International Journal of
Medicinal Chemistry & Analysis
www.ijmca.com
e ISSN 2249 - 7587
Print ISSN 2249 - 7595

MEDICINAL POTENCY OF *FICUS BENGALENSIS*: A REVIEW

Ramesh Patel*and Piyush Gautam

Dept. of Pharmacology, Hygia Institute of Pharmaceutical Education and Research,
Ghazipur Balram, Ghaila Road, Faizullaganj Lucknow, UP, India.

ABSTRACT

Ficus bengalensis, a genus of family Moraceae is a tropical, deciduous, evergreen tree with more than 800 species and about 40 genera of the mulberry family. *F.bengalensis* is known as common name Bargad and cultivated as a Garden tree or Spiritual tree. The leaves of *F. bengalensis* is used as ulcer protective, leprosy and fever, inflammations(Ayurvedic).The milky juice is aphrodisiac, tonic, vulnerary, maturant also useful in piles, diseases of the nose, gonorrhea. In Yunani the aerial root is styptic, syphilis, biliousness, dysentery, inflammation of liver. A lot of pharmacological work has been scientifically carried out on various part of *F.bengalensis* but some other traditionally important therapeutically uses are also remaining to proof till now scientifically. As analgesic, antipyretic, anti-ulcerogenic, inflammatory bowel, antimicrobial, antidiabetic etc. The various chemical constituents present in *F.bengalensis* are Bengalenosides, flavanoids and leucocyanidin glycoside.

Keywords: *Ficus bengalensis*, Moraceae, Antimicrobial, Diabetes, Antioxidant.

INTRODUCTION

Ficus, the fig genus, consists of over 800 species and is one of about 40 genera of the mulberry family. The fig species of greatest commercial importance is *Ficus bengalensis* L. (the banyan tree) *Ficus carica* L. (the common fig). Other notable species of Ficus are Ficus religiosa L. (the Bo tree which sheltered the Buddha as he divined the "Truths"), Ficus elastic Roxb. ex Hornem. (The rubber tree), and Ficus racemosa L. (syn. glomerata, the giant cluster tree).

All Ficus spp.possess latex-like material within their vasculatures, affording protection and self-healing from physical assaults [1].

Plants have been the major source of drugs in Indian system of medicine and other ancient systems in the world. Earliest description of curative properties of medicinal plants is found in Rig-Veda. Charaka Samhita and Sushrusha Samhita give extensive description on various medicinal herbs [2].

Present in most tropical and subtropical forests. Throughout the world and distributed all over India from sub Himalayan region and in the deciduous forest of Deccan and south India. They are very large, fast growing, evergreen tree up to 3.0 meters, with spreading branches and many aerial roots. Leaves stalked, ovate-cordate, 3-nerved, entire, when young downy on both sides; petiole with a broad smooth greasy gland at the apex, compressed, downy; Bark smooth, light grey-white,1.27cm thick wood moderately hard, grey or grayish white. Fruit in axillary pairs, the size of a cherry, round and downy [3, 4].

Some species recorded in India which are *Ficus bengalensis* (Indian banyan), *Ficus auriculata*, syn. *Ficus roxburghii*, *Ficus carica* (common edible fig), *Ficus religiosa* (bo tree or sacred fig) etc. Some important marketed Ayurvedic formulations are samgrahaniya, Kasayacharna, Udumbarasa, Udunbaravaleha, Udumbramatra [5].

CLASSIFICATION: Table 1

Botanical classification of *Ficus bengalensis* [8]

Botanical Name	*Ficus bengalensis*
Kingdom	Plantae
Division	Magnoliophata
Class	Magnoliopsida
Order	Urticales
Family	Moraceae
Genus	Ficus
Species	bengalensis

Corresponding Author: - **Ramesh Patel** Email: Ramesh.bfarm@gmail.com

ETHNOPHARMACOLOGICAL USES

Bargad (*Ficus bengalensis*) is commonly known as Vada in Marathi, Banyan tree in English, Bar in Hindi and as Avaroha in Sanskrit. According to Ayurvedic texts, consist of Nyagrodha. The bark and milky juice are powerful tonic; also have specific properties of Diabetes. Seeds are deemed cooling and tonic [9].

MORPHOLOGY

A very large evergreen tree, 23-34 m tall, with huge spreading limbs supported by aerial roots which later form accessory trunks extending to a large area and stout, softly pubescent branchlets.

Leaves

Simple, alternate, 10-20 cm long, 5-12.5 cm broad, oval, ovate or orbicular-ovate to oblong, coriaceous, obtusely cuspidate, quite entire, glabrous or pubescent beneath, base rounded, sub cordate or acute, basal veins strong, lateral veins7-8 pairs, finely reticulate beneath, petioles 1.2-5 cm long, stipules 1.8-2.5 cm long, coriaceous.

Flowers

Minute, unisexual, of 3 kinds, males, females and imperfect females (gall flowers) crowded along with bracteoles in the inner walls of fleshy receptacles which are sessile, globose, about 1.8 cm diam., puberulous, arising in axilliary pairs, basal bracts 3, orbicular, spreading. Male flowers: near the mouth of the receptacle, perianth 4, stamen 1, filament erect.

Female flowers perianth as in the male but shorter, ovary superior, unilocular with a single pendulous ovule, straight or oblique, style excentric, stigma simple.

Fruit

Fleshy pericarp and with achenes embedded in them, dark red in colour [10].

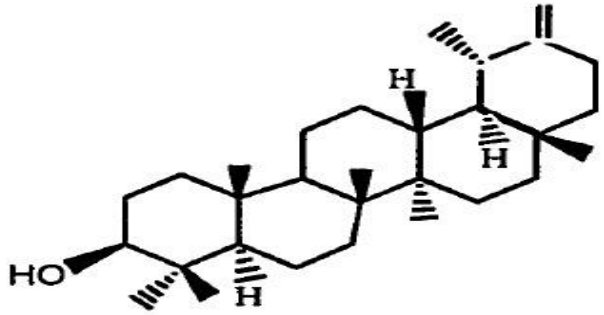
Distribution:

It is common in the low country dry regions of Sri Lanka up to an altitude of about 2000 feet. Also occurs in the sub-Himalayan forests and South India and naturalized elsewhere.

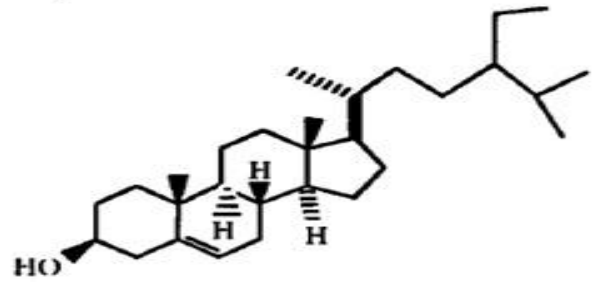
CHEMICL CONSTITUENTS:

Taraxasterol tiglate from heart wood; qucertin-3-galatosideand rutin isolated from leaves [11]; three Newmethyletherofleukoanthocyanidin,Delphinidin-3-o-α-L rhamnoside(I), pelargonodin-3-o-α-L-rhamnoside(II), leucocyanidine – 3 – 0 – β - Dgalactosyl cellobioside (III) -along, with Methyl ether of leucoanthocyanidin isolated from stem bark and characterized and 20-tetratriaconten-2-one,pentatriacontan-5-one and heptatriaconten-10-one isolated from the stem bark and β-sitosterol, α-Dglucoside andmeso-inosito land isolated [12].

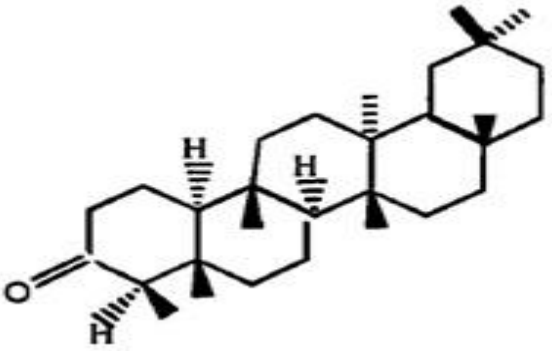
Friedelin (I)



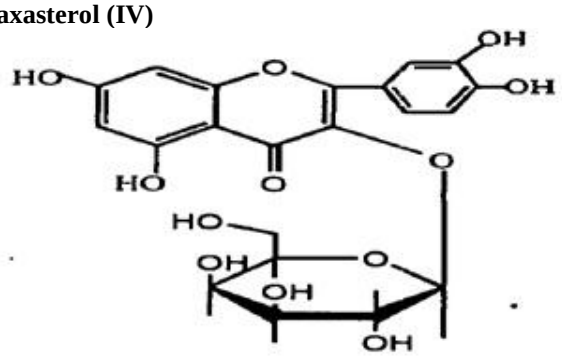
β-Sitosterol (II)



Quercetin-3-glactosidde(III) [13]



Taraxasterol (IV)



PHARMACOLOGICAL PROPERTIES OF *F. BENGALENSIS* LIN:

Anti-Tumor Activity

The chloroform extract of the fruit of *F. bengalensis* has shown toxicity in the brine shrimp (*Artemia salina*) bioassay (LC50 < 1000g/ml). It also possessed anti-tumor activity in the potato disc bioassay (% tumor inhibition >20%) [14].

Analgesic, Antipyretic Activity

Ficus bengalensis Linn is a large evergreen tree found throughout India. It is commonly called Banyan tree. This tree is considered to be sacred in some places. It is used in traditional system of medicine like Ayurvedic, Siddha, Unani and homoeopathy. The active compounds isolated from this plant are considered to be very effective in various treatments such as dysentery, diarrhoea, diabetes, leucorrhoea, menorrhagia, nervous disorders, tonic and astringent. According to Ayurvedic system of medicine *Ficus bengalensis* is widely used in diabetes. This paper reports on its traditional, phytochemical and pharmacognostic properties such as antioxidant, anticancer, analgesic, anti-inflammatory and antipyretic activities of *Ficus bengalensis* [15].

Anti-Rheumatic Activity

Ficus bengalensis Linn (Moraceae) commonly known as Banyan tree or Bargad. It possesses exhorbant medicinal properties and is used in ayurveda for diarrhea, diuretic, as a hypoglycemic and as anti-inflammatory agent. The analgesic and anti-rheumatic activity of the methanolic extract of the bark of *Ficus bengalensis* (MFB) were studied at doses of 100, 200 and 300 mg/kg (i.p) using the Freund's Complete Adjuvant induced arthritis model, the Formalin induced arthritis model and the Agar induced arthritis model. The extract produced marked inhibitory effect on edema especially on secondary immunological arthritis and caused graded inhibition of both phases of Formalin- induced pain. Thus the present study validates the traditional use demonstrating that the methanolic extract of bark of *Ficus bengalensis* possesses dose –dependent anti-rheumatic activity in all the models with a possibility of acting through the central and peripherally mediated activities [16].

Anti-Oxidant Activity

Anti-oxidant activity of the methanolic extract of the bark of *Ficus bengalensis* (MFB) were studied at doses of 100, 200 and 300 mg/kg (i.p) using the Freund's Complete Adjuvant induced arthritis model, the Formalin induced arthritis model and the Agar induced arthritis model. The extract produced marked inhibitory effect on edema especially on secondary immunological arthritis and caused graded inhibition of both phases of Formalin-induced pain .The present study validates the traditional use, demonstrating that the methanolic extract of bark of *Ficus bengalensis* possesses dose dependent anti-rheumatic activity in all the models with a possibility of acting through the central and peripherally mediated activities. The DPPH and hydrogen peroxide model demonstrated positive antioxidant activity in a concentration dependent manner (100μg/ml) [17].

Anti- Ulcerogenic Activity

The effect of aqueous extract of *Ficus bengalensis* (FBE) was assessed in different acute and chronic gastric ulcer models in rats. Gastric ulcers induced in swiss albino rats (200g, N=6) by oral administration of aspirin suspension and pylorus ligation. The anti ulcer activity was assessed by determining and comparing the ulcer index in the test drug groups with that of the vehicle control and standard ranitidine & sucralfate. FBE, 250–500 mg/kg administered orally, twice daily for 5 days showed dose-dependent ulcer protective effect in pylorus ligation (51.28, 63.24% protection, $P < 0.01$ to $P < 0.001$), aspirin (28.94, 64.91 protection, $P < 0.001$). The parameters taken to assess antiulcer activity were pH of gastric juice, total acidity and ulcer index. The results indicated that aqueous extract significantly ($p<0.05$) Ph, total acidity and ulcer index. On the basis of histopathology analysis, the results indicate that FBE possesses antiulcer activity in a dose dependent manner [18].

Hypoglycemic Activity

Hot water extract of *Ficus bengalensis* was given orally to normal rabbits and rabbits with alloxan induced alloxan-recovered, mildly diabetic and severely diabetic states, at a single dose of 50mg/kg/day for three days. After a gap of five days, the water extract was re administered for three days at the same dose level. There was no significant change in fasting blood glucose (FBG), or glucose tolerance test (GTT) in normal rabbits. There was no fall in FBG but improvement in glucose tolerance in alloxan recovered rabbits. In mildly diabetic rabbits there was55.8% fall in FBG values and an improvement in glucose tolerance. The extract produced 68% fall in FBG values in severely diabetic rabbits, an observation not brought out in any of the earlier work in this plant [19].

Anti-Diabetic Activity

The antioxidant effect of aqueous extract of the bark of *F. bengalensis* has been evaluated in hypercholesterolemic rabbits. Rabbits were divided into three groups, Group I served as healthy control; groups II and III were made hypercholesterolaemic by feeding cholesterol suspended in groundnut oil (100 mg/kg body weight per day) for 6 weeks. Rabbits of Group III received water extract of the bark of *Ficus bengalensis* at a dose of 50 mg/kg body weight per day in addition to cholesterol suspended in oil. Feeding cholesterol increased serum cholesterol, triacylglycerol and LDL+VLDL-cholesterol significantly in Group II as compared to Group I (P=0.001). Treatment with water extract decreased the serum cholesterol level by 59%, triacylglycerol by 54% and LDL+VLDL-cholesterol by 60% in Group III as compared to Group II. In addition, treatment with this extract led to a decrease in lipid peroxidation as evidenced by fall in thiobarbituric acid reactive substances with a corresponding increase in blood glutathione content

(P=0.001). Further, there was significant increase in the activities of antioxidant enzymes; superoxide dismutase (P<0.001), catalase (P<0.03), glutathione peroxidase (P=0.03) and glutathione reductase (P<0.01); which were depressed in Group II rabbits after cholesterol feeding. Thus, our results show that the water extract of the bark of *F. bengalensis* has significant antioxidant effect [20].

Anti-Inflammatory Activity

This review explores medieval, ancient and modern sources for ethno pharmacological uses of Ficus (fig) species, specifically for employment against malignant disease and inflammation. The close connection between inflammatory/infectious and cancerous diseases is apparent both from the medieval/ancient merging of these concepts and the modern pharmacological recognition of the initiating and promoting importance of inflammation for cancer growth. Also considered are chemical groups and compounds underlying the anticancer and anti-inflammatory actions, the relationship of fig wasps and fig botany, extraction and storage of fig latex, and traditional methods of preparing fig medicaments including fig lye, fig wine and medicinal poultices [21].

Anti-Bacterial Activity

In the present investigation the antimicrobial efficiency of cotton fibers' loaded with silver nano particles (AgNPs) was studied which are developed by "green process" using natural extracts, of Eucalyptus citriodora and *Ficus bengalensis*. The formation of AgNPs on the cotton fibres was observed by UV–vis spectrophotometer. The size of silver nano particles was found to have20 nm. The structure and morphology of silver nano particles formed on the cotton fibres were confirmed by electron microscopy. The antibacterial activity of cotton fibres loaded with silver nanoparticles was evaluated against gram-negative Escherichia coli (E. coli) bacteria. The results suggest excellent antibacterial activity by the incorporation of 2% leaf extracts on cotton fibres. These fibres have also exhibited superior antibacterial activity even after several washings indicating their usage in medical and infection prevention applications [22].

Nutritive Evaluation

The nutritive value of leaf materials from five each of nitrogen (NFT), namely, *Acacia nilotica, Albizia lebbeck, Butea monosperma, Leucaena leucocephala, Pongamia pinnata* and non-nitrogen fixing multipurpose tree (non-NFT) species, namely, *Anogeissus pendula, Azadirachta indica, F. bengalensis Terminalia arjuna* and *Syzygium cumini* grown at National Research Centre for Agro forestry, were evaluated by chemical and in sacco methods. Mean organic matter (OM) concentration (g kg^{-1} dry matter) was comparable between NFT (902±5.3) and non-NFT (916±6.5). However, significantly (P<0.05) higher mean crude protein (CP) contents (g kg^{-1} DM) were recorded in NFT (174±10.7) than non-NFT (96±1.5) with maximum in L. leucocephala (228) and minimum in *F. bengalensis* (88), respectively. Mean neutral detergent fibre (NDF) contents were relatively lower in NFT than in non-NFT. Significantly (P<0.05) higher contents of NDF, acid detergent fibre (ADF) and lignin (g kg^{-1} DM) were observed in *F. bengalensis* (597, 458 and 222) and S. cumini (566, 483 and 279) than in any of the other trees. Total phenolics (TP) concentration was significantly (P<0.05) lower in NFT except for A. nilotica, but higher (P<0.05) in non-NFT except in *F. bengalensis*. Mean condensed tannins (CT) concentration differed significantly (P<0.05) between NFT and non-NFT and ranged from 17 to 31 and 14 to 94 g kg^{-1} DM, respectively. In sacco degradability of DM differed significantly (P<0.05) amongst the MPTs and ranged from 504 to 809 for NFT and 513 to 881 g kg^{-1} DM for non-NFT, respectively. Mean CP degradability [23].

Anti-Diarrhoeal Activity

Ethanol extract of four different plants of the Khatra region of the Bankura district of West Bengal, India were evaluated for anti-diarrhoeal activity against different experimental models of diarrhoea in rats. The extracts of *Ficus bengalensis* Linn.(Hanging roots), *Eugenia jambolana* Lam. (bark), *Ficus racemosa* Linn.(bark) and *Leucas lavandulaefolia* Rees (aerial parts) showed significant inhibitory activity against castor oil induced diarrhoea and PGE_2 induced enteropooling in rats. These extracts also showed a significant reduction in gastrointestinal motility in charcoal meal tests in rats. The results obtained establish the efficacy of all these plant materials as anti-diarrhoeal agents [24].

Animal Feed

Protein-precipitating capacity (PPC), milligrams of protein precipitated in a solution by 100 mg tanniferous forages, of fodder tree leaves of *Bauhinia racemosa, Dichrostachys nutans Ficus bengalensis, Ficus religiosa, Gymnosporia spinosa, Prosopis cineraria* and *Zizyphus nummularia* was determined using a 0.3% solution of bovine serum albumin (BSA) or groundnut cake albumin (GNCA) in 0.2 M acetate buffer, pH 5.0, containing 0.17 M NaCl. The PPC of tree leaves was 2.10–13.88 in the case of BSA and 1.82–8.39 in the case of GNCA. The PPC of tree leaves using BSA was significantly positively correlated with PPC using GNCA and with the contents of total polyphenols, tannins, condensed tannins and with their relative degree of polymerization [25].

Forensic Examination

The various microscopical characters of taxonomic value have been studied in fresh and dried leaves of *Nerium odorum Soland, Thevetia nereifolia A. Juss, Mangifera indica Linn, Ficus bengalensis Linn,*

Datura alba Nees and *Tamarindus indica* Linn, with a view to find out the preservation of diagnostic characters in the dried leaves. The dried leaf examination is required in some crime cases as part of physical evidence. The results show that based on various indices and anatomical features, it is possible to compare and identify the dried leaves with the parent plants [26].

Cytotoxic Effect of Herbal Extract

Bioinformatics and traditional medicine can be used in discovery and design of novel candidate drugs to efficient cancer chemotherapy. In this study, similarity search tools employed to screen and introduce novel herbs with antitumor property. Several novel herbs have been selected by using logical computational algorithms and assayed on six cancerous cell lines. Complementary assays involved hemolytic and antifungal MIC tests have been performed to determine selectivity and their biocompatibility with RBC of herbal extracts. Final findings may point at selective activity of herbal extracts Rheum ribes, *Ficus bengalensis*, *Morus alba*, *Musa sapientum*, *Arnebia decumbens*, *Citrus limon*, *Fraxinus excelsior*, *Rumex acetosella*, *Arnebia echioides* in inducing cytotoxicity on cancerous cell lines. In the present research, in vitro results confirmed predicted findings from our in silico work. Complementary assays including antifungal MIC and hemolytic tests were carried out also to determine selectivity of herbal extracts. Findings resulted from hemolytic test showed that candidate herbal extracts did not induce hemolysis similar to negative control; also antifungal test results indicated that six herbal extracts had antifungal activity in concentration of 250 µg/m [27].

Wound Healing Activity

Research on wound healing drugs is a developing area in modern biomedical sciences. Scientists who are trying to develop newer drugs from natural resources are looking toward the Ayurveda, the Indian traditional system of medicine. Several drugs of plant, mineral, and animal origin are described in the Ayurveda for their wound healing properties under the term Vranaropaka. Most of these drugs are derived from plant origin. Some of these plants have been screened scientifically for the evaluation of their wound healing activity in different pharmacological models and patients, but the potential of most remains unexplored. In a few cases, active chemical constituents were identified. Some Ayurvedic medicinal plants, namely, *Ficus bengalensis*, *Cynodon dactylon*, *Symplocos racemosa*, *Rubia cordifolia*, *Pterocarpus santalinus*, *Ficus racemosa*, *Glycyrrhiza glabra*, *Berberis aristata*, *Curcuma longa*, *Centella asiatica*, *Euphorbia nerifolia*, and *Aloe vera*, were found to be effective in experimental models. This paper presents a limited review of plants used in Ayurvedic medicine [28].

Antihelmintic Activity

The extracts from *Ficus bengalensis* were found not only to paralyze but also to kill the earthworms. The aqueous and methanolic extract was found to be more effective to execute the earthworm when compared to antihelminthic drugs [29].

Immunomodulatory Activity

To evaluate the Immunomodulatory activity of the aerial roots of *Ficus bengalensis* (Family Moraceae). The successive methanol and water extracts exhibited a significant increase in the percentage phagocytosis versus the control. In the in vivo studies, the successive methanol extract was found to exhibit a dose related increase in the hypersensitivity reaction, to the SRBC antigen, at concentrations of 100 and 200 mg/kg. It also resulted in a significant increase in the antibody titer value, to SRBC, at doses of 100 and 200 mg/kg in animal studies [30].

CONCLUSION

Ficus bengalensis is an easily available plant. The fruit being lot of potent pharmacological activity. The plant belong to family Moraceae, which has given us many important medicinal plants like *Morus alba*, *Ficus benjamina*, *Ficus carica*, *Ficus subulata* etc. Hence it not be wrong to state that still a lot has to be worked upon this important plant. Apart from this, old traditional texts like Yunani, Ayurveda, mention the protective role of *Ficus bengalensis* on important body organ like kidney, skin, digestive etc, many of which are scientifically proven. Clinical investigation on peptic ulcer with aqueous extract. It contains almost all the properties of pharmaceutical care designed like antioxidant property, antidiabetic property, cholesterol lowering and potent antimicrobial property etc. In developing countries like India, one must fully explore this important medicinal plant which might provide us some important "leads" in near future.

REFERENCES

1. Sirisha N, Sreenivasulu M, Sangeeta K, Madhusudhana Chetty C. Antioxidant Properties of Ficus Species – A Review. *International Journal of Pharm Tech Research*, 2(4), 2010, 2174-2182.
2. Kirtikar KR, Basu BD. Indian medicinal plants Eds. E Blatter, Caius J. F, Lalit Maohan Basu, Allahabad, 2nd edn, 2, 1989, 2389.
3. Shivrajan VV. Ayurvedic drugs and their Plant sources, oxford and IBH Publishing company Pvt. Ltd.New Delhi, 2002, 333.
4. A.Chatterjee, The treaties of Indian medicinal plants, 1, 1997, 39.

5. Paarakh Padmma M, Ficus racemosa Linn. - An overview. *Natural Product Radiance*, 8(1), 2009, 84-90.
6. Thin Layer Chromatographic, Atlas of Ayurvedic Pharmacopeial Drugs, 2009, 1(1), 112.
7. The Wealth of India, A Dictionary of Indian Medicinal Plants and Industrial Products, 4, 2005, 26.
8. S Midya Brahmachary R. L, *Journal of Tropical Eco1ogy*, 74, 1991, 537-538.
9. Kirtikar KR and Basu BD, Indian medicinal plants. Eds. E Blatter, Caius J. F, Lalit Maohan Basu, Uttaranchal, 1, 2001, 3191-3192.
10. Jayaweera D. Medicinal Plants. National Science Council of Sri Lanka, 4, 1982, 91.
11. Subramanian SS, Nair AGR, Sterol & Flavonols of *Ficus bengalensis*. *Phytochemistry*, 9, 1970, 2583-2584.
12. Rastogi, P.Ram, Mehrotra, N.B, Compedium of Indian Medicinal Plants, 2, 2007, 187.
13. Subramanian S.Sankara and Nair AGR. Sterols and Flavonols of *Ficus bengalensis*. *Phytochemistry*, 90, 1970, 2583.
14. Mousa O, Vuorela P, Kiviranta J, Wahab SA, Hiltunen R, Vuorela H. Bioactivity of Certain Egyptian Ficus Species. *Journal of Ethnopharmacology*, 41, 1994, 71-76.
15. Patil V.Vikas, Bhangle S.C, BS Narkhede, Jawle NM, Patil RV. Analgesic and Antipyretic Activities of *Ficus bengalensis* Bark. *International Journal of Pharmaceutical Research*, 2(2), 2010, 25-30.
16. N.Manocha, C.K.Samanta, V.Sharma. Evaluation of anti-rheumatic activity of extract of stem bark of *Ficus bengalensis*. *Journal of Global Pharma Technology*, 3(3), 2011, 31-37.
17. N.Manocha, K.S.Chandra, V.Sharma, B. Sangameswaran, M, M. Saluja. Anti-Rheumatic and Antioxidant activity of extract of Stem bark of *Ficus bengalensis*. *Research Journal of Chemical Sciences*, 1(2), 2011, 1-8.
18. Kulshreshtha Mayank, Goswami Mradul, Rao V. Chandana, Ashwlayan D. Vrish, Yadav Sachdev. Anti-Ulcerogenic Potential of *Ficus bengalensis* Leaf .Biochemical Parameter & Histopathological Study, *Journal of Applied Pharmaceutical Science*, 1(2), 2011, 65-68.
19. Shukla Rimi, Anand Kiran, Prabhu K.M., Murthy Suryanarayana P, Hypoglycaemic Effect of the Water Extract of *Ficus bengalensis* in Alloxan Recovered, Mildly Diabetic and Severely Diabetic Rabbits. *International Journal of Diabetes* in Developing *Countries*, *14*, *1994*, *78-81*.
20. Singh Kumar Rakesh, Mehta Shikha, Jaiswal Dolly, Rai Kumar Prashant, Watal Geeta. Antidiabetic effect of *Ficus bengalensis* aerial roots in experimental animals. *Journal of Ethnopharmacology*, 123(1), 2009, 110-114.
21. Lansky Philip Ephraim, Paavilainen M Helena, Pawlus D Alison, Newman A. Robert. Ficus spp. Ethnobotany and potential as anticancer and Anti-inflammatory agents. *Journal of Ethnopharmacology*, 119, 2008, 195–213.
22. Ravindra S,Mohan Murali Y., Reddy Narayana N.,Raju Mohan K. Fabrication of antibacterial cotton fibres loaded with silver nanoparticles via "Green Approach" Colloids and Surfaces A:Physiochemical and Engineering Aspects, 367(1-3), 2010, 31-40.
23. Ramana V.B.D, Singh Sultan, Solanki R.K, Negi S.A. Nutritive evaluation of some nitrogen and non-nitrogen multipurpose tree species. *Animal Feed Science and Technology*, 88(1-2), 2000, 103-111.
24. Mukherjee K. Pulok, Saha Kakali, Murugesan T, Mandal S.C, Pal M, Saha B.P. Screening of anti-diarrhoeal profile of some plant extracts of a specific region of West Bengal India. *Journal of Ethnopharmacology*, 60(1), 1998, 85-89.
25. Vaithiyanathan S, Kumar Ravindra. Relationship between protein-precipitating capacity of fodder tree leaves and their tannin content. *Animal Feed Science and Technology*, 44(3-4), 1993, 281-287.
26. Bhatia P.Y.R, Raghavan S, Rao S.V.K, Prasad N. Veena. Forensic examination of leaf and leaf fragments in fresh and dried conditions. *Journal of the Forensic Science Society*, 13(3), 1973, 183-190.
27. Sardari Soroush, Shokrgozar Ali Mohammad, Ghavami Ghazaleh. Heminformatics based selection and cytotoxic effects of herbal extracts**.** *Toxicology in Vitro*, 23(7), 2009, 1412-1421.
28. Biswas TK, Mukherjee B. Plant medicines of Indian origin for wound healing activity: a review. *International Journal* of *Lower* Extremity *Wounds*, 2(1), 2003, 25-39.
29. Aswar M, Aswar U, Watkar B, Vyas M, Wagh A., Gujar KN. Anthelmintic activity of *Ficus benghalensis* . *International Journal of Green Pharmacy*, 2(3), 2008, 170-172.
30. Gabhe SY, PA Tatke, TA Khan. Evaluation of the Immunomodulatory activity of the methanol extracts of *Ficus benghalensis* roots in rats. *Indian Journal Pharmacology*, 4, 2006, 271-275.