



INDO AMERICAN JOURNAL OF PHARMACEUTICAL RESEARCH



AMLIKA MOOLA (*TAMARINDUS INDICA* L.) - A PHYTO PHARMACOGNOSTIC STUDY

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ARTICLE INFO

Article history

Received 04/08/2022

Available online

04/09/2022

Keywords

Amlika Moola,
Tamarindus Indica,
Pharmacognosy.

ABSTRACT

Tamarind is a nutritious fruit with a variety of uses. The properties of this species have been extensively studied, particularly with reference to the components of the whole parts. Tamarind has many valuable properties and virtually every part of the tree has been utilised by both rural and urban dwellers. Microscopically root powder showed the presence of different structures, Physicochemical parameters including foreign matter, total ash value, acid insoluble ash, etc were evaluated. Phytochemical screening showed the presence of primary and secondary metabolites. All these parameters will help in confirming identity, quality, purity and efficacy of the root. With the help of phytochemical analysis, the drug is understood to have many therapeutic applications, there is a wide scope for its clinical trial.

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Please cite this article in press as **Dr. DEEPIKA R** et al. Amlika Moola (*Tamarindus Indica* L.) - A Phyto Pharmacognostic Study. *Indo American Journal of Pharmaceutical Research*.2022;12(08).

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INTRODUCTION

Tamarind itself was derived from Arabic which combined Tamar meaning 'date' with Hindi meaning 'of India'. The full Arabic name was Tamar-u'l Hind and the word date included because of the brown appearance of tamarind pulp. Tamarind is a long-lived, large, evergreen or semi-evergreen tree, 20-30 m tall with a thick trunk up to 1.5-2 m across and up to 8 m in circumference. The trunk forks at about 1 m above ground and is often multi-stemmed with branches widely spreading, drooping at the ends and often crooked but forming a spreading, rounded crown. The bark is brownish-grey, rough and scaly. Young twigs are slender and puberulent. A dark red gum exudes from the trunk and branches when they are damaged.¹

Root :

Tamarind produces a deep tap root and an extensive lateral root system, but the tap root may be stunted in badly drained or compacted soils. The tap root is flexuous and lateral roots are produced from the main root at different levels.

Leaves :

Leaves are alternate and even pinnate, shortly petiolate (up to 1.5 cm long) and petiole glabrous or puberulent as is the leaf rachis. Laminae are glabrous or puberulent, glaucous underneath and darker green above. Venation is reticulate and the midrib of each leaflet is conspicuous above and below. At the leaf base is a pulvinus and two small stipules, which are caducous early on; stipules are falcate, acuminate and pubescent. A permanent scar is seen after leaf fall.

Flowers :

Flowers are borne in lax racemes which are few to several flowered (up to 18), borne at the ends of branches and are shorter than the leaves, the lateral flowers are drooping.²

Fruits and seeds :

The fruits are pods, oblong, curved or straight, with rounded ends, somewhat compressed and indehiscent although brittle. The pod has an outer epicarp which is light grey or brown and scaly. Within is the firm but soft pulp which is thick and blackish brown. The pulp is traversed by formed seed cavities, which contain the seeds. The outer surface of the pulp has three tough branched fibres from the base to the apex.

Each pod contains 1-12 seeds which are flattened, glossy, orbicular to rhomboid, centre of each flat side of the seed marked with a large central depression. Seeds are hard, red to purple brown, non-arillate and exalbuminous. Seed chambers are lined with a parchment like membrane. Cotyledons are thick.

Medicinal uses:

The medicinal properties of the bark, flower and root are similar in many respects to the pulp. Treatment for digestive tract ailments and indigestion have been reported from Cambodia, India and the Philippines (Jayaweera, 1981; Rama Rao, 1975). The bark ash is usually the most effective method of administration. The bark has also been used to recover loss of sensation due to paralysis. Gargling the ash with water has been used in the treatment of sore throats, to heal aphthous sores and in urinary discharges and gonorrhoea. The bark is astringent and is used as a tonic and in lotions or poultices to relieve sores, ulcers, boils and rashes in the Philippines and Eastern Sudan (Dalziel, 1937). The bark of the tree should be peeled off if needed for medicinal purposes during the time when the tree is not flowering or when the flowering season ends. Ashes of the burnt shells of ripe fruits are used as an alkaline substance with other alkaline ashes in the preparation of medicine 'Abayalavana' in India, for curing enlarged spleen.

A poultice of flowers is used in the treatment of eye diseases and conjunctivitis in the Philippines (Brown, 1954; de Padua et al., 1978). The flowers are also used internally as a remedy for jaundice and bleeding piles. The 'Irula' tribals of the Anaikkatty hills in the northwest of Coimbatore, Tamil Nadu, India, use tamarind root bark for abortion and for prevention of pregnancies. The root bark is ground into a powder and mixed with hot water and administered three days before abortions and for prevention of pregnancies (Lakshmanan and Narayanan, 1994).^{1,3}

MATERIALS AND METHODS:

The roots of *Tamarindus indica* Linn. were collected from the Herbal Garden of Sri Sri College of Ayurveda and authenticated from senior Scientist Department of Dravyaguna Sri Sri College of Ayurvedic Science and Research Bengaluru. The fresh root was taken and Organoleptic study was conducted by observing physical sensory, color, odour and taste of the drug powder. Microscopic study of *Tamarindus indica* Linn. root was soaked in distilled water. Transverse sections of *Tamarindus indica* Linn. root was taken by adopting free hand sectioning method.⁴ Thin and uniform section was selected for staining, after staining, section was mounted by using glycerine. Prepared slide was observed under microscope for detailed study. Powder microscopy was carried out by following standard Pharmacognostic method.⁵ Preliminary phytochemical analysis was done by extracting 100 gms of root powder through hydroalcoholic extraction. Physicochemical studies of root of *Tamarindus indica* Linn was carried out through SOP at Sriveda Satva Unit QA&QC Laboratory, Bangalore.⁵ Phytochemical studies of root of *Tamarindus indica* Linn was carried out at Drug testing laboratory, PG studies Dept. of Dravyaguna, Sri Sri College of Ayurvedic Science and Research, Bengaluru by following the standard procedure⁶

HPLC analysis of root from Azyne laboratory, Bengaluru. The analysis was made on C18 column (symmetry, 4.6mm×250mm) in an isocratic mode with the mobile phase methanol and water in the ratio 80:20 with the RP-HPLC at a flow rate

of 1mL/min. The standard gallic acid with the concentration 0.4mg/mL and samples (10 mg/mL) were dissolved in mobile phase and 20 μ L was injected and the elution was monitored at 270nm. The amount of tannin present in the Tamarind root was recorded.⁷



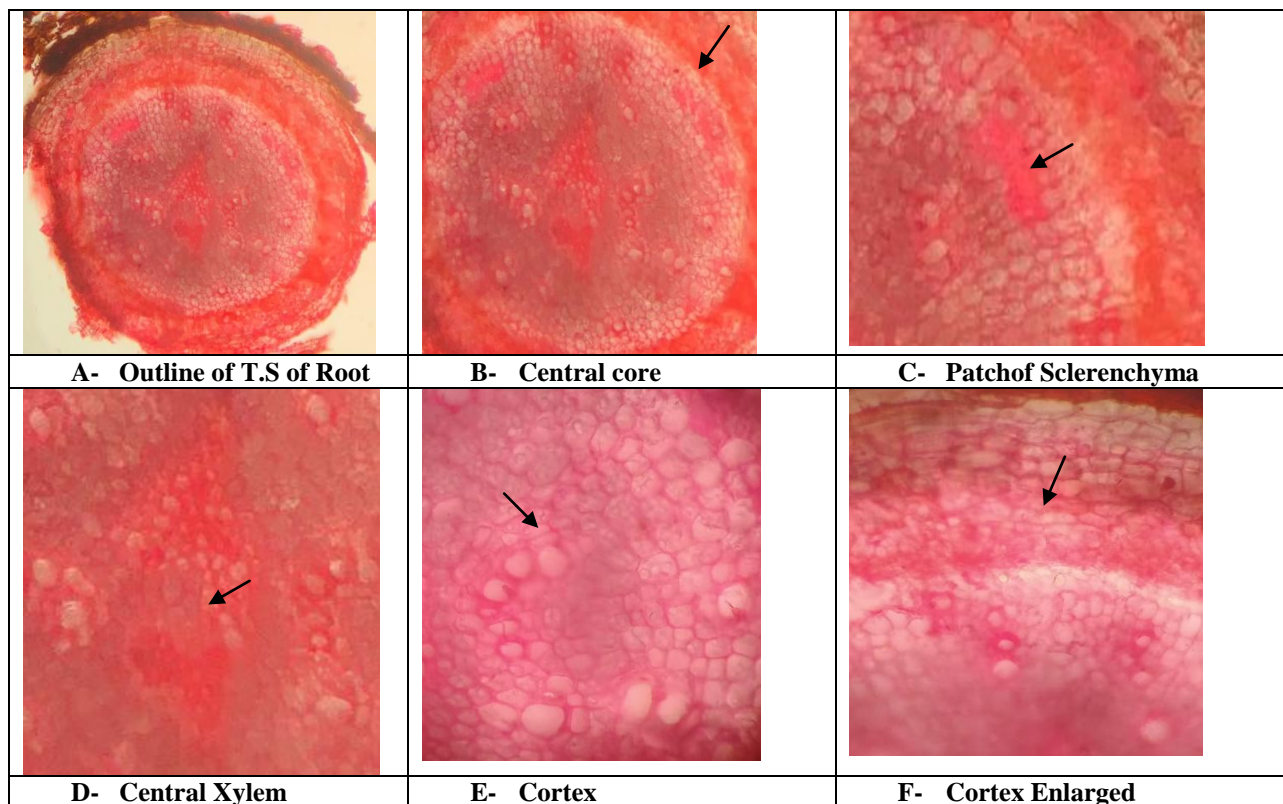
A **B** **C**
Figure 1 : A.Tamarind sapling, B .Tamarind root, C. Tamarind root powder.

Organoleptic Evaluation:

Table No: 1 Organoleptic Evaluation of *Tamarindus indica* L. root powder.

Sl.No	Organoleptic characters	<i>Tamarindus indica</i> Linn seed
1	Colour	Pale Whitish Brown
2	Texture	Course
3	Odour	Characteristic
4	Taste	Astringent

Microscopic Evaluation:



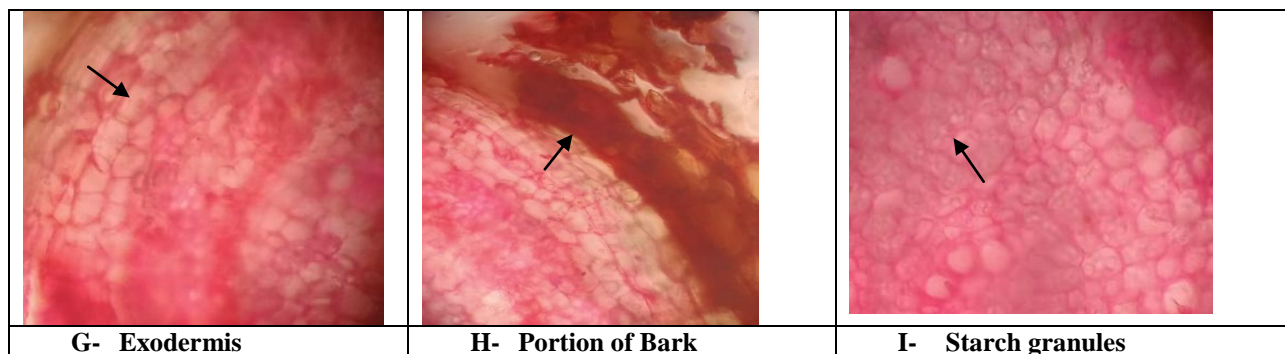
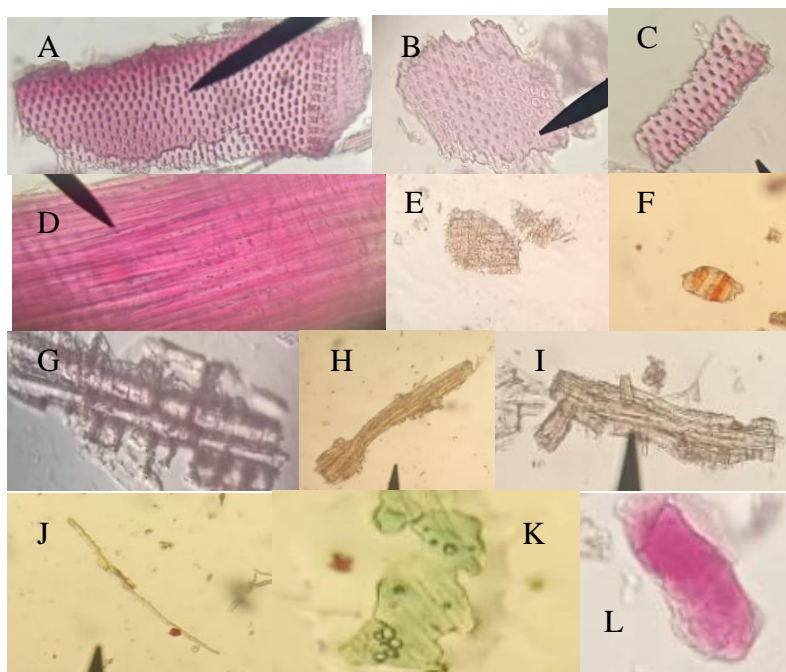


Figure2 : Transverse section of *Tamarindus indica* L. Root.

T.S of the root is circular in outline and consist of outermost bark made up of three to four layers of dead cells which is exfoliate here and there. Below the bark four to five layers of tangentially elongated exodermis made up of parenchymatous cells. Cortex is broad and is made up of loosely arranged circular -oval shaped parenchymatous cells with plenty of starch granules inside the cells. Starch grains are simple present in cluster. Cortex consists of a patches of sclernchymatous tissues. After the corticular region there is ring of undifferentiated cells of phloem that encircles the central core of xylem. Central core is occupied by well-developed xylem.

Powder Microscopy:



A,B,C. Pitted vessels, D. Fragments of vascular bundle, E. Fragment of Cortex, Pigment cells G. Fragments of Epiploma, H, I. Fragments of Vascular bundle, J. Fibre K. starch granules L. Parenchyma cell.

Physicochemical Evaluation:

Table No: 2 Physicochemical Evaluation of *Tamarindus indica* L. Root.

Sl.No	Parameter	<i>Tamarindus indica</i> Linn root
1	Foreign matter	0.0%
2	Loss on drying	5.71%
3	Total ash	0.05%
4	Acid insoluble ash	5.10%
5	Alcohol soluble extractive	2.97%
6	Water soluble extractive	14%

Phytochemical Evaluation

Table No: 3 Phyto-chemical Evaluation of *Tamarindus indica* L. Root.

Sl.No	PHYTO - CONSTITUENTS	TESTS	Observation Of <i>Amlika Moola</i>
1	Alkaloids	Wagner's test	-
2	Proteins	Biuret test	+
3	Tannins	Gelatin test	+
4	Phenols	Ferric chloride test	+
5	Saponins	Foam test	+
6	Steroids	Salkowski test	-
7	Carbohydrates	Molisch's Test	+
8	Starch	Iodine test	+
9	Flavonoids	Lead acetate test	+

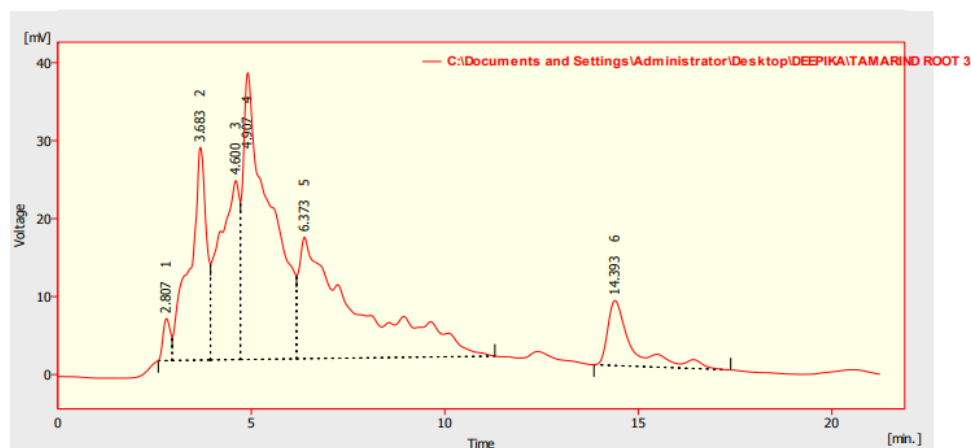
Quantification of Tannin and Polyphenols

Table No: 4 Quantification of Tannin and Polyphenols.

Sl.No	Constituents	<i>Amlika Moola</i>
1	Tannin	1.247%
2	Polyphenols	1.4%

HPLC analysis of *Tamarindus indica* L. RootTable No: 5HPLC analysis of *Tamarindus indica* L. Root.

Sample	Amount (mg/g of sample)
Tamarind root	0.306



	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	2.807	70.381	5.379	1.3	4.6	0.25
2	3.683	827.037	27.279	14.9	23.5	0.38
3	4.600	823.768	22.949	14.9	19.7	0.77
4	4.907	1805.676	36.770	32.6	31.6	0.93
5	6.373	1646.930	15.572	29.7	13.4	1.21
6	14.393	373.111	8.339	6.7	7.2	0.49
	Total	5546.902	116.287	100.0	100.0	

DISCUSSION

Organoleptic studies show the specific texture was course and Odour was characteristic and taste was astringent .The material is free from the foreign matter. The Physicochemical Evaluation of Tamarindus indica Linn rootare within the normal limits. Phytochemical tests detect the presence of protein, carbohydrate, tannins, flavonoids, saponins, phenol and amino acids in the sample material. HPLC standards shows 8 peaks for the Gallic acid, when compared with gallic acid standards.

CONCLUSION

Tamarindus indica root are rich source of phenols, tannins, polysaccharide and other phytochemicals. In traditional medicine, it has many well-known health benefits and literary review suggests that it can be widely used in many disorders. All these parameters will help in confirming identity, quality, purity and efficacy of the root. With the help of phytochemical analysis, the drug is understood to have many therapeutic applications. Hence there is a wide scope for its clinical trial.

ACKNOWLEDGEMENT


I'm thankful to Dr. Ganesh Puttur sir,Principal, Sri Sri College of Ayurvedic Science and Research, Bengaluru, I owe my deep sense of gratitude to my teaching faculty of Department of P.G.Studies in Dravyaguna,Dr. Giriprashanth K.G., sir, Professor, Dr. Naveen V, sir Associate Professor, Dr.Aathira Sreekumar, madam,Assistant Professor, for providing valuable inputs,juniors Bhavana H N Udupa, Bhavana S Gaitondre, Roopali R Shindhe, Venkatesh S for helping in cross-sectioning of the root, mycolleague and friendsfor continuous support andencouragement.

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