



Review Article

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A REVIEW ON SHAMI (*PROSOPIS CINERARIA* L.) AN ETHNOMEDICINAL PLANT IN A DESERT AREA OF RAJASTHAN, INDIA

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ABSTRACT

Prosopis cineraria is a member of the *Leguminosae* family, often referred to as *Khejri*, *Khijdo*, *Shami*, and *Jandi*. The tree is known as *Kalptaru* because all of its components are beneficial. It is also known as the "wonder tree," making it the "lord of the desert." Locally known as "Sangari," the pods are fresh green vegetables that Rajasthani people enjoy together with its dry fruits. In times of scarcity, make pickles with *Karir* (*Capparis decidua*) and use them with *bajara chapati* as a meal. It is also a good source of vitamins for people who live in desert areas. The herb has also been employed as a folk treatment for various illnesses in indigenous folk medicine systems, including leprosy, dysentery, bronchitis, asthma, leukoderma, piles, muscle spasms, and wandering thoughts. Plant components such as leaves, pods, flowers, stems, and seeds have unique metabolites. Significant phytochemical substances found in plants have previously been identified as including fatty acids, carbohydrates, protein, saponins, tannins, alkaloids, and glucoside. Analgesic activity, antitumor activity, anticonvulsant activity, antihyperlipidemic activity, antipyretic activity, and antimicrobial activity are some of the pharmacological properties of plants.

Keywords: *Prosopis cineraria*, Phytochemicals, Pharmacological activities.

INTRODUCTION

Prosopis cineraria, a small to medium-sized plant (5 to 10 meters tall), is found in Jodhpur, Barmer, Bikaner, Nagaur, Sikar, and Churu in Rajasthan. The *Khejri* tree is the only one that thrives in a desert despite all of the environmental challenges. Since the tree's parts are all beneficial, it is known as *Kalptaru*. Additionally known as the "wonder tree," it is also known as the "lord of the desert."¹ Arid Forest Research Institute, Jodhpur, conducted frequent surveys in 2010 that showed the percentage mortality of *khejri* trees ranged from 18.08 to 22.67% with an average mortality of 20.93% in these surveys. Deep-rooted, nitrogen-fixing *Prosopis cineraria* (L.) Druce is a plant that is unique to India's scorching deserts.²

In the summer, fresh leaves emerge before or at the same time as the old ones. Little yellow flowers bloom after the new flush of leaves appears in March through May. Shortly after, pods begin to form and quickly increase in size. The pod's ripening period is from June through August. The driest months, March to June, are when fresh foliage grows flowers, and fruits are produced. The plant also has antibacterial, anticancer, antiviral, antifungal, and anthelmintic properties.³

When *Prosopis cineraria* is watered with 50% seawater, it can grow. Additionally, this tree grows in open forests on soils with a pH of 9.8 or higher and will flourish on dry, stony, alkaline ground.⁴

The *Bishnoi* community of Rajasthan adheres to the religious principle of protecting *khejri* trees. They founded the *Chipko* Movement when 363 *Bishnoi* gave their lives in 1730 to stop the

chopping of the *khejri* tree. The gum from the tree, which is nourishing and delectable, is used by pregnant women during childbirth.⁵ A flower and twig paste also function as an antidiabetic medication when taken internally.

Information related to *Shami* (*Prosopis cineraria* L.) was collected from classical *Ayurvedic* literatures textbooks and various scientific published journals. The available commentaries of the *Ayurvedic Samhitas* have also referred to collect relevant matters.

The present review manuscript focuses on the detailed profile of valuable nutrients, pharmacological compounds, and medicinal health functions.

An effort is made to review various studies on *Shami* (*Prosopis cineraria* L.) to assess its nutritional as well as importance as an *ahar*.

Geographical sources

Jodhpur, Nagaur, Bikaner, Barmer, Jaisalmer, Pali Churu, and Jhunjhunu are almost desert districts of Rajasthan, India.

Plant description

Name - Sami
Botanical name - *Prosopis cineraria*
Ras - Kashaya, Madhur
Guna - Laghu, Ruksha
Virya - Sheeta
Vipaka - Katu, Fruit - Ushna

Chemical constituents

It contains sugars, five flavones, fatty acids, tannins and alkaloids.

Pods (seeds)

Ash 4%, Ca 414, P 400, Zn 4, Fe 19 and Mn 4 mg per 100 gm, 2% fat, 26% crude fibre, and 56% total carbs. High concentration of vitamin C (523 mg/100 g), amino acids (0.99%), and fatty acids (3.5% of which are oleic and linoleic acids, which account for 80%), polyphenols without glycosides, Gallic acid, Pituin, Luteolin, Prosogerin-E (6, 7-dihydroxy-3, 4, 5, trimethoxy flavone), Glycosidic polyphenolics, and Rutin are examples of phenolic compounds.

Leaves

The main chemical components include flavone glycoside, pituitrin 3, 5, 6, 3, 4- pentamethoxy-7-hydroxy flavone, 11.9% crude protein, 2.9% ether extract, 17.5% crude fibre, 43.5% nitrogen-free extract, 0.4% phosphorus, 2.1% calcium, and 8.1% ash.

Stem bark

Vitamin K, n-octastyle acetate, glucose, rhamnase, sucrose, starch, and long-chain aliphatic acid. Additionally, studies have discovered that this plant includes phytochemicals, including 5-hydroxytryptamine, apigenin, isorhamnetin-3-diglucoside, 1- l-arabinose, quercetin, tannin, and tryptamine.

Alkaloids

Previously discovered in *Prosopis cineraria* include substances like Spiceries⁶, Dasycarpidan-1-methanol, acetate (ester), 3- Butylindolizidine, and Prosophylline⁷.

Flavonoids

Resemble the naturally occurring phytohormones prosogerin A, B, C, D, and E.⁸ Researchers have discovered steroids in this plant, including cholesterol⁹, 7,24-tirucalladien-3-one, camp sterol, stigma sterol, -sitosterol, stigmasta-4, and 6-dien-3-one¹⁰.

Fatty acids and Derivatives of *Prosopis cineraria*

These include palmitic acid, stearic acid, oleic acid, and linoleic acid, as well as (Z)-13-Docosamide, 9-Hexadecenoic acid, and others¹¹.

Pharmacological Activities

Antitumor Activity

Bark and leaf hydro-alcoholic extracts were tested for antitumor efficacy using the Ehrlich ascites carcinoma tumour model. The effectiveness of the activity was assessed using in vitro cytotoxicity, solid tumour mass, haematological investigations, peritoneal cells, lipid peroxidation, and survival time. Both extracts exhibited substantial anticancer activity¹².

Male Wister rats were subjected to a preventive activity test using a methanolic extract of the leaves against artificially produced liver cancers. It was discovered that the administration of extract (200 and 400 mg/kg) reduced the levels of mitochondrial lipid peroxidation and liver weight in a dose-dependent manner. Additionally, the extract raised the concentrations of mitochondrial enzymatic antioxidants.

Antibacterial Activity

The agar well diffusion method assessed the antibacterial activity of the different stem bark and extracts from *Prosopis cineraria*. Compared to the conventional antibiotic ciprofloxacin, the methanolic and aqueous extracts of *Prosopis cineraria*'s stem bark showed only moderate antibacterial activity against all of the

tested strains of microorganisms at a concentration of 250 g/ml. Flavonoids and tannins may have contributed to the reported activity¹³.

Analgesic and antipyretic activities

Soxhlet apparatus was used to create stem bark extracts in petroleum ether, ethyl acetate, and ethanol. In rats used in the experiment, ethanol extract significantly reduced pain in Eddy's hot plate model¹⁴.

The acetic acid-induced writhing test model was used to assess the analgesic efficacy of the leaf aqueous extract. Compared to the control, Swiss Albino mice showed significantly more analgesic activity. Using Brewer's yeast-induced hyperpyrexia model, the extract also demonstrated a solid antipyretic efficacy at the same dose.

Antidiabetic and Antioxidant Activities

The Alloxan-induced hyperglycaemia model assessed the antihyperglycemic effects of a 50% hydro-alcoholic stem bark extract. Hyperglycaemic mice received an oral dose of the extract at a rate of 300 mg/Kg B.W. once daily for 45 days. The rate of body weight reduction in mice was substantially slower than in the control group. Fasting blood glucose levels dropped by 27.3%, nearly matching the 49.3% reduction caused by conventional glibness amide, while liver glycogen content dramatically increased when compared to the control group. Drug therapy also stabilized the content of non-enzymatic antioxidants, which decreased the concentration of oxidative damage in the tissue of diabetic rats¹³.

Antimicrobial activity

In order to test the antimicrobial activity of *Prosopis cineraria* leaf extracts, Staphylococcus aureus (a Gram-positive pathogen), Escherichia coli (a Gram-negative pathogen), and Candida albicans (a Fungal pathogen) were utilized as pathogenic organisms¹⁵.

Anticonvulsant Activity

For anticonvulsant effect against maximal electric shock (MES) and pentylenetetrazol (PTZ) produced convulsions in mice, methyl Olić extract of stem barks was investigated. In both models, a substantial anticonvulsant effect of stem bark methanolic extract was seen^{12,14}.

Ethnomedicinal uses

The importance of the healthful worth of the *Prosopis cineraria* tree has been highlighted in ancient *Ayurvedic* literature.

Fruits

The pods are known as "Sangari" locally, and Rajasthani people consume them as fresh green vegetables. It is dried fruit in times of scarcity; make pickles with *Karir* (*Capparis decidua*) and use them with bajara chapati as a meal. It is also a good source of vitamins for people who live in desert areas. According to Maheshwari *et al.*, *Sangari* pods are combined with wheat flour to create bakery goods, including *chapatti* and bread. One of the best meals to come out of *Rajasthani* cooking.

Bark

Prosopis cineraria bark has cooling properties, is an anthelmintic and tonic, and treats a variety of illnesses, including dysentery, bronchitis, asthma, leukoderma, piles, and muscle spasms. Diarrhoea, worm infestations, rheumatoid arthritis, colds and flu, and skin conditions. If you've been bitten by a snake or a scorpion, the plant's bark can provide quick relief¹⁶. Bark as a food source is said to have saved many lives during the *severe Rajputana*

famine of 1868–1869. Cakes were made from the flour that was then pounded into powder.

Leaves

Prosopis leaves are highly nutritious and are referred to as "Long" leaves. *Prosopis* leaf extract exhibits antibacterial, antihyperglycemic, and antioxidant properties¹⁷. Leaf smoke appears to be beneficial for eye problems. Animal mouth ulcers are treated with leaf paste on boils and blisters, while exposed skin sores are treated with leaf infusion¹⁸. Medicines for treating neurological diseases are made from leaves and fruits.

Flowers

To prevent miscarriage, it is pounded, combined with sugar, and consumed throughout pregnancy. Flower and twig paste also function as an antidiabetic medication when taken internally.

Gum

The tree's nutritious and delicious gum is used by pregnant women to induce labour and is thought to have pectoral, astringent, and demulcent properties.

DISCUSSION

Ethnobotany, in totality, is virtually a new field of research, and if this field is investigated thoroughly and systematically, it will yield results of great value to ethnologists, archaeologists, anthropologists, plant geographers, pharmacologists, etc. Herbal medicine also suits the social and cultural needs of the people and influences the patients' physical, mental, and emotional states as well. The herbal drugs prepared with the traditional methods through slow grinding and mixing processes conserve all the natural substances within it in the 'naturally balanced form' without losing any essential component and maintain the activity and purity of the drug. The presence of several crucial components in the 'naturally balanced state' is perhaps the basis for the minimal side effects of herbal drugs. They have been tested since time immemorial and proved to have side benefits in place of adverse effects generally produced by synthetic and chemical-based harmful products. Several plants may be processed in cosmetics, likely in great demand in India and abroad. Perhaps the outstanding example, at least in modern times, of the use of the literature is the massive compilation of all anti-tumour plants, cited in old texts and local folk medicine from all over the world for screening purposes at Cancer Chemotherapy National Service Center (CCNSC). Our ancient literature can also be tapped for information on medicinal plants. It is estimated that nearly one-third of about 15,000 higher plant species in India are used by tribals and poor people. No authentic record of any kind except a few archaeological sculptures of Mohenjo-Daro is available from the preceding period in this country. But Rigveda and Atharvaveda, from 2000 to 1000 B.C., are our oldest Vedic literature resources. They contain valuable information regarding medicinal plants of that period. Thus, from ancient times, Indian folk life has not only included trees, plants, and flowers as members of their own family but has also found God's image in them.

For this reason, the songs, tales and other expressions are replete with deep affection for trees and plants. Edaphic factors influenced the Lawsonia content of *Lawsonia inermis* L. *Adhatoda vasica* Nees has been found as a Putative HIV-Protease inhibitor¹⁹. Thus, plants have potential medicinal uses, but their contents may be influenced by edaphic and climatic factors, which need further investigation.

CONCLUSION

Prosopis cineraria has a variety of phytoconstituents and exhibits a range of biological actions, including analgesic, antitumor, anticonvulsant, antihyperlipidemic, antipyretic, and antimicrobial effects. Different plant parts contain a lot of phytochemicals that can be used to cure a variety of diseases. Native healers employ plant parts to treat gastrointestinal, respiratory, and circulatory illnesses, among other maladies. The plant has been used medicinally since ancient times. Folkloric claims about the stem bark's anti-inflammatory, antirheumatic, tonic, and vermifuge effects have led to its use as a remedy for anxiety, asthma, bronchitis, dyspepsia, fever, dysentery, leprosy, piles, wandering thoughts, and tremors. Additionally, it is said to have laxative and anti-abortion qualities.

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