**Review: A Rare Medicinal Herb Zizyphus xylopyrus (Retz.) Willd**

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**ABSTRACT**

In the present scenario, demand for the herbal products is growing exponentially throughout the world and various pharmaceutical sectors are currently conducting extensive research on plant materials for their potential medicinal value. This inclination seems to be a result of people all over the world looking for various alternative systems of medicine. The research of blending traditional knowledge with modern experimental methodology for testing the efficacy and safety of herbal drugs is increasing. Keeping this point of view the present work has been presented to explore the efficacy and medicinal values of a rare medicinal plant known as *Zizyphus xylopyrus* (Retz.) Willd (ZX). The available literatures on this plant though very less, divulgates that it contains many phytoconstituents like, Flavonoids, Tannins, Saponins, Terpenoids, etc. which when pharmacologically tested proved to be medicinally significant. In vast research, all these phytochemicals have shown their variety of medicinal values, more potent compared to available allopathic medicines in some cases. Apart from that, ZX has shown its promising effect even in the Central Nervous System. Though much of scientific work has not been done on this plant, so in this context it needs to be heeded in all the medicinal and pharmaceutical concerns.

*Key words: Zizyphus, Flavonoids, Pharmacology, Phytochemistry.*

**INTRODUCTION**

Variety of reasons has been cited for the need of the studying medicinal plants. Most of the traditional knowledge about medicinal plants was in the form of oral knowledge that had been lost with persistent invasions and cultural adaptations. There was no uniform or standard procedure for maintaining the inventory of this plant and the knowledge about their medicinal properties. There is a prevalence of using plants and plant based products in various contemporary and traditional systems of medicine, without any written documentation or regulation. Therefore it is essential that such uses of natural products be documented and studied for systemic regulation and wide spread application.1 Interestingly, *Zizyphus* is a genus of about 40 species of spiny shrubs and small trees in the buckthorn family Rhamnaceae. The leaves are alternate, entire, with three prominent basal veins, and 2-7 cm long; some species are deciduous, others evergreen. The flowers are small, inconspicuous yellow-green. The fruit is an edible drupe, yellow-brown, red, or black, globose or oblong, 1-5 cm long, often very sweet and sugary, reminiscent of a date in texture and flavor.2,3

**PLANT PROFILE**

**Biological Source**

The drug consists of the whole dried herb of *Zizyphus xylopyrus* (Retz.) Willd. (Family: Rhamnaceae)4

**Geographical Source**

The plant is found throughout North-Western India, Pakistan and China.4

**Classification**

- **Domain:** Eukaryota – eukaryotes
- **Kingdom:** Plantae Haeckel
- **Subkingdom:** Viridaeplantae
- **Phylum:** Magnoliophyta
- **Subphylum:** Euphyllphytina
- **Infraphylum:** Radiatopses
- **Class:** Magnoliopsida
- **Subclass:** Rosidae

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Microscopic Characters
A transverse section of the fruit reveals a thick cuticle followed by epidermis consisting of unevenly arranged rounded cells; scattered thick-walled, uniseriate, multicellular trichomes present on epidermis; mesocarp with three zones - narrow outer and inner zones of small, compactly arranged parenchyma cells; a third wide middle spongy zone composed of thin walled parenchyma cells, lacunated and containing scattered vascular strands; endocarp consisting of thick walled stone cells, narrow fibres and a few lacunae, some stone cells containing prismatic crystals of calcium oxalate up to 12 μ in size; occasional inroads of mesocarp into the endocarp also seen; epidermis and a few outer layers of mesocarp adjacent to it contain abundant brown substances.

A section through the testa shows radially elongated, narrow, translucent cells, followed by a subepidermal zone of crushed, thin walled, parenchyma cells demarcated inside by a reddish brown lining. A section through the cotyledons shows an outermost epidermal layer of small, squarish cells and a ground tissue composed of rectangular thin walled, prominently nucleated cells rich in fixed oil.

Powder - Thick walled uniseriate, multicellular, 200 to 260 μ long trichomes; fibres (upto 50 μ in width) and angular stone-cells with radial canals and circular striations, 40 to 170 μ in size are seen- tissue fragments of epidermis in surface view present.

Identity, Purity and strength
- Foreign matter not more than 1 per cent, Appendix 2.2.2.
- Total Ash Not more than 12 per cent, Appendix 2.2.3.
- Acid-insoluble ash not more than 1 per cent, Appendix 2.2.4.
- Alcohol-soluble extractive not less than 3 per cent, Appendix 2.2.6.
- Water-soluble extractive not less than 2 per cent, Appendix 2.2.7.

TLC
Thin layer chromatography of the alcoholic extract on silica gel ‘G’ plate (0.2 mm thick) using chloroform : methanol (95:5) as mobile phase shows on spraying with methanolic: sulphuric acid reagent and on heating the plate for ten minutes at 110°C spots at Rf. 0.24 (Pink), 0.39 (Pinkish orange), 0.48 (Yellow), 0.61 (Pink), 0.71 (Blue).

Chemical Constituents
The major chemical constituents found in this plant are:
- Leaves are used for fodder an analysis of the leaves obtained from Tamil Nadu was as follows (on dry weight basis) ash, 12.82; Ca 2.61; total N 0.93; carbohydrate, 44%. The leaves contain Quercetin and Quercitrin.
• Flowers the benzene fraction of ethanolic extract of flowers of ZX was shown to have E-4-hydroxy cinnamic acid: p-coumaric acid, (E)-4-hydmxy - 3-methoxy cinnamic acid: ferulic acid, 5,7,3',4'-tetra hydroxy-3-O-a-L-rhamnosyl flavone: quercitin, 5,7,3',4'-tetrahydroxy 3-O-P-D-galactosyl flavone: hyperoside, kaempferol 3-O-rutinoside and Rutin which were isolated with the help of column chromatography. The entire chemical constituents were characterized with the use of UV, 1 H NMR, IR and or via the use of authentic samples.[8]
• Bark contains Tannins (7.2%), d-7, 3', 4'-trihydroxyflavan-3, 4-diol and oleanolic acid.[10,11] It also contains Cyclopeptide alkaloids namely Amphibine H, Nummularine- K.[11] Two new 13-membered cyclopeptide alkaloids, xylopyrine-A and xylopyrine-B have been isolated from the bark Zizyphus xylopyra, and their structures established by spectral and chemical evidences.[13]
• Root Bark reported to contain two flavonoids namely Kempferol-4'-methylether and Kempferol[14]
• The bark and wood of ZX was found to contain Betulinic acid (1%), However the wood of this plant does not show appreciable amount of either triterpines or leucoanthocynidins.[14]
• Fruit contains Catechol-type of tannins (8-12%). Fruits were also reported to have Oleanolic acid,[15,16] l-leucocyanidin, 3, 3', 4-tri-O-methyl-ellagic acid.[10,11] The

Flowers

(E) - Paracoumaric acid

(E) - Ferulic acid

Quercetin 3-O-α-L-rhamnopyranoside

Quercetin 3-O-β-D-galactopyranoside

Kaempferol 3-O-β-D-rutinoside

Quercetin 3-O-β-D-rutinoside

Structures of Compounds isolated from Ziziphus Xylopyrus
pulp of the fruit contains reducing sugars, sucrose, citric acid, carotene, vitamin C and tannins.[8]

- Seeds unsaponyifiable matter (0.8%) consists of a Sterol, insoluble mixed fatty acid found to contain Myristic, Linoleic and Oleic acid.[17]
- Stem wood is reported to have triterpenoids, lupeol, betulinic acid and a new triterpenoid designated as isocaneothic acid.[18]

**Non Medicinal uses**

**Propagation of Lac**
ZX is one of the chief hosts for the propagation of Lac. Shellac is prepared from the stick-lac, a resinous substance secreted on the twig of the plant by an insect *Taedaria lacca*. Shellac is the most satisfactory material for the manufacture of photographic records. It is a high-grade insulator and is extensively used in the electrical industry. It is the principal Spirit-Varnish resin yielding a tough film with a smooth finish. Shellac is also used in making sealing wax, drawing inks, some water colors and Nitro Cellulose lacquers, for sizing papers, for stiffening felt hats and in India for various ornamental purposes.[19,20,21]

**Changes isozyme patterns of peroxidase and polyphenol oxidase by VAM fungi**
The efficacy of six Vesicular Arbuscular Mycorrhizae (VAM) species viz. *Acaulospora morrowae* Spain & Schenk, *Gigaspora margarita* Beker & Hall, *Lomus fasciculatum* (Thaxt. Sensu. Gerd.) & Troppe, *G. macrocarpum* Tul. & Tul. *Scutellospora calospora* (Nicol. & Gerd.) Walker and Sanders and *Sclerocytes rubiformis* Gerd. & Thorppe. Collected from the Rizospheres of ZX was evaluated for the enhancement of NR (nitrate reductase), GS (glutamine synthetase), PPO (poly phenol oxidase), PRO (per-oxidase), GDH (glutamine dyhydrogenase) activities and protein, Phenolics and Catectin (poly phenol oxidase), PRO (per-oxidase), GDH (glutamine dyhydrogenase) activities and protein, Phenolics and Catectin contents in this fruit tree. Culturing was done under Glass house conditions and analysis was done 180 days after inoculation. All fungi showed beneficial effects with *Scutellospora calospora* seemed to be best promoting all biological parameters.[22]

**Traditional uses**
This plant is widely used in Turkish folk medicines as a potent Sedative. The leaves (2 1/2) are chewed for 15 days as well as fruit is used in urinary troubles.[23] the roasted seed powder paste is applied over the chest for reliving pain after cough and colds.[24,25] In Ayurveda this plant is used as an Antidote especially against Snake bite and lizard poisoning. The bark is used as an Astringent.

This plant is also used as Dental sticks for teeth cleaning. In various parts of Orissa this plant is used in diarrheoa.[26] The fruit decoction of this plant is used as develop sterility in women for birth control in some parts of Rajasthan, India.[27] Roots of this plant crushed with *Calotropis gigantea* (Linn). R.B. (Jillaedu) stem barks, *Erythroxylum monogynum* Roxb. (Devadaari) and *Pterocarpus marsupium* Roxb. (Yegisha), and 10-12 dry chilies is administered for 2-3 days with one liter of water once daily in asthma by Lambadas or in the eastern Ghats region of Andhra Pradesh by the local tribal inhabitants and herbal practitioners.[28]

**Medicinal uses**

**Antinociceptive, Anticonvulsant and Anti-inflammatory activity**
The ethanolic extract of bark, was administered in graded doses (200-1000 mg/ kg body weight) intraperitoneally (ip) in albino mice of either sex (15-30 g) Antinociceptive activity of ZX was determined by radiant heat rat tail hot wire technique using a Techno analgesiometer. Anticonvulsant activity of ZX was determined against supramaximal electroshock seizure and the Anti-inflammatory activity of ZX was determined against oedema produced by subplantar injection of 1% carrageenin in saline. The results obtained suggest that ZX might possess central nervous system (CNS) depressant activity. The present study suggests that alcoholic extract of the bark of *Zizyphus xylopyrus* possesses antinociceptive, anticonvulsant and anti-inflammatory properties.[29]

**Antidepressant effect**
The antidepressant effect of ZX was examined using two behavioral models, the forced swimming test (FST) in rats and tail suspension test (TST) in rats. Ethanolic extract when administered at an acute dose of 50 mg/kg of body weight (*P < 0.01*) reduced the immobility time by 10 and 15 seconds as compared to the immobility time of control in both the screening models. Similarly Ethyl acetate fraction of ethanolic extract reduced latter by 30 and 35 secs. The aqueous ppt. fraction of ethanolic extract showed the best activity, reducing the immobility time by 50 and 60 secs. in both the tests. These results showed that after standard i.e. Imipramine HCl (30 mg/kg), the ppt. fraction is potent amongst all the studied drugs. The present study clearly demonstrated that *Zizyphus xylopyrus* exerts an antidepressant effect in these two behavioral models. It may be due to presence of various kinds of flavonoids.[30]

**Antibacterial activity**
The bacterial strains E. coli, B. subtilis, P. aeruginosa and S. aureus (multi-drug resistant strain) were used to evaluate the preliminary screening of seeds of ZX water extract, minimum inhibition concentration (MIC) and minimum bacterial concentration (MBC) with streptomycin and tetracycline used as reference antibiotics. Finally it was concluded that the later extract of ZX does not possess any antibacterial activity against all of the tested bacterial strains *in vitro.*[31]
Apart from that many of the Zizyphus species have shown to possess numerous pharmacological action and ZX is one amongst them.

Zizyphus xylopyrus (Retz.) Willd is one of the rare medicinal herbs which are yet to prove its medicinal efficacy. But to be medicinally effective it has to undergo various scientific approaches and every phytochemical and pharmacological concern has to be revealed. The present work on this plant is an effort to investigate all the aspects which can give light on the medicinal aspects of later. Though not much work has been done on this plant but we have tried to investigate every possible literature available on this plant. The above work depicts that if this plant is seriously studied scientifically it can prove to be a wonder herb for various ailments existing.

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