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Phytopharmacological potential of *Prosopis spicigera* Linn.

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ABSTRACT

Prosopis spicigera Linn. (Family, Fabaceae) is commonly known as 'Sami'. It is distributed throughout the arid regions of India and other countries. Sami is caducous plant, so in the foliage condition stem and fruits are common. It is also commonly known as *Prosopis cineraria* (L.) Druce. It is one of the chief indigenous tree of the plains of the Punjab, Western Rajasthan, Gujarat, Bundelkhand and the neighborhoods of Delhi and Agra. This plant is xerophytic and draught resistant plant, it can survive for long. Tribal people use this plant as fodder and source of wood. Some of the community uses Sami fruits as food. *Prosopis cineraria* is a moderate sized evergreen thorny tree, with slender branches armed with conical throns and with light yellowish-green foliage. It contains sugars, five flavonones, fatty acids, tannins and alkaloids. The flavone glycoside patulitrin has been isolated from the flowers. Recently a novel variant on the piperidine-3-ol alkaloid is reported, which is spicigerin. Fruits are used as a food for the people in the desert area during scarcity. Fruits are rich source of vitamins. The leaves besides the pods are eaten by camels, goats and cattle as a fodder. Ashes of the wood rubbed over skin to remove hair. The wood is a good fuel for the preparing food in the tribal area. *Prosopis cineraria* flower is pounded, mixed with sugar and used during pregnancy as safeguard against miscarriage in women. The bark of the tree is dry, acrid, and bitter with a sharp taste and used in leprosy, dysentery, bronchitis, asthma, leucoderma and scorpion sting. The plant is recommended for the treatment of snakebite in rural area. The present review is an effort to emphasize the traditional uses, pharmacognostical, phytochemical and pharmacological information on *Prosopis spicigera* Linn.

Key Words: *Prosopis spicigera*, Xerophytic**,** Caducous, Sami, Fodder

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INTRODUCTION:

Plants have long been a source of therapeutic agents used by man. Some 80% of the world's populations still rely upon plants for prime health care; even today in Western medicine, and despite progress in synthetic chemistry, some 25% of prescription medicines are still derived either directly or indirectly from plants. This means that about 3.5 to 4 billion people in the world rely on plants as sources of drugs. For the most plant, the discovery of the drugs can be possible from traditional knowledge that plant parts or extracts can be used to treat one or more diseases in humans. The more interesting of the extracts are then subjected to pharmacological and chemical tests to determine the nature of the active components. Therefore, it should be of interest to ascertain just how important plant drugs are used in the form of crude extracts throughout the world. There is a great deal of interest in support for the search for new and useful drugs from higher plants in countries such as the India, People's Republic of China, Japan, USA, and the Federal Republic of Germany. Virtually every country of the world is active in this search to a limited degree[1,2,3].

Prosopis spicigera Linn. (Syn. *Prosopis cineraria* (L.) Druce.) belonging to the family Fabaceae, is a moderate sized evergreen thorny tree, with slender branches armed with conical throns and with light yellowish-green foliage. *Prosopis cineraria* tree occurs in the dry and arid regions of India. It is one of the chief indigenous trees of the plains of the central and southern India. Leaves are eaten as a fodder by cattle. Smoke of leaves good for eyes. The stem is often rich in tannin sacs and gum passages; they are used as fodder due to presence of rhamnose, sucrose and starch. Stem portion and wood are generally used as good fuel for the tribal people. The Bark is thick, dark brown in color and hard. It is available in the form of single quill and pieces. Liver-warts and lichens are located on the surface of bark. Stem bark is recommended for snake bite. The flowers are small in size and yellowish in colour, appear from March to May after the new flush of leaves. Flowers are mixed with sugar and used during pregnancy as safeguard against miscarriage. Fruits are legume and sweet in taste. Fleshy pods are sickle shape which are10 to 20 cms long and contain sweetish mucilaginous pulp. Pods are mature in May-June before the onset of the rain. Seeds are dark brown in color packed in brown pulp. Seeds contain fixed oil, those are major part of cattle feed[4,5].

Vernacular Names[6]

Sanskrit	:	Sami
English	:	Mesquite

Hindi : Shami, Jhand

Gujarati : Khijado

Marathi : Shemi

Telugu : Jambi

Panjabi : Jhand

Sindhi : Kandi

Rajasthani : khejari

Figure 1 The Twig of *Prosopis spicigera* with Inflorescence and Fruits

Taxonomical Classification[6, 7, 8]

According to the botanical scheme of Engler, the plant is classified as follow:

Kingdom : Plantae

Division : Phanerogamae

Subdivision : Angiospermae

Class : Dicotyledonae

Subclass : Polypetalae

Order : Fabales

Family : Fabaceae

Subfamily : Mimosaceae

Genus : *Prosopis*

Species : *spicigera*

Habit and Habitat

Prosopis spicigera is a widely spreading, densely branched, thorny tree or mainly a big tree of up to 25 m height. It grows abundantly in dry, arid and exposed habitat like wastelands, ditches, cultivated lands, road sides and surrounding plains of hills as it is tolerant to prolonged drought due to its excellent adaptation to arid conditions.

Occurrence and Distribution

It is of a common occurrence in dry places in India particularly Western Rajasthan, Bundelkhand, Delhi, Punjab and Gujarat. It is also found in the dry parts of Central and Southern India, occurring in parts of Maharashtra (near Nasik), Andhra Pradesh, and Karnataka south of Godavari. It also extends to West Pakistan, Afghanistan and Iran. Globally these species originates from North West India and East Pakistan where it is the basis of an agro forestry production system very similar to the one established in Africa. A closely related species is present in the South Arabian Peninsula, South East Saudi Arabia, United Arab Emirates, and Oman. It extends to South Iraq and South Iran, along the Arabo-Persian Gulf shores and the Oman Sea. On most occasions, *Prosopis spicigera* is found to be growing with *Capparis decidua*, *Tecomella undulata*, *Capparis decidua*, *Maytenus emarginata*, *Zizyphus spp*. and *Salvadora spp*.

Botanical Description

Roots: The root system of *Prosopis cineraria* is long and well developed. Growth above the ground is slow but below the ground the roots penetrate deeper and deeper for the sub soil water. Very deep roots help in securing firm footing and in obtaining moisture supplies from deep soil layers. Taproot penetration up to 35 m depth has been reported. The tree is able to withstand the hottest winds and the driest season, and remains alive when other plants would succumb[8].

Stem: Stems are erect branched, terete, solid, woody and strong having diameter about 13-16 cm. Young twigs are purplish green in color. Spines (0.3 to 0.6 cm long) and galls are present on the stem. It is also having annular rings in the woody portion. The stem tissue is often rich in tannin sacs and gum passages.

Bark: The Bark is thick, dark brown in color and hard. It is available in the form of single quill and pieces. Liver-warts and lichens are located on the surface of bark.

Leaves: Compound, bipinnate, stipulate, stipules modified into spines, Alternate, petiolate. Leaflets are ovate, Apex is mucronate, base is unequal, margin is entire and reticulate venation. Size of leaf is 1-1.5 cm. long and 0.4-0.6 cm. broad.

Inflorescence: Racemose Spike

Flowers: Flowers are regular, bisexual, bracteate, complete, zygomorphic, pentamerous hypogynous.The flowers are small in size and yellowish in colour, appear from March to May after the new flush of leaves.

Calyx: Sepals are 5, lobed, gamosepalous, valvate and yellowish in color.

Corolla: Petals are 5, gamopetalous, valvate and yellowish in color.

Androecium: Stamens are free and 10 in number. Amongst 10 filaments 5 filaments are long and 5 filaments are short. Anthers are two celled and dorsifixed.

Gynoecium: Monocarpellary superior ovary, Uni-locular, Marginal placentation. Style is filiform. Stigma is capitate.

Fruit: Legume (pod). Fleshy pods are sickle shape which are10 to 20 cms long and contain sweetish mucilaginous pulp. Pods are mature in May-June before the onset of the rain.

Seeds: Seeds are non endospemic and dark brown in color packed in brown pulp. Seeds are ovoid in shape. 10-25 seeds are present in 1 fruit.

Chemical Constituents

It contains sugars, five flavonones, fatty acids, tannins and alkaloids. Analysis of the beans (immature fruits) gave (dry matter basis): moisture73, protein 18, fat 2, crude fiber 20, total carbohydrates 56, and Ash 4% and Ca 414, P 400, Zn 4, Fe 19 and Mn 4 mg/100 gm. It has exceptionally high level of vitamin C 523 mg/100 gm. The beans contain 55.7% dietary fibers on dry matter basis. The fibre contains: hemicellulose 11.7; cellulose 14.8; lignin 14.9 and pectin 14.3%. Beans contain certain antinutrients. They include: Phytic acid 65, phytate phosphorus 32 and oxalic acid 325 mg/100 gm. The seeds contain 3.5% of fatty oil containing oleic acid and linoleic acids (80%). Analysis of the leaves gave crude protein 14-15, crude fiber 18-22. and minerals 5 to 6.9%. Stem bark contain vitamin K1, n-octacosyl acetate, the long chain aliphatic acid. Presence of glucose, rhamnose, sucrose and starch is also reported. Galls contain triacontanol, an effective plant growth regulator. Presence of β-sitosterol is also reported. It also contains tannins. *Prosopis cineraria* plant produces gum, which is obtained during May and June. The flavone glycoside patulitrin has been isolated from the flowers. A novel variant on the piperidine-3-ol alkaloid recently reported is spicigerin[8, 9].

TRADITIONAL PROPERTIES AND USES

Fruits are used as a food in the desert area during scarcity. It is also rich source of vitamins for the tribal people. The leaves besides the pods are eaten by camels, goats and cattle. Ashes rubbed

over skin to remove hair. The natives eat mealy pulp contained in the pod having a sweetish taste, either raw or cooked as a vegetable. Hindus worship khejri trees during the Dussera festival. Leaves are good forage with 12-18% Crude Protein while the pods contain 10-13% Crude Protein. They are consumed by all livestock species. *P. cineraria* is much appreciated as a sand binder and a wind-break in the desert area[9,10].

Commercial uses

The wood is used for making agricultural implements viz., ploughs, yokes and beams. Branches lopped as fodder for goats. The wood is a good fuel rating 5,000 kcal / kg. Wood ash serves as a potash source. Bark and leaf galls used for tanning. The tannins of the plant may be used as repellent to control the house sparrows.

Medicinal uses of Plant

Prosopis cineraria flower is pounded, mixed with sugar and used during pregnancy as safeguard against miscarriage. The bark of the tree is dry, acrid, and bitter with a sharp taste; cooling anthelmintic; tonic, cures leprosy, dysentery, bronchitis, asthma, leucoderma, piles and tremors of the muscles. The bark is used as a remedy for rheumatism, in cough colds, asthma. The bark is prescribed for scorpion sting. The smoke of the leaves is good for eye troubles. The fruit is dry and hot, with a flavour, indigestible, cause biliousness, and destroys the nails and the hair. The pod is considered astringent in Punjab. The plant is recommended for the treatment of snakebite[10,11].

PHARMACOLOGICAL ACTIVITIES OF DIFFERENT PLANT PARTS

Data of Pharmacological screening of *Prosopis spicigera* Linn. are not sufficient in the literature, so there is urgent need to develop pharmacological and pharmacognostical parameters. Followings are only data available in the standard literature.

Mahgoub et al. (2007) have reported that feeding the by-product concentrate and roughage to Omani sheep did not affect their health although it contained *Prosopis* pods, which was reported to cause health problems in goats earlier. Hematological data was used as an indication of the health status of experimental animals[12].

Mutabaruka et al. (2007) have reported a significant inhibitory effect of tannin against gram positive bacteria. The condensed tannins from the *Prosopis cineraria* leaves inhibited cellulase activity by over 66%. On the other hand, soil under the polyphenol-rich vegetation of Peltophorum had developed an adapted microbial community dominated by fungi[13].

CONCLUSION

Because of its xerophytic nature, *Prosopis cineraria* have wide and cheap availability. Besides, its usefulness in numerous ailments is also mentioned in traditional literatures. Scientific investigation of its therapeutic worth is not found in the literature. Pharmacological and clinical data of *Prosopis cineraria* are not available in order to support its traditional and folklore uses. Some phytochemical investigations are carried out, but still require more scientific approach for those investigations. Pharmacological reports are not sufficient regarding medicinal use of *Prosopis cineraria* Linn. So Pharmacological screening is urgent need for providing benefits of this plant to common man and even tribal people, because it easily available cheaper plant as a medicine and food. Furthermore, pharmacognostical data also needs to be generated for knowing the identity, purity and quality of the plant, which are not available still today in the literature.

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