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# Pharmacognostical and Preliminary Phytochemical Studies on the Leaf Extract of *Ficus pumila* Linn.

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*Ficus pumila* Linn. (Family: Moraceae), commonly known as climbing fig. It is widely used as an ethno medicine in china and India. It is prescribed for a wide variety of ailments like diarrhea, hemorrhoids, treating gastrointestinal, piles, uterine problems and other infections. However, detailed scientific information is not available to identify the plant material and to ascertain its quality and purity. In present communication, morphology anatomical and physico-chemical characters along with phytochemical screening and fluorescence analysis of powdered crude drug were carried out for systemic identification and authentication of leaves. This study provides referential information for identification and characterization of *Ficus pumila* leaf and its extracts.

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**Keyword:** *Ficus pumila* linn, Phytochemical, Morphological, Methanolic extract.

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### 1. Introduction

The genus *Ficus* represents an important group of trees, not only for their immense value but also for their growth habits. The genus *Ficus* is an exceptionally large pan tropical genus with over 800 species and belongs to the family moraceae. The *Ficus* species are used as food and for medicinal properties in Ayurveda and Traditional Chinese Medicine. In India, the most important species of *Ficus* are commonly referred as “Fig”. Figs are one of highest plant sources of calcium and fiber<sup>[1]</sup>. *Ficus* is a huge tropical, deciduous, evergreen plant. Many plants of this genus are used in medicine for the treatment of skin diseases, enlargement of liver and spleen, dysentery, diarrhea, diabetes, leprosy, lung complaints, leucorrhoea, heart diseases, cough, asthma, piles, ulcers, gonorrhea and rheumatism<sup>[2]</sup>.

### 1.1 *Ficus pumila* Linn.

*Ficus pumila* Linn. is a member of the Moraceae family. It is a root climbing evergreen vine attaching to rocks, walls, tree trunks by means of exudations from the aerial roots. This species is native to East Asia- south China, Vietnam, Taiwan, New Zealand Nepal, India, Western Australia and Japan<sup>[3]</sup>.

In traditional Chinese Medicine, the leaves and fruits of the *F. pumila* have been used for treating bleeding, swelling, hemorrhoids, intestinal disorders and have the ability to clear fever and detoxifies. The plant is believed to have anti-inflammatory and anthelmintic activity. It is used to treat skin infections, tuberculosis, injuries. In japan, its leaves use as a beverage or herbal medicine to treat diabetes and high blood pressure<sup>[3-4]</sup>.

The leaf extract of *F. pumila* has been reported to possess antioxidant, antimicrobial, anti-

mutagenic, anti-inflammatory and analgesic activities<sup>[5,6,7,8]</sup>.

In spite of numerous medicinal uses of *F. pumila*, standardization parameters for its leaves have not been reported. Hence the present investigation is an attempt in this direction to evaluate morphological, microscopy and physico-chemical characters along with phytochemical screening and fluorescence analysis.

## 2. Materials and Methods

### 2.1 Plant Material

*Ficus pumila* Linn. leaves were collected in September-October 2011 from campus of the Shoolini University, Solan, Himachal Pradesh, India. The plant was taxonomically identified and authenticated as *Ficus pumila* by Dr. R Raina, Senior Scientist, Prof (Medicinal Plants). At the Department of Forest Products, Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni, Solan, Himachal Pradesh, India. The Herbarium sample was linked to UHF- Herbarium with field book No. 12551.

### 2.2 Chemicals and Instruments

All the Solvents viz. petroleum ether, toluene, chloroform, acetone, ethanol (95%), *n*-butanol and Reagents viz. formalin, acetic acid, ethyl alcohol, paraffin wax, *n*-hexane, ethyl acetate were of analytical grade and were obtained from Nice, Qualikems, Thomas baker. Silica gel G was obtained from Thomas baker. Muffle Furnace of Rolex. Glassware of Borosilicate glass. Microscopic photographs were taken using a binocular projection microscope with USB 2.0 camera.

### 2.3 Macroscopic and Microscopic Evaluation

The macroscopy of a drug includes its visual appearance by the naked eye. For the anatomical studies fresh leaves were collected from the plant and investigated in different organoleptic features by repeated observations. Macroscopic identity of a medicinal plant material is based on shape, size, color, taste, apex, surface, base, margin, venation, texture, fracture and odour. Microscopic examination of section and powder drugs aided

by stains help in distinction of anatomy in adulterants. Further, microscopical examination of epidermal trichomes, calcium oxalate crystals is extremely valuable, especially in powdered drugs. The size shape and relative positions of the different cells and tissues, chemical nature of the cell walls and of the cell contents are determined<sup>[9]</sup>.

### 2.4 Physico-Chemical Analysis

Physico-chemical analysis i.e., percentage ash values and extractive values were determined for the quality and purity of the crude drugs according to the official methods described<sup>[10]</sup>. Loss on drying, swelling index, foaming index<sup>[11]</sup>. Fluorescence analysis was carried out according to the method<sup>[12]</sup>.

### 2.5 Preliminary Phytochemical Screening

For the preliminary phytochemical analysis, the dried powdered material was extracted with petroleum ether (40-60 °C), chloroform, ethyl acetate and methanol successively, using Soxhlet apparatus. The aqueous extract was prepared by cold maceration. The extracts were filtered and concentrated under reduced pressure, dried and weighed. Each extract was tested for the presence of different phytoconstituents, viz. alkaloids, flavonoids, saponins, steroids, tannins, coumarins, triterpenoids and glycosides by usual prescribed methods<sup>[13]</sup>.

## 3. Results and Discussion

### 3.1 Macroscopy Evaluation

*Ficus pumila* L. is an enthusiastic climber able to scramble up vertical surface 3 and 4 stories tall with the aid of a powerful adhesive. This vine coats surfaces with a tracery of fine stems that are densely covered with small heart shaped leaves. These are the juvenile leaves. Adult leaves are held alternately in two rows along these branches. They are more leathery than the juveniles, and are dark green and about 3-6 cm long by 2-3 cm wide. Fig 1. Macroscopy features are representing in Table 1.

*Ficus pumila* Linn.

Upper Surface of leaf

Lower Surface of leaf

**Fig 1:** Photograph of *Ficus pumila* Linn. leaves**Table 1.** Observation of macroscopy features of *Ficus pumila* leaf.

Sr. No.	Features	Observations
1.	Color	Inner surface –Green Outer surface –Dark Green
2.	Odour	Aromatic
3.	Taste	Bitter
4.	Shape	Ovate
5.	Size	Length: 3-6 cm. Breadth :2-3 cm.
6.	Leaf Margin	Serrulate
7.	Leaf Surface	Glabrous
8.	Leaf Apices	Obtuse
9.	Venation	Reticulate
10.	Texture	Coriaceous

### 3.2 Microscopic Evaluation

Transverse section of leaf – The leaves of FP are bifacial with distinct adaxial and abaxial faces. In transverse section, the lamina shows an adaxial/ upper epidermis consists of a single layer of cells found on the upper surface of leaf. It is covered by a thick waxy cuticle. The abaxial/ lower epidermis made up of rectangular / barrel shaped

cells with thick cuticle which distinctly forms on outer and inner ledges on the guard cells and the subsidiary cells of the stomata. Mesophyll region is distinctly differentiated into palisade and spongy tissues. Cells of palisade parenchyma are very compactly arranged in 5-6 layers. Fig 2.

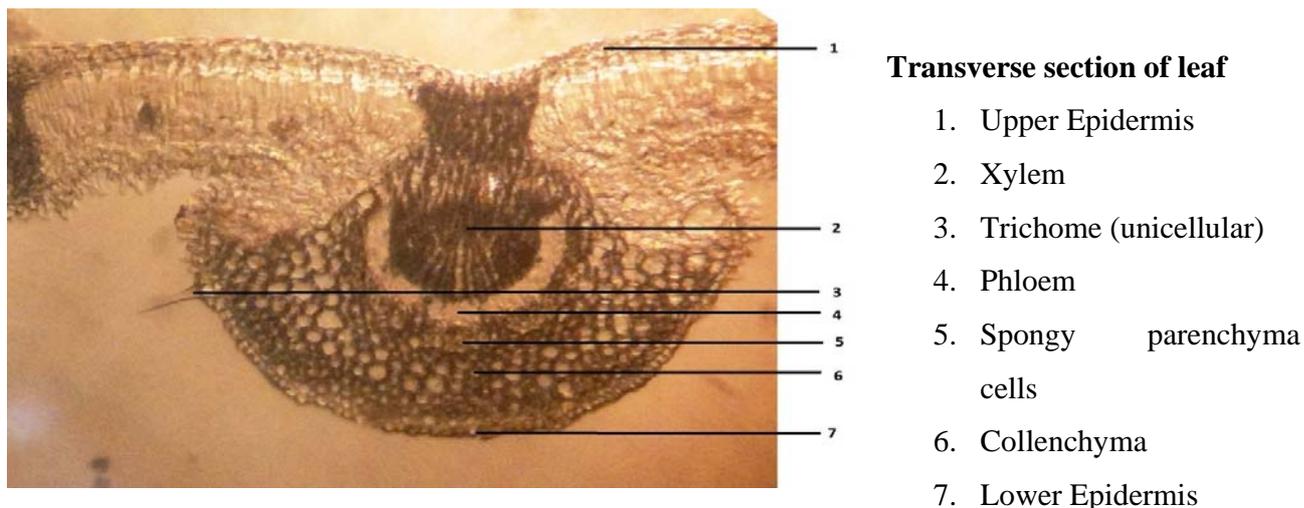


Fig 2: T.S. of *Ficus pumila* leaf

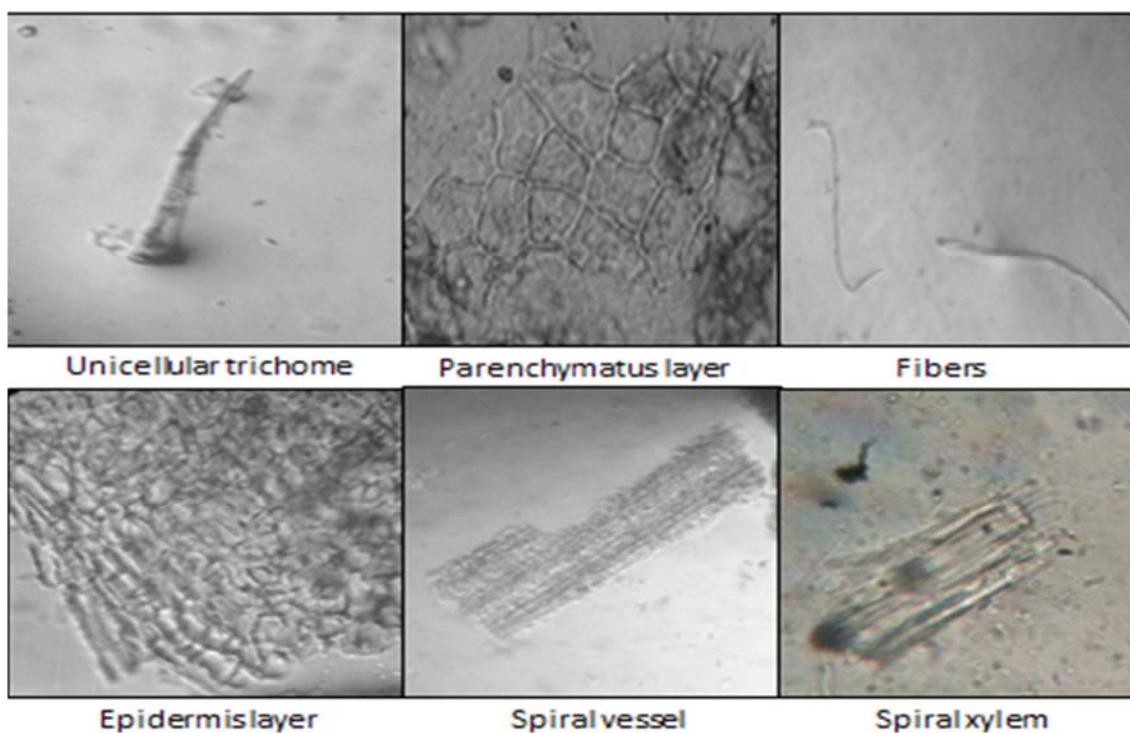


Fig 3: Powder microscopy of *F. pumila* leaf

Photographs showing various powders G) xylem. microscopic

- A) Unicellular trichome
- B) Parenchymatus layer
- C) Fibers
- D) Epidermis layer
- E) Spiral vessel
- F) Spiral

### 3.3 Powder Microscopy

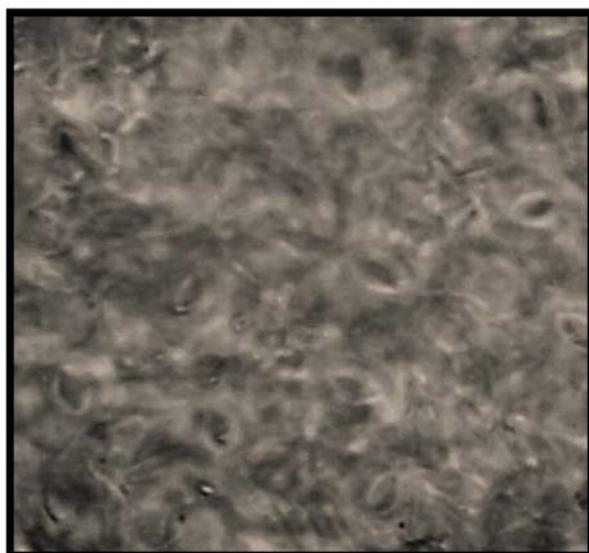
The leaf powder is dark green in colour with an aromatic odour. On microscopical examination, powder of leaves showed the presence of unicellular trichomes, xylem, phloem, vessels,

parenchymatous layer, fibers, palisade cells, stomata and subsidiary cells of stomata. Figure 3.

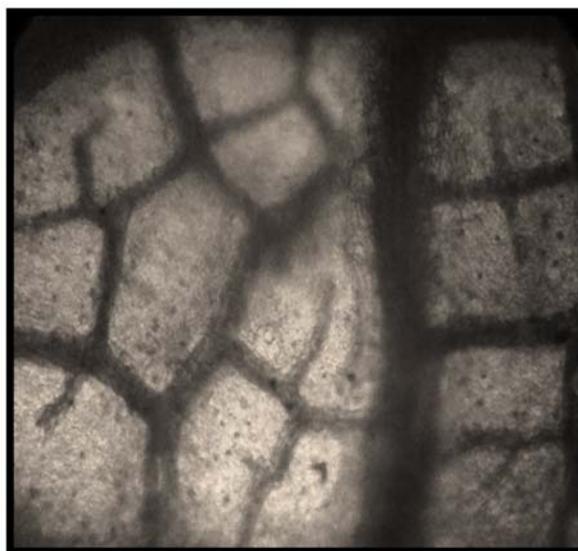
### 3.4 Surface Preparation of Leaf

Both upper and lower epidermises comprises of polygonal cells. Trichomes are simple, unicellular and with a very thick wall. Each stoma is

surrounded by 5-6 subsidiary cells. Stomatal index of lower epidermis is more than the upper epidermis. The microscopic characteristics examination of the leaf is represented in Figure 4 and quantitative details are represented in Table 2.



Stomata of anomocytic type with surrounding subsidiary cells



Veins islet and Veins termination

**Fig 4:** Transverse section showing Stomata and Veins islet and Veins termination of *Ficus pumila* leaf

**Table 2:** Leaf constants of *Ficus pumila* Linn.

S No.	Leaf constants	Value
1.	Stomatal number	11- 13 26- 29
	- Upper epidermis	
	- Lower epidermis	
2.	Stomatal index	0.08 0.18
	- Upper epidermis	
	- Lower epidermis	
4.	Veins-islet number	2- 3
5.	Veins termination number	4- 5

**Table 3** Physicochemicals constituents of leaves of *Ficus pumila* Linn.

Parameters	Values % (w/w)
Total Ash	12.0
Acid insoluble ash	9.50
Water soluble ash	7.20
Water soluble extractive values (cold)	4.3
Water soluble extractive values (hot )	9.4
Alcohol soluble extractive values	2.7
Alcohol soluble extractive values	4.8
Loss on drying	8.13
Swelling index	0.0
Foaming index	142.8

### 3.5 Proximate Analysis

Proximate analysis helps to set up certain standards for dried drugs in order to avoid batch-to-batch variation and to judge their quality and purity. Results of proximate analysis of leaves are shown in Table 3.

### 3.6 Phytochemical Analysis of *Ficus pumila* Linn.

#### 3.7 Successive Solvent Extraction

The leaves of *Ficus pumila* linn. were separately subjected to successive solvent extraction. Percentage yield of the selected successive extracts were recorded in Table 4.

**Table 4: Successive extractive values of the leaves of *Ficus pumila* linn.**

Parameters	Values % (w/w)
Petroleum Ether extract	0.66
Chloroform extract	0.71
Ethyl acetate extract	0.80
Methanol extract	12.57
Aqueous extract	6.81

Leaves of *Ficus pumila* gives maximum extractive value with methanol and water, whereas with petroleum ether, chloroform and ethyl acetate these extractive values were found to be very less.

#### 3.8 Phytochemical analysis of Successive extracts

Wide variety of natural compounds like alkaloids, glycosides, saponins, phytosterols, phenolics, terpenoids, flavonoids, coumarins and tannins which exert physiological activity as synthesized in plants. Results of phytochemical analysis on various successive extracts are summarized in Table 5.

**Table 5: Preliminary phytochemical investigation of *Ficus pumila* leaves**

Test	Petroleum ether	Chloroform	Ethyl acetate	Methanol	Aqueous
Alkaloids	-	-	-	+	+
Carbohydrate	-	-	-	+	+
Tannins	-	-	-	+	+
Flavonoids	-	+	+	+	+
Saponin	-	-	+	+	+
Glycosides	-	+	+	+	+
Steroids /triterpenoids	+	-	+	+	+

**Fig 5: Fluorescence analysis of the methanolic extract of *Ficus pumila* Linn.**

Solvent → Light ↓	Water	Methanol	NaOH-water	NaOH-Methanol	Hexane	HCl	chloroform	Acetone
Day Light	Yellow	Green	Brown	Brown	Brown	Green	Yellow	Yellow
UV (245)	Green	Green	Green	Green	Green	Green	Green	Green
UV (366)	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue

Colour pattern of *Ficus pumila* leaves methanolic extract under ordinary light and UV- 254 and 366 nm with different solvents.

#### 3.9 Fluorescence analysis

In Florescence analysis, the colour of the plant extract is mainly due to its chemical composition. The same extract may appear in different colours at different wavelength of the light, reported that

specific colour patterns of various medicinal drugs are obtained at 254 and 366 nm, day light. The result of florescence analysis of the methanolic extract of the leaf are presented in Figure 5.

#### 4. Conclusion

The present study of the extracts from leaves of *Ficus pumila* Linn. will provide useful information for the identification. Morphological, microscopic and physicochemical standards discussed here, can be considered as identifying parameters to substantiate and authenticate the drug. Pharmacognostical studies of the finding therein will enable the identification of the plant to the future investigation. This will provide a basis for the pharmacognostical standardization of the plant drug. Preliminary Phytochemical study of methanolic extract of the leaves are found to contain carbohydrates, steroids, flavonoids, tannin, phenolic compounds and triterpenoids are present.

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