anti-inflammatory activity which can be checked via saponins crude extract from carrageenan persuaded by edema rat paw procedure after the gel formulation. This procedure performed on albino wister rats treated with 2 strengths of saponin crude gel with 1% weight/weight and 2% weight/weight concentration and 1% weight/weight sodium gel diclofenac used as a drug reference. This crude extract possesses anti-inflammatory properties.⁷

Anti-Diabetic Properties

The leaves of this plant have anti-diabetic potential so the aqueous extract from their leaves can be checked for their anti-diabetic activity on streptozotocin causing diabetic rats by giving it in a dose about 200 and 500 microgram/kg body/w for thirty days or on normal as well. FBG level, bio-chemical data includes glycosylated Hb, level of insulin serum, triglycerides, cholesterol level, HDL (high density lipo-protein), LDL (low density lipo-protein) assessed & shows comparison with antidiabetic medicine glibenclamide 0.25 miligram/kg body/w. after that data shows to rise in the level of high density lipoprotein, reduced the level of glucose in blood, cholesterol, tri-glyceride, glycosylated Hb, insulin, glycogen liver these level shows changes when compared with glibenclamide.⁵

Anti-Microbial Agent

Its stems showed anti-microbial activity when it was tested for ten bacterial species and five fungal species. And methanolic extracted from the stem were used for identification of this activity so, very important activity was detected alongside bacteria *Erwinia amylovora* followed by *Escherichia coli* and fungus *Curvularia lunata* and *Fusarium oxysporum* were hindered completely.⁸

Anti-Nociceptive Activity

The wood of sesbania sesban was checked for its anti-nociceptive activity and for these purpose plate hot tests and AA (acetic acid) induced petroleum ether writhing test, ethyl acetate and chloroform was performed and it gives strong nociceptive activity with dose dependence.⁹

Anti-Fertility Activity

Seed powder of this plant used for this purpose it hinders the functions of ovaries, shows variation in the structure of uterus & reduced the implantation. Therefore, manage the fertility rates of albino rat's female. Sesbania roots extract shows presence of glucuronide 3-β-D and oleanolic acid possesses spermicidal characteristics.^{10, 11}

Central Nervous Stimulant

CNS stimulant activity of sesbania sesban's crude drug was checked for this purpose albino mice was used and used of caffeine seen as a reference medicine and this extract shows strong CNS stimulant characteristics.^{4, 12}

Hepatoprotective Study

The aqueous and ethanolic extract of sesbania flowers noticeably (p less than 0.0001) shows reduction in different tests like TP, serum glutamic oxaloacetic transaminase, serum glutamic pyruvic transaminase, alkaline phosphatase, silymarin and tuberculosis used for comparison because this drug are accepted hepatoprotective drug. This improves the functions of hepatocytes and this extract has healing effect when observed histologically.¹³

Furthermore, several medicinal plants have been played crucial roles in the field of nanotechnology.¹⁴⁻²¹

CONCLUSION

Genus *Sesbania* has six different species *Sesbania sesban* is one of them who belong to the family *Fabaceae* its all parts like roots, seeds, leaves, flowers are used for medicinal purpose for the treatment of different diseases like microbes causing diseases and others. It mostly grows in the India, Philippines, Indonesia, Malaysia, and other tropical countries. It is mostly growing present at the dikes of the rice paddies, vegetables gardens, roadside and in backyards and it grows as soft, semi or vaguely woody 1-8 meter high perennial nitrogen fixing trees and it grows up to 8 meter and achieve a diameter of up to 12 cm. Its growth is very fast, or just after the period of six months it can reach to the height of 4 to 5 meters. Its rapid growth is also the reason for its vast use for medicine. It acts as anti-microbial, anti-oxidant, anti-nociceptive, antifertility, anti-diabetic and as hepatoprotective and CNS stimulant and it also contain a number of chemical constituents which are useful for medicinal purpose and these constituents are carbohydrate, vitamin, tannins, protein, tri-terpenoids, glycosides saponins and steroids.

DISCLOSURE STATEMENT

The author(s) did not report any potential conflict of interest.

REFERENCES

1. Gomase PV. *Sesbania sesban* Linn: a review on its ethnobotany, phytochemical and pharmacological profile. *Asian Journal of Biomedical and Pharmaceutical Sciences*. 2012;2:11-14.
2. Dobriyal RM, Narayana DB. Ayurvedic herbal raw material. *Eastern Pharmacist*. 1998;41:31-35.
3. Evans DO, Macklin B. Perennial *Sesbania* production and use. *Nitrogen Fixing Tree Association*. 1990:41.
4. Pandhare RB, Sangameswaran B, Mohite PB, Khanage SG. Attenuating effect of *Sesbania sesban* (L) Merr. extract on neuropathic pain in streptozotocin-induced diabetic rats: an evidence of neuroprotective effects. *Phytopharmacology*. 2012;2:190-201.
5. Pandhare RB, Sangameswaran B, Mohite PB, Khanage SG. Antidiabetic activity of aqueous leaves extract of *Sesbania sesban* (L) Merr. in streptozotocin induced diabetic rats. *Avicenna Journal of Medical Biotechnology*. 2011;3:37-43.
6. Kathiresh M, Suganya P, Saravanakumar M. Antioxidant effect of *Sesbania sesban* flower extract. *International Journal of Pharmaceutical Sciences*. 2011;3:1307-1312.
7. Dande PR, Talekar VS, Chakraborty GS. Evaluation of crude saponins extract from leaves of *Sesbania sesban* (L.) Merr. for topical anti-inflammatory activity. *International Journal of Research in Pharmaceutical Sciences*. 2010;1:296-299.
8. Mythili T, Ravindhran R. Phytochemical screening and antimicrobial activity of *Sesbania sesban* (L.) Merr. *Asian Journal of Pharmaceutical and Clinical Research*. 2012;5:18-23.
9. Nirmal SA, Bairagi JH, Patil AN, Pal SC, Upasani CD, Mandal SC. Antinociceptive activity of *Sesbania sesban* (L) wood extracts, preliminary study. *Indian Journal of Experimental Biology*. 2012;50:61-64.
10. Singh SP. Fertility control of female through *Sesbania sesban* seeds. *The Journal of Research and Education in Indian Medicine*. 1990;9:27-32.
11. 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;4:481-494.
12. 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*. 2011;1:77-92.
13. Kale I, Khan MA, Irfan Y, Veerana GA. Hepatoprotective potential of ethanolic and aqueous extract of flowers of *Sesbania grandiflora* (Linn) induced by CCl₄. *Asian Pacific Journal of Tropical Biomedicine*. 2012;2:670-679.
14. Ghotekar S. A review on plant extract mediated biogenic synthesis of CdO nanoparticles and their recent applications. *Asian Journal of Green Chemistry*. 2019;3:187-200.
15. Ghotekar S, Pansambal S, Bilal M, Pingale SS, Oza R. Environmentally friendly synthesis of Cr₂O₃ nanoparticles: characterization, applications and future perspective - a review. *Case Studies in Chemical and Environmental Engineering*. 2021:100089.
16. Shah SM, Nisar Z, Nisar J, Akram M, Ghotekar S, Oza R. Nanobiomedicine: a new approach of medicinal plants and their therapeutic modalities. *Journal of Materials and Environmental Science*. 2021;12:1-14.
17. Nagore P, Ghotekar S, Mane K, Ghoti A, Bilal M, Roy A. Structural properties and antimicrobial activities of polyalthia iongifolia leaf extract-mediated CuO nanoparticles. *BioNanoScience*. 2021;11:579-589.
18. Ghotekar S, Pagar K, Pansambal S, Murthy HA, Oza R. A review on eco-friendly synthesis of BiVO₄ nanoparticle and its eclectic applications. *Advanced Journal of Science and Engineering*. 2020;1:106-112.
19. Pagar T, Ghotekar S, Pansambal S, Pagar K, Oza R. Biomimetic Synthesis of CuO Nanoparticle using *Capparis decidua* and their Antibacterial Activity. *Advanced Journal of Science and Engineering*. 2020;1:133-137.
20. Ghotekar S, Pagar T, Pansambal S, Oza R. A review on green synthesis of sulfur nanoparticles via plant extract, characterization and its applications. *Advanced Journal of Chemistry B*. 2020;2:128-143.

21. Ghotekar S. Plant extract mediated biosynthesis of Al₂O₃ nanoparticles-a review on plant parts involved, characterization and applications. Nanochemistry Research. 2019;4(2):163-9.
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