



Phytochemical Studies on Some Bark Drugs from Marathwada Region MS India

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Manuscript details:

Received: 09.04.2026
Accepted: 09.05.2026
Published: 30.05.2026

Cite this article as:

Kshirsagar S.P. and Kare M.A. (2026) Phytochemical Studies on Some Bark Drugs from Marathwada Region MS India, *Int. J. of Life Sciences*, 14 (1A): 7-11.
<https://doi.org/10.5281/zenodo.20653841>

Available online on <http://www.ijlsci.in>
ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)



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ABSTRACT

Bark drugs constitute an important group of raw materials in traditional and modern herbal medicine due to their rich phytochemical composition and therapeutic potential. The present investigation aims to evaluate the physicochemical characteristics, nutritional composition, extractive values, and phytochemical constituents of selected bark drugs collected from the Marathwada region of Maharashtra, India. Bark samples of *Ficus amplissima*, *Ficus arnottiana*, *Ficus benjamina*, *Ficus carica*, *Ficus elastica*, *Ficus hispida*, and *Ficus microcarpa* were analyzed using standard pharmacognostic and phytochemical procedures. Parameters such as dry matter, ash values, fibre content, carbohydrates, sugars, lignin, tannins, mineral composition, gross energy, and solvent extractive values were determined. Qualitative phytochemical screening revealed the presence of bioactive compounds including tannins, phenols, alkaloids, saponins, flavonoids, coumarins, and iridoids. Considerable variation was observed among species, indicating their differential medicinal and nutritional significance. The study highlights the therapeutic potential of *Ficus* bark drugs and supports their rational use in herbal formulations and pharmacological research.

Keywords: Bark drugs, Phytochemical screening, *Ficus* species, Marathwada, Medicinal plants

INTRODUCTION

Medicinal plants have been an integral component of traditional healthcare systems since ancient times. Among various plant parts used therapeutically, bark occupies a prominent position due to its high concentration of secondary metabolites such as tannins, alkaloids, flavonoids, and phenolic compounds. Bark drugs are widely employed in Ayurveda, Unani, and folk medicine for treating ailments like diarrhea, inflammation, diabetes, skin disorders, and microbial infections. The term "bark" is used most often in a nontechnical context and refers to all tissues external to the vascular cambium (Srivastava 1964, Esau 1965). Accordingly, the

bark is an aggregation of organs and tissues that includes phloem and secondarily thickened tissues from the secondary plant body, as well as epidermis, cortex and phloem derived from the primary plant body (Esau 1965). The term bark was used by earlier authors in a technical context in reference to all dead tissues exterior to a deep-seated periderm (de Bary 1884, Büsgen and Münch 1929). Contemporary authors refer to this aggregate of dead tissues, which consists of alternating layers of periderms and associated tissues, as "rhytidome", a term often considered synonymous with the term "outer bark" (Eames and Mac Daniels 1947, Esau 1965). The Marathwada region of Maharashtra is characterized by semi-arid climatic conditions and diverse vegetation, supporting several medicinally important tree species. Members of the genus *Ficus* (family Moraceae) are particularly significant due to their extensive ethnomedicinal applications. Bark of various *Ficus* species is traditionally used as astringent, anti-diabetic, anti-inflammatory, wound-healing, and antimicrobial agents.

Despite their traditional importance, systematic phytochemical and physicochemical evaluation of bark drugs from this region remains limited. Standardization of crude drugs through scientific parameters is essential to ensure quality, safety, and efficacy. Therefore, the present study was undertaken to assess the chemical composition, extractive values, and phytochemical constituents of selected *Ficus* bark drugs from Marathwada, providing a scientific basis for their medicinal utilization.

MATERIALS AND METHODS

Study Area:

The bark samples were collected from different localities of the Marathwada region, Maharashtra, India. The region experiences a tropical semi-arid climate with moderate rainfall and supports dry deciduous vegetation.

Collection and Preparation of Bark Samples:

Healthy bark samples of *Ficus amplissima* Sm., *Ficus arnottiana* (Miq.) Miq., *Ficus benjamina* L., *Ficus carica* L., *Ficus elastica* Roxb. ex Hornem., *Ficus hispida* L.f. and *Ficus microcarpa* L.f. were collected, cleaned to remove extraneous matter, shade-dried, and powdered using a mechanical grinder. The powdered samples were stored in airtight containers for further analysis.

Physicochemical Analysis

Standard analytical methods were used to determine:

- Dry matter percentage
- Bulk density
- Total ash
- Acid soluble ash
- Acid insoluble ash
- Water soluble ash
- Water insoluble ash

These parameters help in assessing purity, quality, and inorganic content of bark drugs.

Chemical and Nutritional Composition

The bark powders were analyzed for:

- Nitrogen content and crude protein
- Total carbohydrates
- Reducing and non-reducing sugars
- Crude fibre
- Crude fat
- Cellulose and hemicellulose
- Lignin
- Tannins
- Gross energy
- Mineral elements (Calcium, Phosphorus, Potassium)

Extractive Value Determination:

Extractive values were determined using different solvents—water, methanol, alcohol, benzene, petroleum ether, chloroform, and acetone—to evaluate the solubility of bioactive compounds.

Qualitative Phytochemical Screening:

Preliminary phytochemical tests were conducted to detect the presence of tannins, phenols, alkaloids, saponins, iridoids, flavonoids (quercetin, kaempferol, catechin), coumarins, and related compounds using standard protocols.

RESULTS AND DISCUSSION

Physicochemical Characteristics:

Dry matter content ranged from 35.9% in *F. elastica* to 68.5% in *F. hispida*, indicating variation in moisture and structural components. Total ash values were highest in *F. benjamina* (11.98%), reflecting higher inorganic mineral content, while *F. hispida* showed the lowest ash value (5.11%). Acid insoluble ash values were low in all species, suggesting minimal contamination with siliceous matter.

Nutritional and Chemical Composition:

Carbohydrate content was notably high in *F. hispida* (73.10%) and *F. microcarpa* (72.60%), indicating their potential as energy-rich plant materials. Crude fibre content ranged from 18.46% (*F. microcarpa*) to 35.46% (*F. amplissima*), supporting their traditional use as digestive aids. Tannin content varied

considerably, with *F. carica* (12.50%) and *F. hispida* (10.40%) showing higher levels, correlating with their astringent and antimicrobial properties. Mineral analysis revealed appreciable amounts of calcium, phosphorus, and potassium, essential for metabolic and therapeutic functions.

Table 1: Chemical Composition of Bark Samples

Sr. No.	Name of the Samples	DM %	Bulk Density mg/cm ³	Ash %	ASA %	AIA %	WSA %
1	<i>Ficus amplissima</i>	64.8	264	10.98	10.19	0.79	8.75
2	<i>Ficus arnottiana</i>	56.4	262	9.95	9.27	0.68	8.25
3	<i>Ficus benjamina</i>	42.3	259	11.98	11.43	0.55	10.18
4	<i>Ficus carica</i>	47.1	192	7.95	7.54	0.41	5.97
5	<i>Ficus elastica</i>	35.9	163	8.92	8.45	0.47	6.68
6	<i>Ficus hispida</i>	68.5	369	5.11	4.45	0.66	3.97
7	<i>Ficus microcarpa</i>	63.6	347	7.13	6.32	0.81	5.46

Table 2: Chemical Composition of Bark Samples

Sr. No.	Name of the Samples	WIA %	N%	WSN %	CP %	Carbohydrates %	Reducing Sugar %
1	<i>Ficus amplissima</i>	2.23	0.68	0.14	4.25	45.50	4.85
2	<i>Ficus arnottiana</i>	1.70	1.13	0.51	7.06	58.50	2.69
3	<i>Ficus benjamina</i>	1.80	1.26	0.72	7.78	64.50	3.73
4	<i>Ficus carica</i>	1.98	0.89	0.30	5.56	69.25	4.23
5	<i>Ficus elastica</i>	2.24	0.92	0.23	5.75	65.60	2.49
6	<i>Ficus hispida</i>	1.14	0.81	0.09	5.06	73.10	3.82
7	<i>Ficus microcarpa</i>	1.67	0.57	0.19	3.56	72.60	3.57

Table 3: Chemical Composition of Bark Samples

Sr. No.	Name of the Samples	Non Reducing Sugar %	Total Sugar %	C Fibre %	C Fat %	Cellulose %	Hemicellulos %
1	<i>Ficus amplissima</i>	0.89	5.74	35.46	3.62	25.50	11.40
2	<i>Ficus arnottiana</i>	1.71	4.41	23.86	2.19	38.30	4.60
3	<i>Ficus benjamina</i>	0.93	4.66	24.41	2.83	35.20	3.50
4	<i>Ficus carica</i>	0.86	5.09	27.13	4.29	19.80	6.70
5	<i>Ficus elastica</i>	0.76	3.25	29.26	3.68	22.70	9.40
6	<i>Ficus hispida</i>	1.16	4.98	24.83	5.60	23.40	10.30
7	<i>Ficus microcarpa</i>	0.76	4.33	18.46	4.87	24.90	3.60

Table 4: Chemical Composition of Bark Samples

Sr. No.	Name of the Samples	Lignin %	Tannins %	Gross Energy K/cal	Ca %	P %	K %
1	<i>Ficus amplissima</i>	3.90	5.20	3.42	4.10	0.268	0.245
2	<i>Ficus arnottiana</i>	17.40	8.30	3.62	2.45	0.572	0.311
3	<i>Ficus benjamina</i>	4.20	6.80	3.38	1.65	0.481	0.494
4	<i>Ficus carica</i>	7.80	12.50	3.55	2.60	0.193	0.317
5	<i>Ficus elastica</i>	9.50	9.20	3.45	3.50	0.107	0.652
6	<i>Ficus hispida</i>	5.60	10.40	3.63	3.14	0.098	0.580
7	<i>Ficus microcarpa</i>	2.70	8.80	3.75	2.63	0.132	0.556

Table 5: Extractive values of Bark Samples

Sr. No.	Name of the Samples	Solvents						
		Water %	Methanol %	Alcohol %	Benzene %	Petro. Ether %	Chloroform %	Acetone %
1	<i>Ficus amplissima</i>	8.30	7.40	5.70	2.89	2.71	0.65	4.60
2	<i>Ficus arnottiana</i>	11.20	6.30	9.40	5.54	0.95	0.76	1.90
3	<i>Ficus benjamina</i>	5.40	8.20	8.70	2.94	0.98	1.03	3.68
4	<i>Ficus carica</i>	7.10	7.10	7.60	6.82	0.95	0.42	2.92
5	<i>Ficus elastica</i>	9.50	4.90	6.80	3.51	4.96	0.52	6.28
6	<i>Ficus hispida</i>	6.90	9.90	6.80	5.01	5.24	0.48	5.65
7	<i>Ficus microcarpa</i>	5.30	8.30	8.20	7.38	0.68	0.84	3.45

Table 6: Distribution of chemical compounds in Barks

Sr. No.	Name of the Samples	1	2	3	4	5	6	7	8	9	10	11	12	13
1	<i>Ficus amplissima</i>	+	+	+	+	-	-	-	-	-	-	-	-	-
2	<i>Ficus arnottiana</i>	+	+	+	+	-	-	-	-	-	-	-	-	-
3	<i>Ficus benjamina</i>	+	+	+	+	+	-	+	+	-	+	-	-	-
4	<i>Ficus carica</i>	+	+	+	+	+	+	-	-	+	-	-	-	-
5	<i>Ficus elastica</i>	+	+	+	-	-	-	-	+	-	-	-	-	-
6	<i>Ficus hispida</i>	+	+	+	+	+	-	+	-	-	-	-	-	-
7	<i>Ficus microcarpa</i>	+	+	+	+	+	-	-	-	+	-	-	-	-

1. Tannins 2. Phenols 3. Alkaloids 4. Saponins 5. Iridoids 6. Quercetin 7. Kaempferol 8. Catechin
9. Coumarin 10. 6,7-Dimethoxy coumarin. 11. 5-Methoxy genistein 12. Anthocyanin 13. Proanthocyanin

Extractive Values:

Water and methanol extractives were generally higher compared to non-polar solvents, indicating the predominance of polar bioactive compounds. *F. arnottiana* and *F. hispida* exhibited higher water-soluble extractives, suggesting better availability of therapeutically active constituents.

Phytochemical Screening:

Qualitative analysis confirmed the presence of tannins, phenols, alkaloids, and saponins in all studied species. Flavonoids such as quercetin and kaempferol were detected in selected species, while coumarins and iridoids were variably distributed. The presence of these compounds substantiates the medicinal value of *Ficus* bark drugs and supports their pharmacological relevance.

CONCLUSION

The present study demonstrates that bark drugs of selected *Ficus* species from the Marathwada region possess rich phytochemical and nutritional profiles. Significant inter-specific variation in chemical

composition and bioactive constituents highlights their diverse therapeutic potential. The findings provide a scientific foundation for the traditional use of these bark drugs and emphasize their importance in herbal drug development and quality standardization.

Conflict of interest

The authors declare no competing interests.

Data Availability Statement: Not applicable.

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