



## AN INSIGHT HIGHLIGHT STORY ON THE BENEFICIAL AND PHYTOCHEMICAL IMPACT OF *PROSOPIS CINERARIA* IN TONK, RAJASTHAN (INDIA)

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**Abstract:** *Prosopis cineraria* belongs to the family Mimosaceae. Traditionally the tribal people use *Prosopis cineraria* in their daily diet. Its leaves, pods and bark have many significant phytochemical components. It is used traditionally for treatment of various ailments like leprosy, muscular tremors, dysentery, asthma, leukoderma, bronchitis, dyspepsia, rheumatism, gastrointestinal, respiratory, cardiovascular disorders, piles and earache etc. The stem barks and leaves of *Prosopis cineraria* were collected for phytochemical screening to identify the different types of beneficial compounds used in herbal medicine. The solvent extract of the plant material was studied. The objective of this study was to analyze the extracts of *Prosopis cineraria* which proved a positive response for phytochemicals like alkaloids, proteins, carbohydrates, flavonoids, saponins and tannins in alcohol and aqueous solvent extracts.

**Keywords:** Alkaloids, Bark, Pharmacology, Phytochemical, *Prosopis cineraria*, Shami, Stem.

### INTRODUCTION

India is a very rich country with respect to ethnomedicines both of plant and animal origin (Pandey, 2019; Prakash and Verma, 2021; Sharma and Pareek, 2021). *Prosopis cineraria*, commonly called Shami is one of them. This moderate sized tree found worldwide including the regions of Arabia (Fig 1a). In India, it is distributed in Telangana, Andhra Pradesh, Rajasthan, Gujarat, Haryana, Uttar Pradesh and Tamilnadu. *Prosopis cineraria* has also been used in indigenous system of medicine as a folk medicine for various ailments as mentioned in ancient literature. It has been distributed in to nine agro climatic regions. Among the flora, the state harbours a total of 2,800 taxa belonging to 1,051 genera under 185 families. Shami is small to moderate-sized tree,

evergreen, with light foliage and slender branches having conical spines. Bark rough, exfoliating in thin flakes. Leaves are bipinnate, generally with 2 pairs of pinnae; pinnules 7-12 pairs. Flowers borne in slender spikes are small and yellowish. Pods are cylindrical or flattened with coriaceous exocarp. Seed are 10-15, compressed, oblong, with moderately hard brown testa (Fig. 2a & 2b).

The *Prosopis cineraria* plays an important role in the socio-economic development of the farmers. The wood is the main part of the tree that has economic importance as it is used for fuel, firewood and charcoal. Bark is used as a tonic, blood purifier and for the treatment of skin diseases. The plant finds use in one form of the

other in various ayurvedic preparations and this has been made in necessary to review the various studies carried out in its chemistry as well as pharmacology. The trees not only boost the growth and productivity of companion plants, but also provide fuel, fodder, food, small timber, medicines, gum and tannin. Telangana State in India is known for its rich heritage in biological diversity. It is also useful for dry areas restoration of dry land.

Dry pod is known as sangri, which is the main part of some Rajasthani dishes and also have a broader range of pharmaceutical application like in pain, high cholesterol level, diabetes, anaemia, kidney and liver disorders (Ukani *et al.*, 2000;

Velmurugan *et al.*, 2010; Robertson *et al.*, 2011; Yates *et al.*, 2012; Xue and Jackson, 2015). Cooked pods of Khejri are used as a functional food in Rajasthan, for the amelioration of numerous illnesses.

#### Synonyms\*

- *Acacia cineraria* (L.) Willd.
- *Adenanther aaculeata* (J. Koenig ex Roxb.) W. Hunter
- *Mimosa cineraria* L.
- *Prosopiscineraria aculeata* J. Koenig ex Roxb.
- *Prosopiscineraria spicata* Burm.f.
- *Prosopiscineraria spicigera* L.



Fig. 1: a

\*Source: <http://www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:515801-1#source-KB>

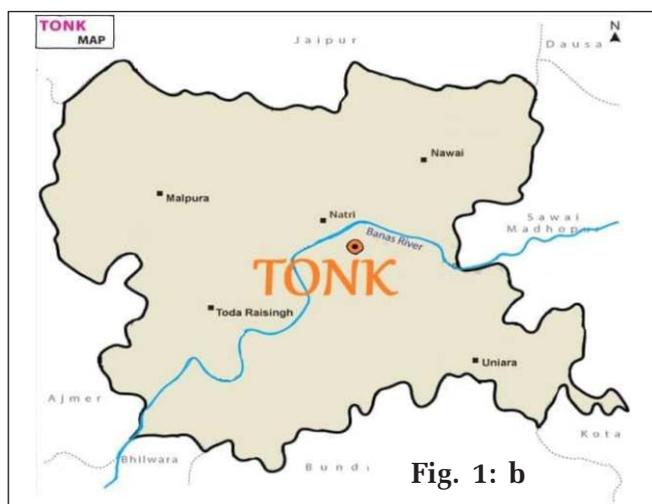


Fig. 1: b

Fig. 1: a) Map showing worldwide distribution of *Prosopis cineraria*.  
b) Study area, Tonk district of Rajasthan.



2a



2b

Fig. 2: a) *Prosopis cineraria* plant  
b) *Prosopis cineraria* pods (Fruits)

*Prosopis cineraria* is reported as a source of herbal medicine. The powder of root has a pharmacology function, used as antidiarrheal. Sitosterols, spicigerine, prosogerinand vitamin A, B, C, D and E have been isolated from its seeds (Nandkarni, 2000; Pazyar *et al.*, 2014; Pakrashi and Chatterjee, 1992). It has shown the presence of gallic acid, patuletin, iutolin, patulitrin and rutin in *Proposis cineraria* in some literature. Besides these, the isolation of unsaturated fatty acids, with linoleic and oleic acids present in the lipids isolated from seeds (Figure 3).

## MATERIALS AND METHODS

### Collection of sample

The sample of *Prosopis cineraria* was collected nearby tribal village of Tonk, district of Rajasthan (Fig. 1b). For analysis of phytochemicals, macerated the 2 g air dried powder with 100 ml alcohol and distilled water separately in a closed iodine flask for 24 hours, shaking frequently during first 6 hours and allowed to stand for 18 hours. Then the solution was filtered by using Whatman filter paper No.1. Both the extracts (alcoholic and aqueous) were used for the analysis of different bioactive constituents.

The extracts obtained from successive solvent extraction were then subjected to various qualitative chemical tests to determine the presence of various phytoconstituents like alkaloids, carbohydrates, proteins, resins, saponins, starch, flavonoids, steroids, coumarins, tannins, and phenolic compounds.

For phytochemical analysis of *Prosopis cineraria*, tests conducted are as under:

#### (a). Test for Alkaloids

- **Mayer's test:** Added few drops of Mayer's reagents to 1 ml of the acidic, aqueous extract of the powder.
- **Dragendorff's test:** Dissolved few mg of alcoholic or aqueous extract of powder in 5 ml of distilled water, added 2 M HCl until an acid reaction occurs, then added 1 ml of Dragendorff's reagent.
- **Hager's test:** To 1 ml of alcoholic extract of powder and added few drops of Hager's reagent.

#### (b). Test for Carbohydrates:

- **Anthrone's test:** 2 ml of anthrone's test solution, added 0.5 ml of aqueous extract of powder.
- **Fehling's test:** 2 ml of aqueous extract of powder, added 1 ml of mixture of equal parts of Fehling's solution, A and Fehling's solution B and boiled the content of the test tube for few minutes.
- **Molish's test:** 2 ml of aqueous extract of the powder, added 2- drops of freshly prepared 20% alcoholic solutions of naphthol and poured 2 ml of conc. H<sub>2</sub>SO<sub>4</sub> so as to form a layer below the mixture.

#### (c). Test for Proteins:

- **Biuret test:** 1 ml of hot aq. extract of sugarcane powder, added 5-8 drops of 10% w/v NaOH solution followed by 1 or 2 drops of 3% w/v CuSO<sub>4</sub> solutions.
- **Xantho protein test:** A little residue was taken with 2 ml of water and 0.5 ml of concentrated nitric acid was added to it.
- **Ninhydrin test:** The Ninhydrin reagent is 0.1% w/v solution of Ninhydrin in n-butanol. A little of this reagent was added to the test extract.

#### (d). Test for Resins:

- Dissolved 1 ml of extract in 1 ml of acetone and poured the solution into 5 ml distil water.

#### (e). Test for saponins:

- **Foam test:** 5 ml of aq. extract of sugarcane powder, added few drops of sodium bicarbonate. Shaked vigorously and left it for few minutes.

#### (f). Test for Starch:

- Dissolved 0.015g of iodine and 0.075g of KI in 5 ml of distilled water and added 2-3 drops of an aq. extract of sugarcane powder.

#### (g). Test for Flavonoids:

- **Shinoda's test:** 0.5 ml of alcoholic extract of sugarcane powder, added 5-10 drops of concentrate HCl followed by small 0.5g of 'Mg' metal.

- **Alkaline reagent test:** To the test solution added sodium hydroxide solution.
- (h). Test for Steroids:**
- **Salkowski's reaction:** Added 1 ml of concentrate  $H_2SO_4$  to 2 ml of chloroform extract of the sugarcane powder carefully, from the side of test tube.
- (I). Test for Coumarins:**
- Plant extracts (1ml) were treated with alcoholic sodium hydroxide.
- (j) Test for Tannins:**
- Ferric chloride test: 1-2 ml of extract of Sugarcane powder, added few drops of 5%  $FeCl_3$  solutions.
- (k). Test for Phenolic compounds:**
- The extract was taken in water and warmed; to this added 2 ml of ferric chloride solution and observed.

## RESULTS AND DISCUSSION

In the present study, detailed survey has been made on this plant with respect to its usage as a medicine to cure several diseases. Information was gathered and documented from all the areas of district Tonk, Rajsthan, India. The present

study also focused about the *Prosopis cineraria* for its medicinal values and mythological believes. During the survey, it was noticed that the tribal people of Tonk district mostly depend on this plant for various diseases like asthma, dysentery, leucoderma, bronchitis, dyspepsia, rheumatism, gastrointestinal, respiratory, cardiovascular disorders, piles and earache etc. (Table 1). A focused screening was also done for its novel phytochemical components. Authors found that the extracts of *Prosopis cineraria* have positive response for phytochemicals like alkaloids, proteins, carbohydrates, flavonoids, saponins and tannins in alcohol and aqueous solvent extracts. The chemical constituents include hydroxybenzoic acid, gallic acid, ferulic, caffeic acid, leuteolic etc. (Fig. 3).

In addition to medicinal properties, it also provides economic supports to the farmers in the form of fuel, firewood, and as a livestock. Usually, farmers collect its leaves, compost and use to increase the fertility of their agricultural fields. The leaves also have some fungicidal and insecticidal properties that control fungi and insects attacking plants. Humans use the extract of leaves to kill intestinal parasitic worms. Smoke burned leaves can cure eye problems (Kumar *et al.*, 2011; Malik and Kalidhar, 2007).

**Table 1: Showing the different activities of *Prosopis cineraria* plant parts.**

Sl No.	<i>Prosopis cineraria</i>	Medicinal effects	Phytochemical components
1.	Leaves	Inhibition of drug resistant fungi	Piperidine alkaloids
2.	Seeds and leaves	Inhibition of $H^+ K^{++}$ , ATPase of H pylori	Alkaloids, Flavonoids, Anthraquinone and Quinone
3.	Pods	Antioxidant activity	Triterpenoids
4.	Root and stem	Antiripromosomal activity	Tannins
5.	Root and bark	Anti-inflammatory activity	Tannins
6.	Leaves	DNA binding activity	Tryptamine
7.	Leaves	Ant-infective	Indolizidine
8.	Aerial parts	Antioxidant activity,	Chaetin, Indolizidine
9.	Fruit	Antihyperglyseemia activity	Phenolic compounds
10.	Whole plant	Anticonvulsant Activity	Alkaloids

The leaves are palatable and nutritious for livestock in desert. The bark of the *Prosopis cineraria* is used as a source of tannin, dye and

fibers. It is used as medicine to cure stomach, skin and eye problems, and to cure rheumatism, leprosy, dysentery, bronchitis, asthma,

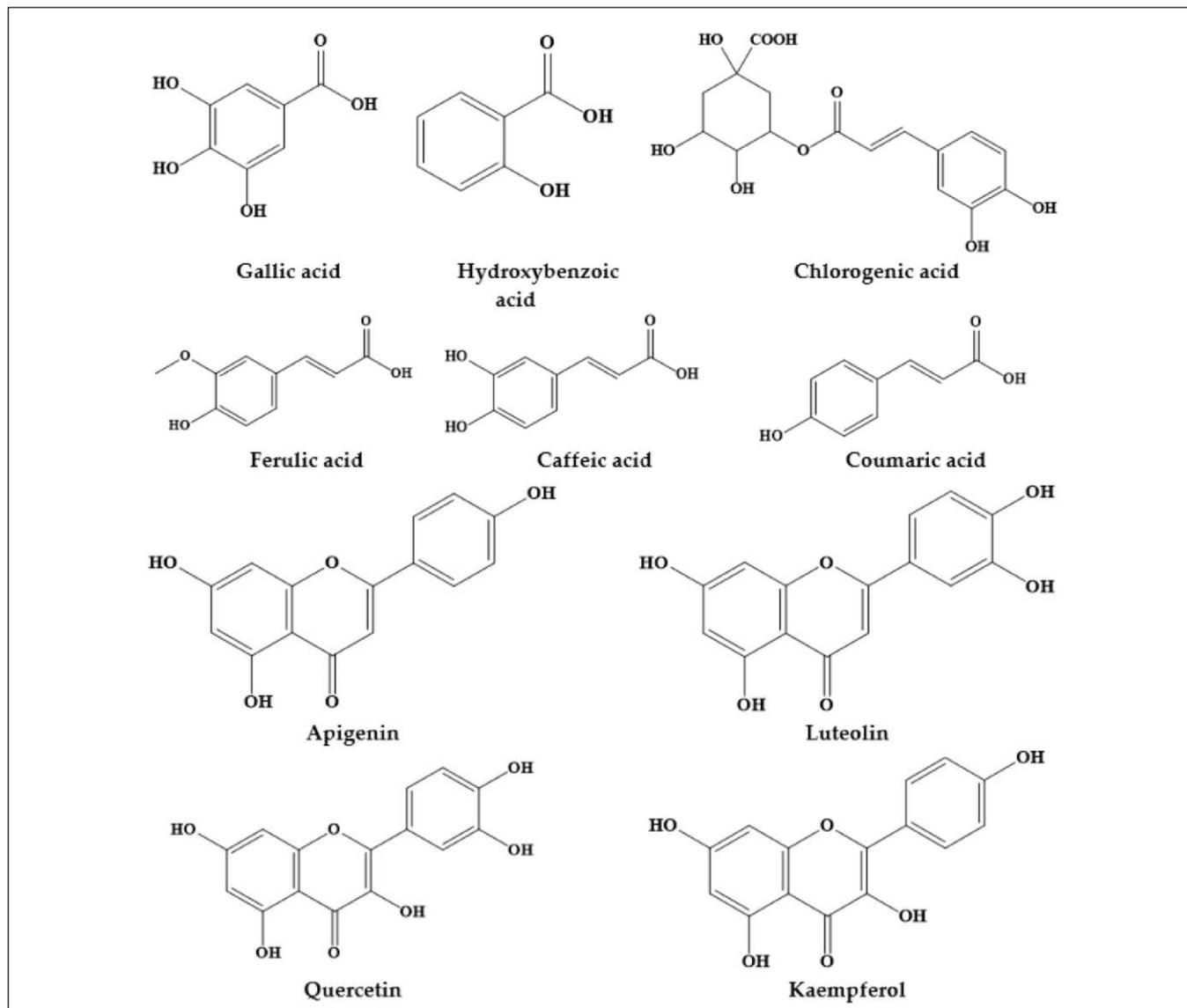


Fig. 3: Structure of some chemical constituents of *Prosopis cineraria*.

leucoderma and piles (Gonzalez *et al.*, 2016; Alaysia *et al.*, 2007; Heinrich and Gibbons, 2001). Water-soluble extract of the residue from methanol extract of the stem bark exhibits anti-inflammatory properties. The bark is recommended medicine for scorpion sting. The gum of the tree is nutritive and good in taste. It is used by pregnant woman at the time of delivery. *Prosopis cineraria* flower is pounded and mixed with sugar, used during pregnancy as safeguard against miscarriage.

The pods are used in the treatment of urogenital diseases. The seeds are reported to have a hypoglycaemic effect. Paste of shami seeds prevents the growth of arm pit hair follicles permanently (Gangal *et al.*, 2009; Hoyouni *et al.*,

2011; Dharani *et al.*, 2011) and also prevent facial hair caused by hormonal imbalance. The pods are also used as animal fodder that is rich source of protein. It is also considered as dry fruit of desert and added as main ingredients of vegetable and pickle of main dish by local people.

The bark of shami is used in treating arthritis. The leaves of this herbal plant can be applied to the eyes which relieves from irritation (Kirtikar *et al.*, 1987; Henciya *et al.*, 2017). The tree of Shami plant is often used for afforestation to prevent from soil erosion. Its leaves have an auspicious use; it can be soaked in water for bathing which helps in removing sins and negative energy. This plant is also considered as lucky according to vastushastra.

## CONCLUSIONS

There are no side effects of ayurvedic herbal medicines. Such medicines have a significant impact on human body, mind and soul. Authors noticed that *Prosopis cineraria* have several compounds including alkaloids, tannins, saponins, flavonoids, proteins, coumarins, resins and so on. This plant is recommended for the treatment of snake bite and is a divine medical herb with several medicinal properties. Shami plant is used as a great remedy for pediatric disorders in ancient Ayurveda. The vigorous study on ethnomedicinal information was collected on this plant has found to be a significant impact of medicine for the past many years. Furthermore, interviewed villagers, priests and tribal folks seem to discover and gather more beneficial impact about the medicinal aspect of this plant.

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