

TAMARIX GALLICA – AN OVERVIEW

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ABSTRACT

The use of plants as medicines predates written human history. The records show the study of herbs dates back over 5,000 years. The use of traditional medicine is globally expanding to newer horizons primarily due to low cost and less side effects associated. India is a vast repository of medicinal plants used in traditional medical treatments¹. There are estimated to be around 25,000 effective plant-based formulations, used in folk medicine and known to rural communities in India². It is estimated that there are over 7800 medicinal drug-manufacturing units in India, which consume about 2000 tonnes of herbs annually³. The various indigenous systems of medicine in India such as Siddha, Ayurveda, Unani and Allopathy have been using several plant species to treat different ailments^{4,5}. Taking these points in view Tamarix gallica plant is briefly reviewed in this article for its history, anatomy, phytochemical constituents and pharmacological activities.

Keywords: Tamarix gallica, Anatomy, Phytochemical constituents, pharmacological activities.

INTRODUCTION

Tamarix gallica belongs to the genus Tamarix (tamarisk, salt cedar). There are about 50-60 species of flowering plants in the family Tamaricaceae⁶. The generic name originated in Latin and is believed to refer to the Tamaris River in Spain⁷. Following are some of the known species of genus Tamarix -

Tamarix africana Poir.	Tamarix jintaenia
Tamarix androssowii	Tamarix juniperina
Tamarix aphylla (L.)	Tamarix karelinii Bunge
H.Karst.	Tamarix laxa Willd.
Tamarix arceuthoides	Tamarix leptostachys
Tamarix austromongolica	Tamarix mongolica
Tamarix boveana	Tamarix parviflora DC.
Tamarix canariensis	Tamarix ramosissima Ledeb.
Tamarix chinensis Lour.	Tamarix sachuensis
Tamarix dalmatica	Tamarix smyrnensis Bunge (=T. hohneckeri)
Tamarix dioica Roxb.	exTamarix taklamakanensis
Roth	Tamarix tarimensis
Tamarix duezenlii	Tamarix tenuissima
Tamarix elongata	Tamarix tetragyna Ehrenb.
Tamarix gallica L.	Tamarix tetragyna var. meyeri (Boiss.)
Tamarix gansuensis	Tamarix tetragyna var. tetragyna
Tamarix gracilis Willd.	Tamarix tetrandra Pall. ex M.Bieb.
Tamarix hampeana	
Tamarix hispida Willd.	
Tamarix indica	

HISTORY

Tamarix gallica L. (Syn. T. Troupii) is commonly known as "Jhau" in Hindi, Shavaka in Sanskrit and Tamarisk in English. It was first described for botanical classification by the taxonomist Carolus Linnaeus in 1753, but had already been in cultivation since 1596⁹. These deciduous, herbaceous, twiggy shrub or small tree reaching up to about 5 meters high are indigenous to Saudi Arabia and the Sinai Peninsula, and are very common around the Mediterranean region. It is present in many other areas as an invasive introduced species, often becoming a noxious weed⁸. It has fragile, woody branchlets that drop off in autumn along with the small, scale-like leaves that cover them. The leaf-shape is an adaptation over time to exceedingly dry conditions. The pink flowers are tiny, hermaphroditic, and are borne on narrow, feather-like spikes. They frequently bloom earlier than the leaves, first in May, and sometimes a second time in August. It has been grown as an ornamental plant for its profuse production of showy pink flower spikes. This plant is

mainly found in the salty regions and is found between interdunal areas of the desert¹⁰.

CLASSIFICATION

Kingdom	Plantae – Plants
Subkingdom	Tracheobionta – Vascular plants
Superdivision	Spermatophyta – Seed plants
Division	Magnoliophyta – Flowering plants
Class	Magnoliopsida – Dicotyledons
Subclass	Dilleniidae
Order	Violales
Family	Tamaricaceae – Tamarix family
Genus	Genus Tamarix L. – tamarisk

ANATOMY

Tamarix species are ornamental bushes or trees with feathery foliage, mostly evergreen and pink or white blossoms. They are relatively long-lived plants that can tolerate a wide range of environmental conditions and resist a biotic stresses such as high temperature, salt, and drought stresses. Tamarix prefer alluvial soil but grow well on saline and alkaline soil¹¹. It grows in semi-arid localities, growing to 17 to 19 feet tall, and is recognized by its stringy appearance. The smooth, reddish-brown bark of younger plants becomes brownish-purple, ridged, and furrowed as it ages. Masses of small, pink flowers blossom on the ends of its branches from June to August. The leaves are scale-like, 1–2 mm long, and overlap each other along the stem. They are often encrusted with salt secretions. The pink to white flowers appear in dense masses on 5–10 cm long spikes at branch tips from March to September, though some species (e.g. T. aphylla) tend to flower during the winter. Tamarix can spread both vegetatively, by adventitious roots or submerged stems, and sexually, by seeds. Each flower can produce thousands of tiny about 1 mm diameter seeds that are contained in a small capsule usually adorned with a tuft of hair that aids in wind dispersal. Seeds can also be dispersed by water. Seedlings require extended periods of soil saturation for establishment. Tamarix species are fire-adapted, and have long tap roots that allow them to intercept deep water tables and exploit natural water resources. They are able to limit competition from other plants by taking up salt from deep ground water, accumulating it in their foliage, and from there depositing it in the surface soil where it builds up concentrations temporarily detrimental to some plants. The salt is washed away during heavy rains. Tamarix trees are most often propagated by cuttings. Tamarix species are used as food plants by the larvae of some Lepidoptera species including Coleophora asthenella which feeds exclusively on T. africana. Resin of Tamarix gallica when melts in the sun is similar to wax, is sweet and aromatic (like honey), and has a dirty-yellow colour, fitting somewhat with the Biblical descriptions of manna. This plant makes a good fuel

wood¹², burning well even when green due to the wax content of the wood¹³. It is very tolerant of maritime exposure and is a good shelter hedge in coastal gardens. It is excellent for soil stabilisation because of its extensive root system and is suitable for use in erosion control in sandy soils¹⁴.

PHYTOCHEMICAL CONSTITUENTS

The phytochemical analysis of this plant shows that it is rich in antioxidants such as tannin (50%), tamarixin, tamarixetin, troupin, 4-methylcoumarin and 3, 3'-di-O-methylsuccinic acid¹⁵. The principle constituents are tamarixin and its traces of aglycone, tamarixetin, Tamarixetin-3-glucoside, Quercetin and Kaempferol. The plant contains a high level of tannin (ellagic and gallic) and quercetol (methyllic ester)¹⁶. Furthermore, the Tamarix is found to be rich in polyphenolic compounds such as flavonoids, phenolic acids and coumarins^{17, 18}. The Quercetin glycosides are found abundant in plants and their 3-O-methyl (isorhamnetin) derivatives are also not uncommon. However, the 4-O-methyl Quercetin (Tamarixetin) glycosides are rare in nature. Compositions of sterols of Tamarix gallica have been reported in light petroleum extract¹⁹. Trans-Coniferyl alcohol, 4-O-Sulphate and flavonoid sulphates from some Tamarix species have been isolated²⁰. Several types of polyphenols (anthocyanins, tannins, flavonones, isoflavonones, resveratrol and ellagic acid) have also been reported in addition to terpenoid antioxidant compounds like carotenoids and essential oils^{21, 22}. Whole aerial parts of Tamarix boveana are rich in acid compounds like Hexadecanoic acid (18.14%), docosane (13.34%), germacrene D (7.68%), fenchyl acetate (7.34%) and Benzyl benzoate (4.11%)²³.

PHARMACOLOGICAL ACTIVITIES

Tamarix Gallica has been reported to be useful in leucoderma, spleen trouble and eye diseases²⁴. Tamarix species are employed in traditional medicine as astringent, aperitif, stimulus of perspiration and diuretic²⁵. It is used as an anthelmintic, antihaemorrhoid haemostat and for diarrhoea and gingivitis. The plant is used to cure dromedary galls²⁶. Several researches have proved antioxidant and antimicrobial activities of Tamarix species such as *T. ramosissima*²⁷ and *T. hispida*²⁸. In Algeria and surrounding areas the plant has been used medicinally for rheumatism, diarrhoea, and other maladies. Vegetable and fruit peels of the plant are used as a novel source of antioxidant²⁹. Antimicrobial activity of Tamarix gallica has also been reported³⁰. It can be used as prophylactic and therapeutic remedies to cure malaria as folk medicine³¹. The bark is bitter and an astringent, tonic; fruit and roots are useful for dysentery and chronic diarrhoea³². The manna produced on the plant is detergent, expectorant and laxative³³. The sweet and mucilaginous manna is believed to be produced by exudation from the insects. Galls produced on the plant as a result of insect damage are astringent³⁴. 5-Hydroxy-4,3,7-trimethoxyflavone (1), 3,5,7-Trihydroxy-4-methoxyflavone (2) have been isolated from Tamarix gallica L. and evaluated against both standards and the isolated strains bacteria together with the fungus strain *Aspergillus niger* using disk diffusion method³⁵. Leaves and flower infusion have been reported to have anti-inflammatory and antidiarrheic properties. Antioxidant and antimicrobial activities of leaf and flower extracts and their phenolic composition have been reported³⁶. The extract of Tamarix gallica L. is very rich in acid compounds that are used as an inhibitor of nephrolithiasis (calcium oxalate)³⁷. Presence of these compounds exhibit a wide spectrum of medicinal properties, such as anti-allergic, anti-inflammatory, anti-thrombotic, cardio-protective and vasodilatory effects³⁸. Literature reviews indicates that no studies combining the antinociceptive, antidiarrhoeal and cytotoxic activities of the roots have so far been undertaken. The antinociceptive, anti-inflammatory and antibacterial properties have been reported in the roots extract of Tamarix indica³⁹. Protective role of Tamarix gallica against DEN initiated and 2-AAF promoted hepatocarcinogenesis in male Wistar rats have been reported. Tamarix gallica have been found to cause a marked inhibition of thioacetamide-induced hepatotoxicity, oxidative damage and early tumor promotion related events in the liver⁴⁰. Isothiocyanates of

Tamarix gallica have been shown to be especially effective in fighting lung and esophageal cancers⁴¹.

COMMERICAL APPLICATIONS

Tamarix Gallica has found its use in many commercial medicines like Bonnisan, Geriforte, Liv 52, Digyton, geriforte Aqua Vet, Liv 52 vet, Liv 52DS⁴².

CONCLUSION

The current review indicates that Tamarix Gallica is a highly useful plant and have already found its application in wide array of medicines to cure Leucoderma, spleen trouble, eye diseases, rheumatism, diarrhoea and gingivitis to mention a few. It is however found that not all phytoconstituents present in the plant have been studied in depth and needs to be explored more. In future study, the isolated principles from Tamarix Gallica needs to be evaluated in scientific manner using specific experimental animal models and clinical trials to understand further the medicinal activities of the plant.

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