

Pharmacognostical study on fruit of *Ziziphus xylopyrus* (Retz.) Willd

Singhal U*, Goyal A, Solanki N S, Jain V K, Goyal P K
B.N. Institute of Pharmaceutical Sciences, Udaipur (Rajasthan)-313 001

Abstract

Ziziphus xylopyrus (Retz.) willd known as katber is used traditionally in the treatment of various diseases like Bronchial Asthma, Thirst, Diarrhoea and as Aphrodisiac, Antimicrobial, Antiinflammatory Antinoceptive and as Anticonvulsants. Present Paper deals with Pharmacognostic study of fruit part of *Ziziphus xylopyrus* (Retz.) willd., for its identification and to distinguish it from the coexisting weeds and adulterants. The Section of fruit has thick pericarp, hard and thick seeds and sclerotic seed coat. The seeds are endospermous. Powdered sample of drug showed large pieces of pericarp and individual sclereids. Calcium oxalate crystals are Present in the cells of fruit wall. Epidermal Trichomes of powdered sample are unicellular, unbranched and thick walled and curved or twisted. The study includes Macroscopic, Microscopic characters, Physico-chemical characters and phytochemical investigation of fruit parts of *Ziziphus xylopyrus* (Retz.) willd.

Key words:

Ziziphus xylopyrus, Macroscopic characters, Microscopic characters, Physico-chemical characters, Phytochemical investigation.

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INTRODUCTION:

Herbal medicines are practised world-wide and is now recognized by WHO as an essential building-block for primary healthcare⁽¹⁾. *Ziziphus xylopyrus* (Retz.) willd (Family: Rhamnaceae) is distributed in North Western India, Uttar Pradesh, Bihar and Central South India. In Hindi it is known as katber, in Tamil -kottei, and in Telugu- Gotte. This Plant is a

*Corresponding author, Mailing address:
Singhal U
Email: singhal_pharma@yahoo.co.in

large shrub or small tree, having spines and about four meter in height⁽²⁾. Root bark and fruit of this plant, traditionally used to treat Bronchial Asthma, Thirst, Diarrhoea and as Aphrodisiac. Fruit and bark is used as Antimicrobial. Bark is used as an Anti-inflammatory, Antinoceptive and as Anticonvulsants⁽³⁾. Present study on pharmacognostic characters of this plant would provide an account on correct identification.

MATERIAL AND METHOD:

The fruits of *Ziziphus xylopyrus (Retz.)* willd were collected from Orakadam forest near Chennai (Tamilnadu) during the Month of July 2007. Its identification was established by Prof. P.Jayaraman, Director, plant anatomy research centre, Pharmacognosy institute, Chennai, where a voucher specimen was kept for further references (voucher number of specimen: PARC/2007/104). The fruit parts were washed with water and dried in sunlight for one hour and then shade dried. For powder analysis some fruit part pieces were powdered by means of a wood-grinder and this powder passed through the sieve no. 60. The coarse fraction of powder, subjected for phytochemical studies. Anatomical studies were carried out as per standard method⁽⁴⁾. For anatomical studies Care was taken to select healthy plants and for normal organs. The required samples were cut and fixed in FAA (Formalin – 5ml + acetic acid – 5ml + 70% Ethyl alcohol – 90ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary-Butyl alcohol⁽⁵⁾. Infiltration of the specimens was carried by gradual addition of paraffin wax (melting point 58-60 C) until TBA solution attained super saturation. The specimens were cast into paraffin blocks. The paraffin embedded specimens were sectioned with the help of Rotary Microtone. The thickness of the section was 10-12 µm. Dewaxing of the section was by customary procedure. The sections were stained with Toluidine blue⁽⁶⁾. Sections were also stained with

safranin and Fast-green and KI (for Starch). For powder Microscopy Powdered materials of Fruit parts were cleared with NaOH and mounted in glycerin medium after staining. Different cell component were studied and measured. Photographs of different magnifications were taken with Nikon Labphot 2 Microscopic Unit. For normal observations bright field was used. For the study of crystals, starch grains and lignified cells, polarized light was employed. Magnifications of the figures indicated by scale-bars. Descriptive terms of the anatomical features are as given in the standard anatomy books⁽⁷⁾ Physicochemical characters were determined as per standard method^(8,9) Powdered plant material was successively extracted with ethanol and water in a soxhlets apparatus and was subjected to qualitative preliminary phytochemical investigation of various plant constituents^(10,11,12).

RESULT AND DISCUSSION:

Morphological/Macroscopic Characters

Ziziphus xylopyrus (Retz.) willd is a large straggling shrub or small tree, armed with spines and up to four meter in height. Its fruits are globose, 3, rarely 2 or 4-celled, with usually a seed in each cell. Fruits are greenish gray in colour with characteristic odour. These are very hard and woody and covered with short grayish tomentum (Fig.1).

Microscopic Characters

The fruits has thick pericarp and hard and thick seeds with sclerotic seed coat. The seeds are free from the pericarp and they are endospermous (Fig.2,3).

Pericarp (Fig.4)

The pericarp is 1.9mm thick, It consist of outer most layer of narrow, thick walled epidermis. Following the epidermis there is a wide mucilaginous epicarp which is 1.3mm wide. The epicarp has small, compact, and different shaped parenchymatous ground tissue cells, and tangentially stretched irregular, mucilage filled cavities. The cells of the

epicarp have tannin content, especially those lying along the inner border of the epicarp. Mesocarp is the middle zone of the pericarp. It is also wide, homogenous and parenchymatous. The cells are lobed and thin walled. The mesocarp cells do not contain any specific inclusions. Endocarp is the innermost part of the fruit wall. It is 70 μ m diameter. It comprises of small, squarish, compact, thin walled cells.

Seed coat (Fig.5)

The seed coat is 120 μ m thick. It has a thin epidermal layer of squarish cells and inner layer of similar cells. In between the two epidermal layers, there are vertically elongated, narrow palisade cells. These cells are thin walled and loosely arranged.

Adjacent and inner to the seed coat is the endosperm tissue. The outer zone of endosperm has darkly staining, fairly thick walled, less compact parenchyma cells. The inner endosperm tissue has soft, lightly staining thin walled parenchyma cells which are mostly disintegrated. The inner endosperm cells are again darkly staining, Vascular traces are running in the median part of the seed.

Powder Microscopy

Large pieces of pericarp and individual sclereids are present in the powdered sample of fruit. The calcium oxalate crystals of druses or sphaerocrystals are abundant in the cells of the fruit wall (Fig.6,7). The druses are scattered in the tissue and are randomly distributed. These are up to 30 μ m wide. The sclereids in powder are of two types, Some are square shaped, circular or ovate in shape, Some other sclereids are highly lobed with various forms (Fig.8.1,8.2). The sclereids have wide lumen thick wall and circular, equal like pits (Fig.8.3). The isodiametric sclereids are 100 μ m in diameter. The lobed ones are 30 μ m wide and their lobes are 50 μ m long.

Epidermal Trichomes (Fig.8.1,8.2,8.3)

The powder also contains epidermal trichomes of the fruit. The trichomes are unicellular,

unbranched and thick walled. They are usually curved or twisted. It is gradually tapering towards the tip into a pointed end. The cell walls are lignified. The cell lumen is narrow. The trichomes are dead cells of covering type. The trichomes are 100-400 μ m in length and 10 μ m thick.

Physicochemical/Phytochemical Studies

Physicochemical values of fruit powder are presented in Table-1. Preliminary phytochemical studies were done as per standard methods and results are presented in Table-2. Carbohydrates, glycosides, tannins, and terpenoids reported in both aqueous and ethanolic extracts, Whereas flavonoids, alkaloids and steroid were present only in ethanolic extract, gums, glycosides and saponins are reported only in aqueous extracts.

CONCLUSIONS:

The pharmacognostic characters and phytochemical values reported in this paper could be used as the diagnostic tool for the standardization of this medicinal plant. Adulterants if any can be easily identified using these parameters. The microscopic feature could help in laying down micromorphological standards as per WHO guidelines for authentication of the drug.

Table 1: Physico-chemical parameters of powdered *ziziphus xylopyrus (retz.)* Willd. fruit

Sl. No.	Parameters	Values
1	Ash values	
	(a) Total Ash	14.2% w/w
	(b) Acid Insoluble Ash	0.52% w/w
	(c) Sulphated ash value	1.16% w/w
2	Extractive Values	
	(a) Alcohol Soluble Extractive	11.20% w/w
	(b) Water soluble Extractive	11.38% w/w
3	Loss on Drying	11.21% w/w
4	Foaming index	<100

Table 2: Qualitative phytochemical analysis of ethanolic and aqueous extracts of *ziziphus xylopyrus (retz.) willd.*

Plant constituents	Ethanolic extract	Aqueous extract
Alkaloids	+	-
Saponins	-	+
Glycosides	+	+
Carbohydrates	++	++
Tannins	++	+++
Flavonoids	+	-
Steroids	+	-
Proteins	-	-
Gum	-	+
Terpene	++	+++
Starch	-	-
Volatile Oil	-	-

(+) : Present (-) : Absent

Figure 1: Exomorphic feature of fruit of *Ziziphus xylopyrus (retz.) willd*



T.S of Fruit, showing pericarp and seed

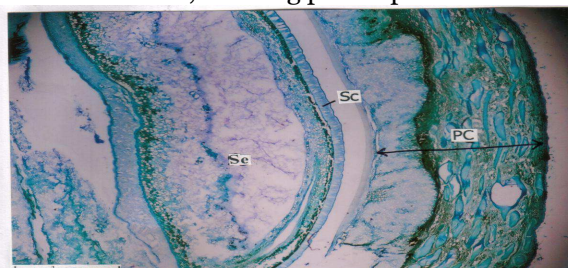


Figure 2: PC – Pericarp, Sc – Sclerotic outer feed coat, se-seed

A sector of the pericarp and seed coat

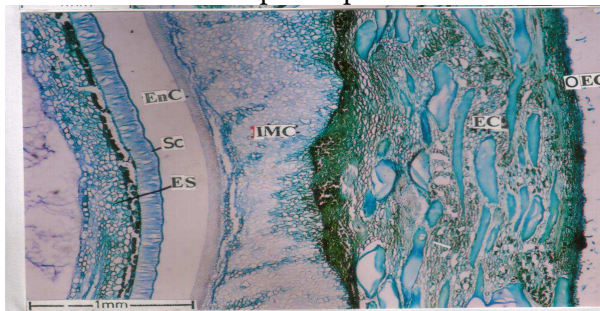


Figure 3: ENC – Endocarp, ES- Endosperm of the seed, EPC-Epicarp(inner portion), OEC – Outer endocarp, MC-Mesocarp

T. S. of Pericarp

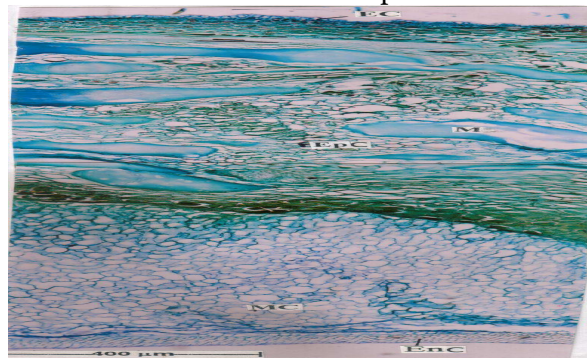


Figure 4: EC-Epicarp-outer layer, ENC- Endocarp, EPC-Epicarp with Mucilage Masses, MC- Meso Carp, M- Mucilage

T S of seed coat (Testa) enlarged



Figure 5 EP-Epidermal layer of the seed coat, ES- Endosperm tissue in the outer and inner portions ,PC- Palisade layer of the seed coat VT- Vascular traces of the seed.

Powder Microscopy



Figure 6: Outer pericarp, Linear pericarp (Cr-crystal)

Sclerids in the powder

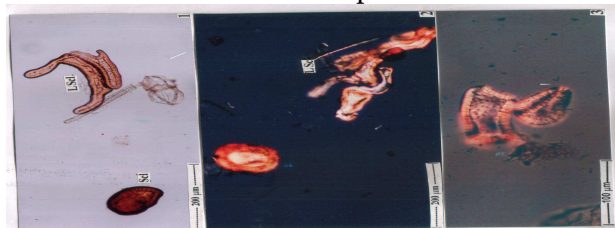


Figure 7 1. Circular and lobed scleroids
2. Rectangular and twisted scleroids
3. Ovate and rectangular scleroids (LSC-Lobed scleroids; Sel-scleroids.-Circular type)

Epidermal trichomes of the fruit

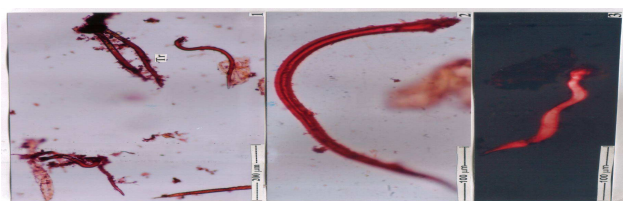


Figure 8: 1. straight and twisted trichomes
2. Arc-Shaped trichomes
3. Undulate trichome (Tr. Trichome)

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