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Original Article

Standardization and preliminary phytochemical screening of *Ficus Palmata Forssk* stem barks

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ABSTRACT

Ficus palmate Forssk is a herbaceous perennial plant belonging to the family Moraceae. Even though this plant has gained scientific importance recently, there is a need for the pharmacognostic standardization. Hence, in the present work the stem bark was subjected to various microscopical and physical evaluations. In the microscopical studies, the different cell structures and arrangements were studied and in physical evaluation the ash values and extractive values were studied. The various pharmacognostical constants were obtained which could help in the development of a suitable monograph for the plant.

Key Words: *Ficus palmate Forssk,* fluorescence analysis. Physiochemical parameters, Phytochemical screening.

INTRODUCTION

Ficus palmata Forssk, syn *Ficus pseudosycomorus* Decne, (Moraceae) is commonly known as Anjiri, Bedu, Khemri (Hindi) or Pepri (Gujrati) or Manjimedi (Telegu) or Phagwara (Punjab). It is a bush or a moderate sized tree, sometimes deeply 3- or 5- lobed; fruits 1/2-1 inch in diameter, auxiliary, pedunculate, sub-globose or periform, usually tormentose which become yellow or purple when ripe. The tree is found in Central and North West India and the outer Himalayas from Nepal westwards to Afghanistan, Egypt and Abyssinia. It occurs in Kumaon upto 6,000ft and is common in open places, especially along the banks of rivers and streams. It is also found on the hills of Mewar and Orrisa. It is frequently cultivated in hills for its fruits as a source of fodder.

The fruits of this species resemble those of F. *carica*. The plant is regarded as the Indian form or the eastern representative of F. *carica* and some of the figs grown and marketed in Punjab evidently belongs to this species. The fruits from plants cultivated in the plains. The plant has been tried as a stock for *F .carica* and has been found to induce vigour in the scion. The fruits ripen from May to October. In parts of Mysore, yields up-to 360 fruits per tree have been recorded. The fruits are edible, though the flavour is strong and disagreeable. This species is valued in USA for its earliness and for its possible use in hybridization.

The leaves are lopped for fodder in Punjab and U.P. The tree yields latex containing: moisture 42.88%, total solids 57.12%, alcoholic extract 45.09 and chloroform extract 2.30 (light brown in colour), and residue 9.73%. Analysis of the leaves gave crude protein 13.9, crude fiber 11.2, ash 17.5, calcium 3850 and phosphorus 464mg/100g.
The wood (wt: 39lb/cu .ft) is white and is moderately hard. It is said to be useful for building purposes. The fruits are demulcent and laxative. They are used in the diseases of the lungs and bladder. The ripe fruits are eaten for hypertension. The latex is applied on pimples. Aqueous extract of fresh leaves and litter showed strong allopathic potential (phototoxicity) against some crop plants.[1]

Distribution: It is found in Nepal, India, Pakistan, Afghanistan, Iran, Arabian Peninsula, Somalia, Sudan, Ethiopia and S. Egypt. It is a highly variable and commonly occurring in Hills up to 2500 m on hot dry slopes in clay-loam soils in Baluchistan, Punjab and North Western Frontier Province and Kashmir. The type of subspecies from E. Africa and Saudi Arabia has more elongate, distinctly acute or acuminate leaves with slight pubescence. [2]

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Chemical Composition of the Fruit: The fruits are juicy, containing 45.2 per cent extractable juice and 80.5 per cent moisture. The total content of soluble solids of the juice is 12.1 per cent. The fruit-juice contains acidity to the extent of 0.71 per cent; total sugars, 5.98 per cent. Most of the sugars are in the form of reducing sugars. The pectin content of the fruit is 0.20 per cent. The fruits are, however, not rich source of vitamin C and contain only 3.35 mg of vitamin C per 100 g of pulp.

The protein content of the fruit is 1.72 per cent, and the ash content is 0.924 per cent. Some of the mineral elements, viz. phosphorus, potassium, calcium, magnesium and iron, were found to the fruits contain chiefly sugars and mucilage.[3]

Uses

Edible uses The fruit is widely eaten, whole fruit with seeds. It has a sweet taste and is juicy. It tastes slightly astringent due to the presence of latex below the epicarp. The astringency of the fruit can be removed by soaking the fruits in water for 10-15 minutes. The unripe fruits and young growth are cooked and eaten as a vegetable, rich in carbohydrates. They are especially beneficial to such areas where there is a limited availability and variety of marketed fruits. Young leaves are also cooked as food. Wood is used as fuel[4] and leaves as fodder. The half ripe fruits and the sap are said to be poisonous.[5]

Medicinal uses The fruit is demulcent, emollient, laxative[6] and poultice. It is used as a part of the diet in the treatment of constipation and diseases of the lungs[7] and bladder, decoction of leaves are also used; sometimes seeds are also used. The sap is used in the treatment of warts.

MATERIALS AND METHODS

Chemicals and reagents: All the solvents, chemical and reagents are of analytical grade and supplied by High media, New Delhi.

Collection and Authentication: In the present study, the stem barks of *Ficus palmata* were collected from local area of Garhwal, were authenticated by Botanical Survey of India, Dehradun and voucher specimens was deposited at the Department of Pharmacy, Guru Ram Das Institute of Management and Technology, Dehradun for future reference.

Physicochemical Examination: Physicochemical values such as percentage of ash values and extractive values and loss on drying were performed according to the official methods [8-9] Fluorescence characteristics of the powder of drug was examined under ultra-violet light according to the methods suggested by Kokoski et al.[10] Behavior of the powder of drug with different reagents observed under ordinary light and UV-radiation according to the methods suggested by Chase, C.R. et al.[11]

Determination of macroscopic characteristics: Soon after authentication, the stem bark was dried at room temperature, until they were free from moisture and subjected to physical evaluation with different parameters. The parameters used for evaluation were nature, colour, odour, taste, size, shape, width and length. Finally all the parts were subjected to size reduction to get coarse powder and then passed through sieve no. 40 to get uniform powder. Then the uniform powder was subjected to standardization with different parameters as per Indian Pharmacopoeias/literatures.

Determination of microscopic characteristics: Microscopic evaluation of the selected plant species was done as a whole (bark) as well as in the powder form (Khandelwal, 1988).[12]

Method for powder study: The crude drug powder was cleared with chloral hydrate solution, stained with phloroglucinol and HCl staining reagent and mounted with glycerine.

Preliminary Phytochemical Screening: Preliminary phytochemical screening was carried out by using standard procedures described by Kokate [13] and Harborne. [14]

RESULT

In the present work, *Ficus palmata* was selected on the basis of literature survey and traditional uses from the local area of Chamoli (Garhwal). It was observed that the plant was extensively used in the treatment of variety of diseases.

Physicochemical Examination

Determination of macroscopic characteristics: All the extracts were subjected for preliminary organoleptic and phytochemical investigations. Results of organoleptic observations of *Ficus palmata* stem barks are presented in Table 1 followed by microscopical examination. Ash values, extractive values, loss on drying and fluorescence analysis of the leaves of stem bark of *Ficus palmata* were carried out; the results obtained were comparable and satisfied standard literature values collected. The results obtained are mentioned in Table 2. Hot extraction of the *Ficus palmata* stem barks was carried out successively with petroleum ether, ethyl acetate, methanol and water.

Determination of microscopic characteristics:
Bark of *ficus palmata* was reddish brown, mild aromatic odour, bitter taste. Ficus palmate stem bark around 2.5 ± 1 cm size cut bark materials were used for this pharmacognostic study (Fig 1).
Latex Tree yields a latex containing moisture about 42.88, total solids about 57.12. Applied to the extract spines ledged deeply in the flesh.
Leaves are alternate, broad, ovate, membranous, 12.92 cm long, 14.16 cm broad, having reticulate pinnate venation and dentate margin; dark green and rough on the upper surface, light green
Flowers are unisexual, cyclic, greenish white, very small; the fleshy receptacle forms a hollow cavity, with an apical opening, guarded by scales, and the flowers are borne on the inner walls of the cavity; both the male and female flowers are present within the same receptacle.
Fruits are ripening from May to October. Fruits are edible, though the flavor is strong and disagreeable. Fruits medicinally for digestive disorders useful plant of agroforestory. Fruit, syconoid, developing from the hollow, globose, fleshy receptacle, average diameter 2.58 cm, weight, 6.08 g, volume, 5.94 ml, colour varying from deep violet to black; colour of the juice, tyran rose 24.Seeds, numerous, round and very small. Fruits of this species resembles to those of *F.carica* (fig 2).

Microscopical Characteristics: The transverse section of *Ficus palmata* stem bark showed modularly rays, radially flattened Narrow cork cambium. Stone cells were arranged tangentially in a continuous manner interrupted by patches of scleroids, pericyclic fibers. Secondary phloem consists of phloem parenchyma, Secondary phloem consists of sieve tubes, companion cells, phloem parenchyma and fibers traversed by funnel shaped modularly rays. Phloem fibers arranged in radial rows throughout phloem region. Prismatic and rhomboidal crystals or calcium oxalate abundantly found in phloem and secondary cortex regions, very rarely found in cork cells, cluster crystals also present in secondary cortex and secondary phloem, crystal fibers also found in secondary phloem.

Powder Microscopy of Ficus palmata leaves: It is a light yellowish brown powder with distinct odour or taste. The important diagnostic features of the powder include parts of epidermis in surface view showing straight walled epidermal cells and, calcium oxalate cluster and prisms, starch grains and numerous dagger-shaped, warty, unicellular covering trichomes (Fig 3-7).

Determination of proximate parameters: In order to identify the chemical composition of various extracts preliminary qualitative analysis was carried out. These results are summarized in Table.3. It was observed that extracts of *Ficus palmata* stem bark showed the presence of steroidal glycosides, flavonoids, alkaloids and proteins. The extracts of *Ficus palmata* leaves showed the presence of steroidal glycosides, flavonoids, alkaloids and proteins. The percentage yield obtained for each solvent is tabulated in table 2. The highest yield was obtained from aqueous solvent and lowest yield was obtained from petroleum ether (Table 3).

DISCUSSION

In the present study Ficus palmate stem barks were collected from the local area of Chamoli, Garhwal. The plant of *Ficus palmata* was authentified from Botanical Survey of India, Dehradun and voucher specimens were preserved at GRD (PG) IMT, Dehradun. Soon after authentication the plants were dried at room temperature, until they were free from the moisture and subjected to physical evaluation with different parameters. The organoleptic parameters like shape, size, colour, odour and taste were studied.

All the parts were subjected to size reduction to get coarse powder and then passed through sieve no. 40 to get uniform powder. Then the uniform powder was subjected to standardization with different parameters as per Indian Pharmacopoeias. Phytochemical investigation revealed the presence of different chemical constituents like steroids, saponins, alkaloids, proteins, sugars, flavonoids, tannins, phenols, amino acids and steroidal glycosides in different plant extracts.

CONCLUSION

As there is no pharmacognostic / anatomical work record of this much valued traditional drug, the present work was taken up with a view to lay down standards which could be useful to detect the authenticity of this medicinally useful plant. In other words, the pharmacognostic features examined in the present study may serve as tool for identification of the plant for validation of the raw material and for standardization of its formulations.

Table 1: Observation of Morphological Characters of the selected plant's parts

S.No.	Parameters	Ficus palmate
1.	Shape/Texture	Rough
2.	Colour	Reddish brown
3.	Odour	Aromatic
4.	Taste	Bitter
5.	Length	7-9cm
6.	Width	2.5-5 cm

Table 2: Physical Parameters *Ficus palmata*

S.No.	Parameters	Values
1.	Loss on drying	4.715 %w/w
2.	Ash Values	
	A. Total ash	5.314 %w/w
	B. Acid insoluble ash	0.431 %w/w
3.	Extractive Values	Hot Extraction (%w/w)
	A. Methanol	17.86
	B. Aqueous	45.12
4.	Fluorescence Analysis	Blue fluorescence

Table 3: Phytochemical Screening of *Ficus palmata* bark extracts.

Extract constituents		PE	EtOAc	MeOH	Aq
Test for sterols	Salkowski'stest	-	-	-	-
	Libermann-Buchardt's test	-	-	-	-
Test for steroidal glycosides		+	-	-	-
Test for triterpenoids	Salkowski'stest	-	-	+	-
	Libermann-Buchardt's test	-	-	+	-
Test for saponins	Foam test	-	-	-	-
	Haemolytic test	-	-	-	-
Test for flavonoids	Alkaline reagent test	-	+	-	-
	Shinoda test	-	+	+	-
Test for carbohydrates	Molisch's test	-	-	+	-
	Fehling's test	-	-	+	-
Test for alkaloids	Mayer's tets	-	+	+	-
	Dragendorff's test	-	+	+	-
	Hager's test	-	+	+	-
	Wagner's test	-	+	+	-
Test for tannins and phenols	Lead acetate Test	-	-	-	-
	Ferric chloride test	-	-	-	-
Test for proteins	Xanthoproteic Test	-	+	-	-
	Millon's Test	-	+	-	-
	Biuret test	-	+	-	-
Test for free amino acids	Ninhydrin test	-	-	+	-

(+) Present; (-) Absent

Figure 1: Bark of *Ficus palmate*

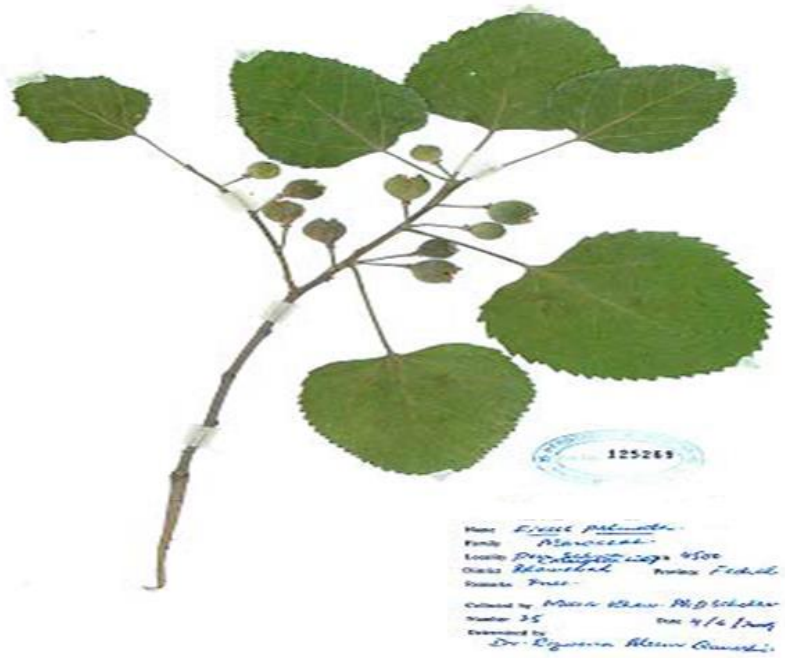

Figure 2: *Ficus palmata* twig

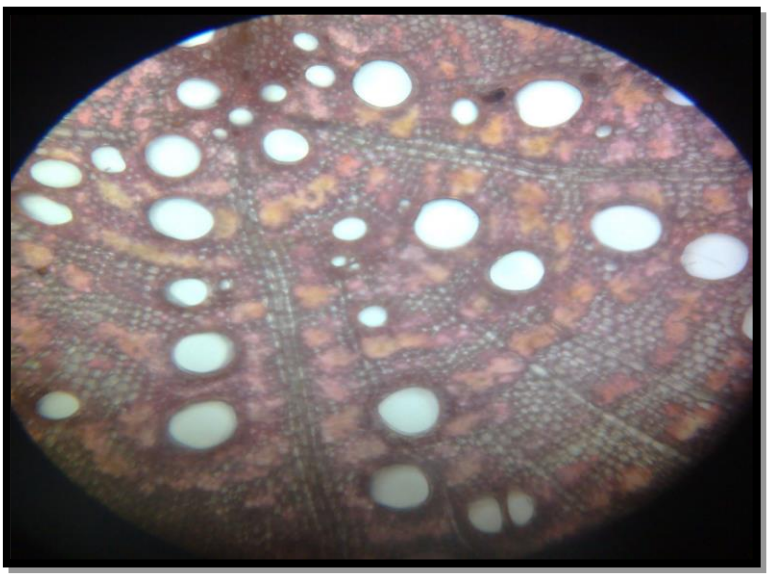

Figure 3: Transverse section of *Ficus palmata* stem bark

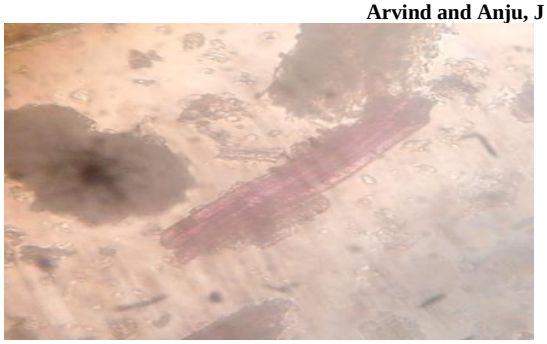

Figure 4: Xylem

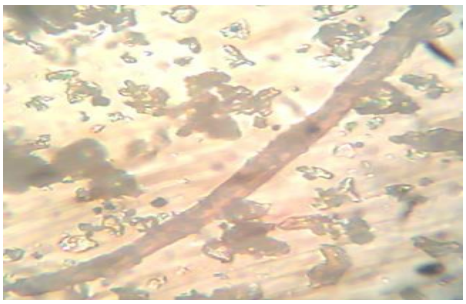

Figure 5: Phloem fibers

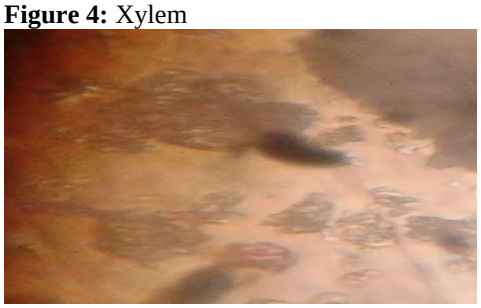

Figure 6: Cork cells

Figure 7: Stone cells

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