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## *Prosopiscineria*: An updated review

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### Abstract

In ancient literature, *Prosopis cineraria* are mention as a vital natural herbal plant. In the present review, an attempt has been made to congregate the traditional, phytochemical and pharmacological studies done on important medicinal plant *Prosopis cineraria* of Family Fabaceae. Various phytoconstituents like Fatty acids, tannins, alkaloids, flavonoids, and glycosides were the major phytochemical compounds studied from this medicinal plant. The plant possesses the major pharmacological activities like antioxidant, analgesic, antipyretic, antitumor antihyperglycemic, antihypercholesterolemic, nootropic/leucoderma, leprosy, asthma, dysentery, dyspepsia, and antidiabetic activity, etc have been reported from various extracts of the plant. The current paper deals with the review of *Prosopis cineraria* on phytoconstituents and pharmacological action.

**Keywords:** Nootropic/leucoderma, *Prosopis cineraria*, dyspepsia

### 1. Introduction

*Prosopiscineria* is a promising multipurpose indigenous tree species with hard climatic adaptation and locally called as Jandi, ghaf, Khejdi. It is also called as Kalpataru in Ayurveda and Siddha literature. It is also known as Wonder tree and King of desert as all the parts of tree are useful [1]. The crude extracts of *Prosopis cineraria* shows positive results in supporting of health benefits and in prevention of wide range of illness includes protein and mineral deficiency [2]. For example, the decoction from its twigs and flowers are also reported to be anti-diabetic. Leaf extracts of *P. cineraria* showed antibacterial, antihyperglycemic, antihyperlipidemic and antioxidative activities. Aqueous extract of bark and leaves applied externally to treat skin disease disinfects wounds and promotes healing. The *in vitro* antiplasmodial activity of the *P. cineraria* ethyl acetate flower extract may be due to the presence of major chemical classes such as phenols and alkaloids. Hence alkaloids are strong antiplasmodial compounds [3]. Consumption of dry pods of Khejri is known to prevent protein and mineral deficiency [4]. *Prosopis cineraria* have a number of chemical constituents and Phytochemical analysis of the extracts revealed presence of carbohydrates, proteins, tannins (gallic acid), steroids (stigmasterol, campesterol, sitosteroletc), Flavone derivatives (Prosogerin A, B, C, D and E), alkaloids (spicigerine, prosophylline) and terpenes in most of the parts of *P. cineraria* Leaves are suggested for treatment of eye troubles, stomach and skin disease, but the fruit is said to be indigestible, inducing biliousness, and destroying nails and hairs. The plant material is one of the herbal remedies for snake bite and scorpion sting. The wood ash may be used as source of potash and the ashes are rubbed over the skin to remove hair. Leaves and Bark of *Prosopiscineria* have been shown to possess good DNA-binding abilities [4]. Seed protein showing antifungal activity against post harvested fruits. Preparation of activated carbon from dried pod of *prosopiscineria* is possible [5]. Adsorbents prepared from *Prosopis Cineraria* sawdust—an agro-industry waste—were successfully used to remove the malachite green from an aqueous solution in a batch reactor [6].

### 2. Taxonomical classification

Kingdom: Plantae  
Division: Magnoliophyt  
Class: Magnoliopsida  
Subclass: Rosidae  
Order: Fabales  
Genus: *Prosopis* L. – mesquite  
Family: Fabaceae – Pea family  
Species: *Prosopis cineraria* (L.) Druce – khejri

### 3. Morphological Characteristics

**Table 1:** [7].

Morphology of <i>prosopis cineria</i>	
Leaves	Leaves are alternate, glabrous, petiole and rachis is 0.5-4 cm long, each leaf divide in 2 pinnae the pinnae is 2-7 cm long, , oblong, oblique, apex usually mucronate, base rounded, 3 nerved; leaflets are 7-14-jugate, ovate, straight to subfalcate, without nerves (or 2-4- nerved at base, the midrib excentric), grayish when dry; stipules foliaceous, deciduous, , more or less sessile, c. 3-5 mm long and c. 2-4 mm broad, leaf are grey green
Flower	Flowers creamy white in pedunculate spikes, nearly 5-12.5 cm long, peduncle 1.0-2.5 cm long. Calyx c. 1-1.5 mm long, cup-shaped, truncate or obscurely 5 toothed. Petals 3-4 mm long, oblong, tips recurved. Stamens 10, free, shortly exserted, anthers tipped with deciduous glands. pistil glabrous.
Fruit	Pods 12.5-25 cm long, c. 5-8 mm broad, cylindricorulose or flattish with coriaceous exocarpbrittle, mesocarp pulpy, endocarp papery and thin, longitudinal and less developed.
Stem	The stem is commonly straight with a grey roughish bark with deep fissure, exfoliated in numerous thin flakes. The branches are slender, glabrous, armed with short nearly straight somewhat compressed prickles (3-6 mm long)
Root	Root is a tap root and are very deep may penetrate vertically upto 20m or more. it has deep root system
Seeds	Seeds are 10-15 in a pod, distant, longitudinal, ovate, 6 mm long, the tegument with open horse-shoe fissural line on faces, with moderately hard brown testa.

**Table 2:** Microscopy

Microscopy of <i>prosopis cineria</i>	
Color	Externally Brownish white or Brownish green in color
Texture	Rough, Ridged and Fissured
Odor	Aromatic odor
Taste	Slightly Pungent
Shape	Shallow Curved
Thickness	2mm to 5mm

#### 3.1 Microscopy

**Table 3:** Microscopical characteristics of Khejri

Periderm	Periderm consists of outer cortical tissue and it includes a few layers of outer layer of phellem and inner narrow zone of pheloderm.
Collapse Phloem	Secondary phloem are present inside the periderm it is differentiated as outer wide zone of collapsed phloem and inner narrow zone of non-collapsed phloem. In collapsed zone sieve elements are crushed into small necrotic masses. Phloem fibers are gelatinous type. Gelatinous fiber have thick outer cellulose wall and inner unglified mucilage
Crystal Distribution	Calcium oxalate crystals are present in the collapsed phloem zone. the crystals are prismatic type

Phyto chemicals	Plant part				
	Leaf	Pod	Flower	Stem	Seed
Carbohydrates	-	+++	+	-	+
Proteins	+	++	-	--	+
Tannins	+	+	-	-	+
Flavonoids	+	++	+++	-	++
Cardiac glycoside	-	+	-	-	-
Alkaloids	++	++	++	-	+
Terpenes	+	+	-	+	++
Steroids	+++	-	+	-	++

+, low concentration, ++, moderate concentration, +++, high concentration, -, absent: Phytochemicals

#### Phytochemicals

Phytochemicals present in various parts of *P. cineraria* in ethanol extract. Amino acids isolated from leaves and pods are Aspartic acid, Glutamic acid, Serine, Glycine, Histidine,

Threonine, Arginine, Alanine, Proline, Tyrosine, Valine, Methionine, Cysteine, Isoleucine, Leucine, Phenylalanine and Lysine.

Plant part	Chemical constituent	Pharmacological activity
Whole plant	Contains methyl heptacosanoate, heneicosanoic acid, 4-hydroxy benzoic acid, methyl 4-Hydroxycinnamate, methyl 2-methoxy-5-hydroxycinnamate and O-Coumaroylglycerol [8].	Hydroxycinnamic acid has been possess antioxidant properties
Leaves	Linoleic acid and oleic acid, campesterol, cholesterol, sitosterol and stigmasterol, actacosanol, hentriacontane, methyl docosanoate, Diisopropyl-10, 11-dihydroxyicosane 1, 20-dioate, Tricosan-1-ol, and 7,24-Tirucalladien-3-one along with a piperidine alkaloid spicigerine [9].	Steroid reduce blood levels of cholesterol, also possess potent antioxidant, hypoglycemic and thyroid inhibiting properties
Dried Pods	Contain 3-benzyl-2-hydroxy-urs-12-en-28-oic acid, maslinic acid 3-glucoside, linoleic acid, prophylline, 5, 50-oxybis- 1, 3-benzendiol, 3,4,5, trihydroxycinnamic acid 2-hydroxy ethyl ester and 5,30,40-trihydroxyflavanone	coumaric acid derivatives have been reported to possess antioxidant properties and are believed to reduce the risk of stomach cancer by

	7-glycoside [4].	reducing the formation of carcinogenic nitrosamines
Flowers	Patuletin glycoside patulitrin, luteolin and rutinositol, spicigerine, Flavone derivatives Prosogerin A and Prosogerin B [10].	has been reported significantly cytotoxic active against Lewis lungs carcinoma <i>in vivo</i>
Seeds	Prosogerin C, Prosogerin D, Prosogerin E, Gallic acid, patuletin, patulitrin, luteolin, and rutin [3, 10].	Rutin show anti-inflammatory activity
Bark	Hexacosan-25-on-1-ol, a new keto alcohol along with ombuin and a triterpenoid glycoside. Vitamin K1, n-octacosyl acetate, the long chain aliphatic acid. Presence of glucose, rhamnose, sucrose and starch is also reported	

### Pharmacological activity

Pharmacological activity	Pant part use	Extract/ fraction	Dose tested & route of administration	Animals/ cell line	Experimental model
Nootropic Activity	Stem bark	Methanol using soxhlet apparatus	2gm/kg, 400mg/kg B.W. Orally	Male adult Charles foster strain albino rat	working memory model [11]
Anticancer Activity	Leaf and Stem bark	Hydroalcoholic	200-400mg/kg B.W.	Swiss albino mice & Male wistar rat	Ehrlich ascites carcinoma tumor model [12]
Antidiabetic activity	Leaf, stem bark	Hydroalcoholic, chloroform	750g/kg, Orally, 50-100mg/kg bw	Wistar albino rat	streptozotocin induced experimental [13, 14]
Antioxidant ( <i>In vitro</i> )	Stem bark, Leaf	Methanolic,	10ui/kg	Goat	spectrophotometric method [15, 16]
Anticonvulsant Activity	Stem bark	Methanolic	200-400mg/kg, Orally	Swiss albino mice	MES and PTZ model [16]
Analgesic & Antipyretic activity	Leaf Root Stem bark	Aques Ethanol Petroleum ether	200-600mg/kg, Orally	Swiss albino mice, rat	Writhing test model, Eddy's hot plate model, Brewer's yeast induced hypyrexia model [17, 18]
Anti-Hypercholesterolemic activity	Stem bark	70% hydroalcoholic extract	500mg/kg, Orally	Albino male White rabbit	High fat diet induced hypercholesterolema model [19]
Skeletal muscles relaxant activity	Leaves	Aquoues	200mg/kg, Orally or i.p	Swiss albino mice	Rota rod experiment [15, 20]
Antidepressant activity	Leaves	Aqueous	200mg/kg, orally	Swiss albino mice	Forced swim test
Antihyperglycemic activity and antioxidant activity	Stem bark, leaves	Hydroalcoholic, aqueous	300mg/kg, Orally, 250-750mg/kg	Mice, rat	Alloxan induced Hyperglycemia model
Antimicrobial activity	Leave, Pod, stem, root bark	Ethanolic, Methanolic, Hydro alcoholic and ethanolic	15mg/ml 500ug/ml	Bacterial strain	Disc diffusion method [12, 21]
Bronchodilator, and vasodilator activities	Stem bark	Methanolic extract	0.01–5.0mg/mL	Rabbit	[22]
Anti-inflammatory activity	Seed	Ethanolic and Aqueous Extract	100mg/kg p.o	Swiss albino mice	carrageenan induced rat paw edema and glass rod ganuloma method

L: Leaf; SB: Stem bark; B: Bark; F: Flower

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