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COMPARATIVE PHARMACOGNOSTICAL STUDY ON PLAKSHA: BARK AND LEAF OF FICUS AMPLISSIMA SM. AND F. VIRENS AIT.

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ABSTRACT

In the present investigation a comparative pharmacognostic study of *Ficus amplissima* and *F. virens* has been carried out, which will enable to distinguish the two species from one another.

INTRODUCTION

Various authors of Ayurvedic texts (Dutt, 1922, Dýmock et al, (Reprinted) 1976; Nadkarni, 1954; Roberts, 1931; Sharma, 1956; Aiyer et al, 1957; Aiyer and Kolammal, 1960; Singh and Chunekar, 1972; Playfair, 1833; Bhandari, 1949, Watt, 1908) have used the Sanskrit name Plaksha for different species of Ficus (Family: Moraceae), viz., F. amplissima Sm. (syn. F. tsiela Roxh,); F. virens Ait. (syn. F. lacor Buch.-Ham.; F. infectoria Roxb.); F. talbotii King, F. arnottiana Miq., F. rumphii Blume and F. retusa Linn. The drug is known in the various regions of the country as 'Pakaria' 'Pakur', 'Pilkhan', 'Pipri', Pepre', Jari', 'Jangli Piple'. In greater parts of India Ficus virens Ait. is considered as In Madhya Pradesh and South 'Plaksha' India, F. amplissima Sm. and F. talbottii King both are known as Plaksha but in Sri Lanka it is only F. amplissima which is regarded as Plaksha (Roberts, 1931).

As the different species of *Ficus* are used as 'Plaksha' in different parts of the country, a detailed pharmacognosy of the stem bark and leaves of these have been undertaken. Pharmacognostical studies on the stem bark and leaves of *F. amplissima* and *F. virens* have already been made by Mitra & Kapoor (1974), Mitra et al. (1978), Mitra & Mehrotra a & b (1980) respectively. The present communication deals with a comparative pharmacognosy of the barks and leaves of the two very commonly used species of Ficus viz. F. amplissima and F. virens exhibiting in particular the diagnostic features. These characteristics will enable to distinguish them exo- and endomorphically as well as in powder form.

The voucher specimens collected at Lucknow are lodged in the herbarium of the National Botanical Research Institute, Lucknow under the following numbers F. *amplissima* Sm. (U. C. Srivastava, CCRIMH, 1588) and F. virens Ait. (U. C. Srivastava, CCRIMH, 1589).

COMMON CHARACTERS OF THE BARK AND LEAF OF FICUS AMPLISSIMA SM. AND FICUS VIRENS AIT.

Bark: Bark of both the species occurs in thick, slightly curved pieces. Outer surface is rough due to the presence of numerous lenticels, transverse and longitudinal cracks and striations. Microscopically both show a wide zone of cork, phelloderm and rhytidoma. Secondary phloem occupies $\frac{1}{3}$ rd of the bark and consists mostly of stratified layers of ceratenchyma, groups of phloem fibres, parenchyma and laticiferous cells traversed by medullary rays. The parenchyma cells are filled with reddish brown

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Plate I. Figs. 1-12: Microscopical characters of the barks of Ficus amplissima and Ficus virens. 1. Diagrammatic representation of the transverse section of the stem of Ficus amplissima. 2. Diagrammatic Diagrammatic representation of the transverse section of the stem of Ficus amplissima. 2. Diagrammatic representation of the transverse section of the stem of Ficus virens. 3. Diagrammatic representation of the transverse section of the part of the mature bark of Ficus amplissima. 4. Diagrammatic representation of transverse section of the part of the mature bark of F. virens. 5. Transverse section of the part of the stem of F. virens. 5. Transverse section of the part of the stem of F. virens showing details. 6. Transverse section of the part of the part of the part of the part of the stem of f. virens showing details. 7. Transverse section of stem of F. amplissima showing a portion of pericycle. 9. Transverse longitudinal section of the bark of F. amplissima showing a part of the medullary ray. 10. Transverse longitudinal section of the bark of F. virens showing a part of the medullary ray. 11. Isolated stone cells of F. amplissima. 12. Isolated stone cells of F. amplissima. CG=Cell Content. CER=Ceratenchyma. CH=Chlorenchyma. CK=Cork. CR=Crystal. CU=Cuticle. EPI=Epidermis. FIB=Fibre. LG=Laticiferous cell. MR=Medullary ray. PAR=Parenchyma. PER= Pericycle. PH=Phloem. PHD=Phelloderm. PI=Pith. RH=Rhytido. SCL=Sclerenchyma. STC=Stone cells. TR=Trichome. XY=Xylem.

contents, tannins and starch grains. Peg petiolate, 3-nerved, ovate, acuminate, base like trichomes, stone cells and prismatic crystals of calcium oxalate are also present. Odour of the powdered bark of both the species is pleasant and there is no characteristic taste.

Leaf: The leaves of both are alternate,

narrow, rounded or cordate. Microscopically leaves represent a dorsiventral structure, palisade being present on the upper surface. Cystoliths, rubiaceous stomata and glands are present. Medullary bundles are present in the midrib as well as in the petiole. Vas-

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	F. amplissima	F. virens
Bark : External surface	Greenish-white.	Greenish grey or black.
Internal surface	Reddish brown.	Creamish yellow or light buff colour.
Mature bark	Thick, hard and lenticels, appear as small blackish or brownish slightly warty dots irregularly scattered over the surface.	
Fracture	Short,	Hard and fibrous.
Leaf : Petiole	2-5.0 cm long.	2.5-8 cm long.
Lamina	7.5-10.4 cm long and 3-5.7 cm broad; broadly ovate or elliptic, lanceolate, margin, thick cartilaginous minute raised dots present on the upper surface.	6.5-15 cm long and 3.2-7.2 cm broad ovate or ovate-oblong, base, acute, rounded or cordate ; margin thin, no dots present.
Venation	Intermediate nerves very few, slender.	Intermediate nerves prominent, lateral nerves raised.
Texture	Thickly coriaceous, slightly leathery.	Thinly coriaceous, membraneous.

TABLE I : MACROSCOPICAL CHARACTERS

TABLE II : MICROSCOPICAL CHARACTERS OF STEM, STEM BARK (Plate I, Figs. 1-12)

	F. amplissima	F. virens
Stem : Epidermis	Sclerosed.	Not sclerosed.
Trichomes	Mostly unicellular.	Uni- to bicellular.
Cortex	Consists of 2-3 layers of chlorenchyma and 5-6 layers of parenchyma.	Consists of 2-3 layers of thin-walled paren- chyma and a few layers of sclerenchyma and 7-8 layers of thin-walled parenchyma. Chlorenchyma absent.
Pericycle	Composed of discontinuous band of fibres and parenchyma. Prismatic crystals are present in this region.	Composed of sclerenchymatous fibres. Both rosette and prismatic crystals are present in this region.
Bark : Cork	Outer layer considerably thick with a narrow lumen in centre of the cell.	Outer layer is not thickened.
Phelloderm	Thick-walled, consists of chlorenchyma and stone cells.	Consists of stone cells and parenchyma. Chlorenchyma absent.
Secondary Phloem	Composed of ceratenchyma, alternating with thin-walled parenchyma and stone cells.	Composed of ceratenchyma alternating with thin-walled parenchyma and fibres. Stone cells are absent.
Medullary rays	Ray cells are composed of thin-walled paren- chyma and stone cells.	Ray cells are composed of thin-walled parenchyma and sclerenchymatous firbes.
Gell centents	Brownish contents, tannins and prismatic crystals of calcium oxalate are relatively less.	Reddish brown contents, tannins, prismatic and rosette crystals of calcium oxalate are abundantly present
Isolated sone cells	Elongated as well as circular.	Mostly circular but elongated also.

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	F. amplissima	F. virens	
Petiole :			
Hypodermis	Tangentially elongated, thick-walled.	Large, thin-walled and squars.	
Vascular bundles	9-14 bundles are present.	6-10 bundles are present.	
Cell contents	Brownish contents are sparsely distributed in the cortical region.	Reddish brown contents are abundantly present in the cortical region.	
Mid Rib ;			
Cortex Consists of thin-walled parenchyma.		Consists of sclerenchyma.	
Pericycle	Thin-walled, cell contents are less.	Thick-walled, cell contents are more.	
Lamina :			
Epidermis	Tangentially elongated.	Vertically elongated.	
Hypodermis	Present.	Absent.	
Palisade cells	Smaller and two layered.	Longer and two to three layered.	
Mesophyll	Well developed	Reduced.	
Glánds	Abundantly present, large, each being surrounded by 6-10 cells, 10-63 μ in diameter.	Abundantly present, small, each being surrounded by 10-14 cells, 38-45 μ in diameter.	
Stomata	Mostly Rubiaceous, epidermal cells are larger.	Rubiaceous and Ranunculaceous type, epi- dermal cells are smaller.	
Venation	Vein islets are less in number.	Vein islets are more in number.	
Cystolith	Present on the upper surface, 48-80 μ in dia meter.	- Present on the lower surface, 38-50 μ in diameter.	
Margin	Gollenchymatous.	Sclerenchymatous.	

TABLE III : MICROSCOPICAL CHARACTERS OF THE LEAF (Plate II, Figs. 1-18)

cular bundles are capped by sclerenchymatous fibres. Prismatic crystals of calcium oxalate and tannins are present and the cells are filled with yellowish or reddish brown contents. The powders have no characteristic odour.

Study of powder (Plate III, Figs. 1-4): Microscopically the leaf powder of both the species shows the presence of epidermal cells, stomata, glands, palisade cells, fragments of fibres, vessels and parenchyma. In addition to these prismatic crystals of calcium oxalate are also observed.

In bark powder fibres, parenchymatous cells, laticiferous vessels, stone cells, fragments of cork cells and prismatic crystals of calcium oxalate are present.

Pharmacognostic Features of the Barks and Leaves: The characteristic features by which the two species can be easily distinguished are present in tabular form (Table I to X).

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PLATE II: Figs. 1-18: Microscopical characters of the leaf of Ficus amplissima and Ficus virens. 1. Diagrammatic representation of the transverse section of the petiole of F. amplissima. 2. Diagrammatic representation of the transverse section of the petiole of F. virens. 3. Transverse section of the petiole of F. amplissima showing details of the portion. 4. Transverse section of the petiole of F. virens showing details of the portion. 5. Diagrammatic representation of the transverse section of the leaf of F. amplissima. 6. Diagrammatic representation of the transverse section of the leaf of F. virens. 7. Transverse section of the leaf of F. amplissima showing cystolith. 8. Transverse section of the leaf of F. virens showing cystolith. 9. Transverse section of the leaf of F. amplissima showing part of the lamina. 10. Transverse section of the leaf of F. virens showing part of the lamina. 11. Gland of F. amplissima in surface view. 12. Gland of F. virens in surface view. 13. Stomata and epidermal cells of F. amplissima in surface view. 14. Stomata and epidermal cells of F. amplissima in surface view. 15. Venation pattern of F. amplissima in surface view. 16. Venation pattern of F. virens in surface view. 17. Transverse section of the leaf of F. vinens passing through margin. 18. Transverse section of the leaf of F. vinens passing through margin.

GG=-Cell	content. COL=Collenchyma.	CR=Crystal.	CU=Cuticle.	CY=Cystolith.	EPI=Epidermis.	HP=Hy-
podermis.	LG=Laticiferous cell. LEI	PI=Lower epid	lermis. PAL=	Palisade tissue.	PAR == Parenchyma	. SCL=
•	Sclerenchyma.	UEPI=Uppe	er epidermis.	VB=Vascular bu	undle.	

TABLE IV : CHARACTERS OF THE POWDER

TABLE V : MICROSCOPICAL CHARACTERS OF THE POWDER (Plate III, Figs. 1-4)

	F. amplissima	F. virens		F. amplissima	F. virens
Leaf : Golour	Greyish green in colour.	Brownish green in colour.	Leaf : Epidermal cells	Large.	Small.
Taste	Slightly pungent.	Not characteristic.	Stone cells	Observed.	Not observed.
Bark : Colour	Chocolate brown.	Reddish brown.	Crystals of Calcium	Prismatic and rosette.	Prismatic

Contd.		
Bark :		
Cork cells	Thick-walled.	Thin-walled.
Stone cells	Elongated and circular.	Only elongated observed.
Crystals of Calcium oxalate	Prismatic.	Prismatic and Rosette.



PLATE III : Figs. 1-2 : Microscopical details of the powder. 1. Leaf powder of F. amplissima. 2. Leaf powder of F. virens.

A. Stomata with epidermal cells. B. Palisade cells. C. Spiral vessels. D. Gland. E and E₁ Epidermal cells. F. Stone cell. G, H. Portion of fibre. I. Prismatic crystal of Calcium oxalate.

Figs. 3-4: Microscopical details of the powder. 1. Bark powder of F. amplissim: 2. Bark powder of F. virens. A. Vessel. B. Parenchymatous cells with brown contents. C, G₁. Prismatic crystal of Calcium oxalate; D, E, E₁. Cork cells. F, F₁. Fibre. G. Cell content. H, I, J, K. Stone cells. J. Parence of Colorism ovelate J, K. Stone cells. L. Rosette crystal of Calcium oxalate,

TABLE VI : BEHAVIOUR ON TREATMENT WITH DIFFERENT CHEMICAL REACENTS

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	F. amplissima		F. virens	
Treatment	Bark	Leaf	Bark	Leaf
With Iodine	Black.	Reddish brown.	Brown.	Yellowish black.
With Conc. HCl	Brown.	Brown.	Buff.	Yellowish green.
With antimony trichloride		Grey.		Olive green.
With H ₂ SO ₄	Black.	Light brown.	Brown.	Blackish yellow.

TABLE VII : FLUORESCENCE CHARACTERS OF THE LEAF

F. amplissima			F. virens		
Powder 1NNaOH green flu	treated I in water orescence	with gives light	Powder NaOH fluores tinge	treated in water g cence with	with 1N- gives black greenish

TABLE VIII : QUANTITATIVE STUDY OF THE LEAF

	F. amplissima	F. virens
Palisade ratio	26.15	20.00
Stomatal index	7.858	15.79
Vein islet numbers	3.33	7.0
Vein termination number	2.55	7.0

TABLE IX : PHYSICAL CONSTANT VALUES OF THE BARKS AND LEAVES

	F. amplissima		F. virens	
	Bark	Leaf	Bark	Leaf
Total ash	8.486	11.942	14.16	16.26
Acid insolutle ash	0.049	1.427	1.29	3.55
Alcohol soluble extractive	19.533	7.1	19.6	9.06
Water soluble extractive	18.066	17.5	12.0	13.0

FABLE X :	PRI	ELIMI	INARY I	PHYTC	DCHEMICAL
TESTS	OF	THE	BARKS	AND	LEAVES

	F. amplissima		F. vi	irens
	Bark	Leaf	Bark	Leaf
Chloroform extract	Dark brown.		Brownish yellow.	
Water extract	Steroids present.		Steroids absent.	_
Alcohol extract	Reducing sugar absent.	Steroids present.	Reducing sugar present.	Steroids absent.

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