Available online on www.ijppr.com
International Journal of Pharmacognosy and Phytochemical Research 2016; 8(1); 193-198

ISSN: 0975-4873

Research Article

Pharmacognostic, Phytochemical and Physicochemical Study of *Ficus arnottiana* Miq. Leaves (Moraceace)

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Available Online: 31st December, 2015

ABSTRACT
The study is focussed at development of pharmacognostic, phytochemical and physicochemical parameters and to investigate the active principle present in *Ficus arnottiana* Miq. leaves (Moraceae).The leaves, fruits and bark are used in medicine. This is used as astringent, demulcent and emollient, also used in diabeties, wound healing and inflammation. From literature survey it was revealed that no reports were available on microscopic evaluation, standardization parameters of *Ficus arnottiana* Miq. Leaves. All the parameters are carried out as per WHO guidelines of quality control methods for medicinal plant materials.

Keywords: *Ficus arnottiana* Miq. Moraceae, Pharmacognostic, Phytochemical, WHO guidelines.

INTRODUCTION

Ficus is a large genus of tree or shrubs, often climbers with milky juice, widely distributed throughout the tropics of both hemispheres, but particularly abundant in South-east Asia and Polynesia. About 65 species of Ficus occurs in India. The genus is remarkable for the large variation in the habitat of its species. It contains some of giants of the vegetable kingdom such as Banyan tree, Peepal tree and Indian rubbers and also small wiry climbers like *Ficus pumila* and *Ficus scandens* Roxbs. Traditionally various parts of different species are used for medicinal purpose. Ficus genus is rich source of flavonoids, xanthones, tannins, flavonoid glycosides and many other phenolic compounds.

MATERIALS AND METHODS

Plant Material

The leaves of *Ficus arnottiana* Miq., belonging to Family Moraceae was collected as Wild plant from the forest of Balawala, Dehra Dun (Uttrakhand, India) in the month of August 2011 was shade dried, powdered and stored. It was authenticated and identified as *Ficus arnottiana* Miq. by Dr. A.S.Sandhu, Garden Supervisor at National Institute of Pharmaceutical and Educational Research (NIPER), Mohali. The sample was submitted to college herbarium with reference number GFA/11/09.

Extraction Procedure

The shade dried, powdered leaves of the plant undergone successive extraction with different solvents as per the polarity. 100g of the coarsely powdered material was exhaustively extracted for 8 hours with hexane (50-70ºC) in soxhlet apparatus. The hexane using rota- vapor. The extracted plant material was then air dried and repacked in soxhlet apparatus extract was filtered and evaporated under reduced pressure and exhaustively extracted with chloroform for 8 hours. Then the extract was filtered and evaporated under reduced pressure using rota vapor. The extracted plant material was then air dried and repacked in the soxhlet apparatus and extracted with methanol, ethyl acetate and finally with water and filtered, evaporated using rota vapor[1].

Table 1: Morphological features of leaves of *Ficus arnottiana* Miq.

S.No	Parameter	Result
1	External colour	Green
2	Condition	Dried
3	Odour	Not characteristic
4	Taste	Not characteristic
5	Texture	Rough
6	Size	12-17 cm long, 5-10 cm wide
7	Apex	Acute
8	Shape of lamina	Cordate
9	Fracture	Erect
10	Leaf type	Ovate

Macroscopic study

The macroscopic evaluation includes its visual appearance to naked eye. It includes the evaluation of drugs by colour, odour, size, shape, taste and special features including touch and texture *etc*.[2]

Microscopic study

The microscopic studies of transverse section and powdered drug was carried out. Microscopic characteristics were studied in powdered form with the

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Figure1 Transverse section of leaf

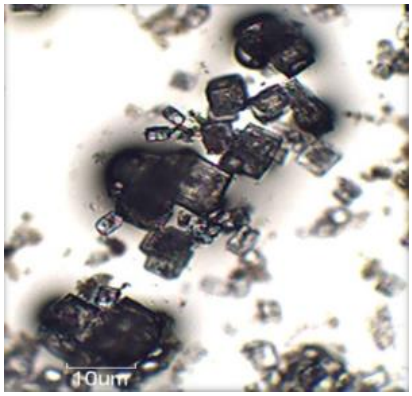


Figure 2 Calcium oxalate crystals

Figure 3 Trichomes

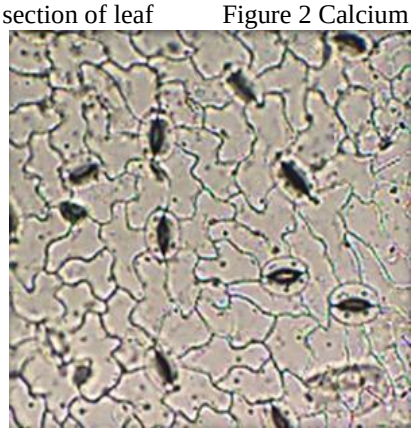


Figure 4 Anomocytic stomata

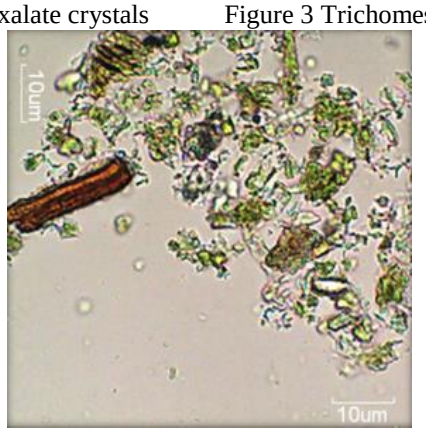


Figure 5 : Fibres

help of compound microscope[3]. A small amount of powder was taken and stained with phloroglucinol solution for few minutes and followed by concentrated hydrochloric acid (1:1) in watch glass. It was then mounted in glycerine (50%) and observed under microscope. Similarly, the powder was also stained with weak iodine solution for the identification of starch grains. Powder was treated with concentrated sulphuric acid for the identification of calcium oxalate crystals[4-6].

Physicochemical parameters

The determination of various physicochemical parameters such as total ash, water soluble ash, acid insoluble ash, swelling index, foaming index, moisture content, loss on drying and pH were calculated as per Indian Pharmacopoeia[7,8].

Preliminary phytochemical screening

The hexane, chloroform, methanol, ethyl acetate and aqueous extract were subjected to preliminary phytochemical screening for the detection of various phytoconstituents such as alkaloids, steroids, flavanoids, glycosides, tannins, phenolic compounds, carbohydrates, proteins, amino acids and fats[9,10].

RESULTS AND DISCUSSION

The macroscopic studies indicated important characteristics which are useful diagnostic characters (Table 1)

Microscopic examination of transverse section and powdered drug aided by stains help in distinction of anatomy in adulterants. Main characters of the transverse section include presence of bi-layered palisade, cystoliths, pericyclic fibers and perimedullary phloem. Diagnostic characters of powder include pericyclic fibers, cystoliths, anomocytic stomata, horse-shoe shaped xylem vessels and xylem vessels with annular thickening.

Determination of leaf constants

Anomocytic stomata were present on the surfaces. Stomatal number, stomatal index, vein-islet number and vein- termination number of epidermis of the leaf of *Ficus arnottiana* Miq. were determined. Results showed in table 3.

Physicochemical parameters

The results of various ash values of *Ficus arnottiana* leaf are observed in table 4.

Foreign matter analysis

Foreign matter analysis is shown in table 5.

Foaming Index

Foaming index of the sample is 100 because the height of the foam in each tube is less than 10 mm. This revealed that saponins are present in the leaves, though in less amount.

Loss on Drying

The results of loss on drying was observed in table 6. The swelling factor of *Ficus arnottiana* Miq leaves was found to be 2.7%w/v.pH Values was observed in table 7.

Successive extraction

Percentage yield and physical characteristics of various extracts of *Ficus arnottiana* Miq. leaves (continuous hot extraction) is shown in table 8.

Physicochemical Analysis

The aqueous extract (FAAE), methanolic extract (FAME) and ethyl acetate extract (FAEAE) showed the maximum alkaloids, flavanoids, saponins, tannins, terpenoids and carbohydrates. The petroleum ether extract (FAPEE) and

Table 2: Powdered Drug Reactions of *Ficus arnottiana* Leaf with different reagents

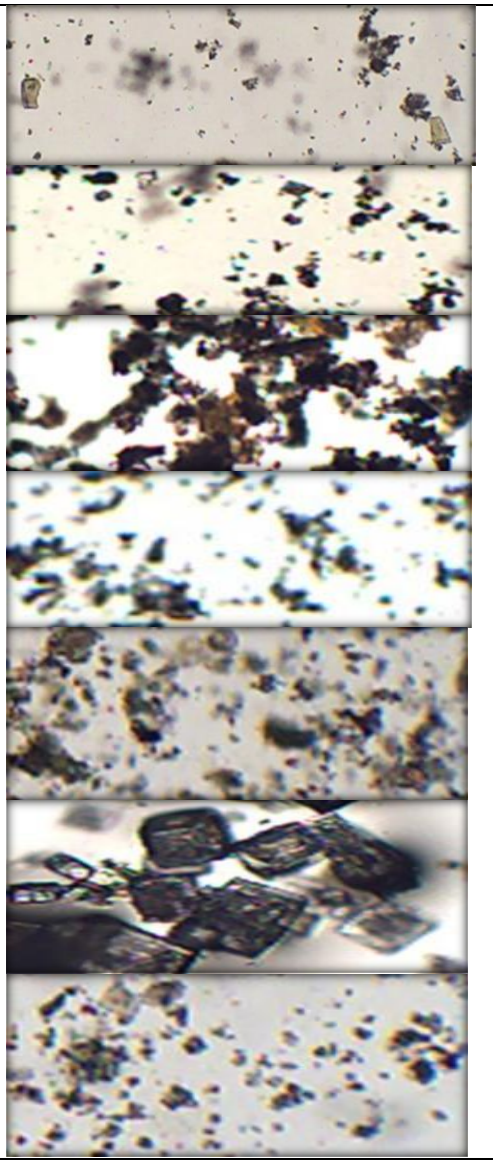
S.No	Chemical treatment	Compound	Colour	*Ficus arnottiana*	Results
1	Millon's reagent	Proteins	Yellow to brown	+	
2	Lugol's solution	Proteins	Black	+	
3	Iodine followed by H2SO4	Cellulose	Black	+	
4	Weak Iodine solution	Starch	Blue	–	
5	Sudan III	Fixed oils and fats	Pink	–	
6	Caustic alkali + HCl	Calcium oxalate	Yellow crystal	+	
7	Phloroglucinnol-HCl	Lignins	Reddish brown	+	

Table 3 Various Leaf constants of *Ficus arnottiana*

S.No	Parameter	Results
1	Stomatal number	130
2	Stomatal index	35.11
3	Vein islet number	5.3
4	Vein termination number	18.4

Table 4: Ash values of *Ficus arnottiana* leaf

S.No	Ash value	% yield (%w/w)
1	Total ash	12
2	Acid insoluble ash	3
3	Water soluble ash	2

Chloroform extract (FACE) showed alkaloids, flavanoids, terpenoids. Detail of results of phytochemical screening of extracts showed in table 9.

Table: 5: Foreign matter analysis of *Ficus arnottiana* leaf

S.No	Weight of drug (g)	Weight of drug after removal of Foreign matter (g)	Weight of Foreign matter (g)	% Foreign matter
1	10.002	10.000	0.002	0.021
2	10.004	10.000	0.004	0.040
3	10.001	10.001	0.000	0.000
Mean			0.002	0.020

Table 7: pH values of various extracts of *Ficus arnottiana* leaf

S.No	Sample	pH
1	pH of 1% solution	7.77
2	pH of 10% solution	7.50

Table 6: Loss on Drying of various extracts of *Ficus arnottiana* leaf

S.No	Weight of drug + china dish before drying a (g)	Weight of drug + china dish after drying B (g)	Loss on drying A- B (g)	%w/w Loss on drying
1	64.94	64.83	0.11	11
2	55.20	55.10	0.10	10
3	62.80	62.69	0.11	11
Mean			0.11	11

Table 8: Characteristics of various extracts

Extract	% Dry wt (g)	Colour	Odour	Consistency
Hexane (FAHE)	4.44	Henna green	Odourless	Sticky
Chloroform (FACE)	4.16	Dark green	Characteristic	Sticky
Methanol (FAME)	6.88	Chocolate brown	Sweet	Sticky
Ethyl acetate (FAEAE)	5.52	Dark green	characteristics	Sticky
Aqueous (FAAE)	3.34	Yellow brown	odourless	Dry

Table 9: Phytochemical investigation of various extracts of *Ficus arnottiana* leaf

Chemical test	Petroleum ether	Chloroform	Ethyl acetate	Methanol	Water
CARBOHYDRATES					
Molish test	–	–	+	+	+
Fehling test	-	-	-	-	-
Cobalt chloride	+	+	-	-	-
Iodine test	+	+	-	-	-
PROTEINS					
Biuret test	+	+	-	-	-
Millon's test	-	-	-	-	-
Xanthoprotic test	+	+	-	-	-
AMINO ACIDS					
Ninhydrin test	-	-	-	-	-
Tyrosine test	-	-	-	-	-
STEROIDS					
Salkowski test	-	-	-	-	-
Libermann's reaction	-	-	-	-	-
Libermann burchard	-	-	-	-	-
FATS AND OILS					
Filter paper test	-	+	-	-	-
GLYCOSIDES					
Cardiac glycosides	-	-	-	-	-
Anthraquinone glucosides					
Borntrager's test	-	-	+	+	+
Modified Borntrager's test	-	-	-	-	-
Saponin glycosides					
Foam test	-	+	+	+	+
FLAVANOIDS					
Shinoda test	-	+	+	+	+
Lead acetate test	-	-	+	+	+
PHENOLIC COMPOUNDS					
5% $FeCl_3$ test	-	-	+	+	+
Lead acetate test	-	-	+	+	+
Acetic acid solution	-	-	+	+	+

Table 9: Phytochemical investigation of various extracts of *Ficus arnottiana* leaf

Chemical test	Petroleum ether	Chloroform	Ethyl acetate	Methanol	Water
ALKALOIDS					
Dragendorff's test	-	+	+	+	-
Mayer's test	-	+	-	+	-
Wagner's test	+	-	+	-	+
TANNINS					
Vanillin-HCl test	-	+	+	+	+
Gelatin	-	-	-	-	-
RESINS					
$FeCl_3$ test	-	-	-	+	+
Turbidity test	-	-	-	-	-

CONCLUSION

In the present study, the herbal drugs *Ficus arnottiana* Miq. leaves is selected and authenticated by morphological and organoleptic properties. Detailed microscopical characters of *Ficus arnottiana* Miq. leaves along with photographs of their special characters and T.S. were taken during the study. Detailed powdered microscopical characters of *Ficus arnottiana* leaves was performed. Determination of physic-chemical constants is important for the purpose of evaluation of crude drugs. Several physico-chemical parameters were established for the selected drugs. Different drugs were extracted with range of solvents (Petroleum ether, chloroform. Methanol, ethyl acetate and water) using soxhelet apparatus. The fluorescence analysis and the drugs treatments with several acids and bases and other reagents were done. These all indicates the presence of some particular type of constituents in the plants confirmed by the phytochemical screening. These characters can be used for the identification of drugs to find out any kind of adulterations. The ash values were performed to know the presence of any earthy particles or inorganic matter. The ash values were performed to obtain total ash, acid insoluble ash and water soluble ash. During ash value content, the drug show that the ash values are within limits. The pH values give the little hint towards the presence of type of constituents present as it describes the basic nature i.e. acidity of basicity of the constituents. The *Ficus arnottiana* contains the constituents belonging to somewhat basic range. In the phytochemical studies, the various extracts of drugs were tested by different chemical tests to know the nature of particular type of constituents present. All drugs extract showed the presence of various types of important constituents. *Ficus arnottiana* contains high amount of flavanoids, saponins, tannins and other phenolic compounds. Medicinal plant materials should be entirely free from the visible signs of contamination by moulds or insects, and other animal contaminations including animal excreta. It is seldom possible to obtain plant materials that are entirely free from some form of innocuous foreign matter. The percentage of foreign matter was found to be 0.020% in all drugs indicating normal quality. The excess water content in medicinal herbs encourages the microbial growth, presence of fungi or insects, and deterioration following hydrolysis. Thus, limits for water content should be set for every drug. Loss on drying or heating to a constant weight can be determined for material which do not contain compounds, which are volatile at the temperature of drying. The percentage losses on drying were found to be as 11%. From the phytochemical investigations, it was concluded that the *Ficus arnottiana* was found to contain phenolic compounds, flavanoids, carbohydrates, alkaloids and tannins as their chemical constituents. As per the results of investigation, it was concluded that the leaves of plant *Ficus arnottiana* is worth for further chemical and pharmacological investigations.

ACKNOWLEDGEMENTS

Authors are thankful to all the members A.S.B.A.S.J.S.M College of Pharmacy, Bela for their full co-operation during the whole research work. I would like to thank Dr. Satnam Singh, for his illuminating guidance right from the conception to the completion of my work.

REFERENCES

1. Harbone, JB., 19/3. Phytochemical methods. London: Chapman and Hill.
2. World Health Organisation: WHO guideline for the assessment of herbal medicines. WHO expert committee on specification for pharmaceutical preparation. Technical report series number. 863 Geneva (1998).
3. Fahn, A. plant anatomy. Fifthe edition. Pergmon press. New York (1997).
4. Kokate C., Purohit A. and Gokhale S. (1994). Practical Pharmacognosy, Vallabh Prakashan, New Delhi, Edition 10, 112-120.
5. Khandelwal Dr. K.R. "Practical Pharmacognosy" 20TH edition, Aug. 2010, published by nirali prakashan, 10-39.
6. Sahu Namrata, Yadu Umesh Kumar, Jana G.K., Tripathi Ramashish. Pharmacognostic, Phytochemical and Physiochemical Study of *Ficus arnottiana* (Moraceae). International journal of Pharmacognosy and Phytochemical Research 2014-15; 6(4); 874-878 ISSN: 0975-4873.
7. Khare C P; Indian Medicinal Plants: An Illustrated Dictionary. Springer: New York. 2007; 65-66.

8. Wallace RA .Biology: The World of Life, 6th ed. Harper Collins, New York, 1992.
9. The Ayurvedic Pharmacopoeia of India, Government of India, Ministry of Health and Family Welfare, Department of Indian System of Medicine and Homeopathy, New Delhi.Ist Edition, Part I, Vol. I, 117-118, (1990)
10. C.P.Khare, Indian Medicinal Plants An Illustrated Dictionary, Springer (India) Private Limited, New Delhi, Ist Indian reprint,266-267,(2007)