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## PHARMACOGNOSTICAL AND PHYSICOCHEMICAL STUDY OF *MORINGA OLEIFERA* LAM. LEAVES

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### ABSTRACT

*Moringa oleifera* Lam. (Family Moringaceae) is well known in Indian system of medicine. *Moringa oleifera* (Lam.) has many common names ben oil, horseradish, and miracle tree. It is found wild and cultivated throughout the plains, and is near the sandy beds of rivers and streams. For the correct identification of similar looking species, there should be well documented characteristics of plant. The study of the fresh leaves and powdered study were carried out to determine the morphological, microscopical, some physicochemical and phytochemical parameters. The evaluation of preliminary phytochemical investigations was carried out which shows the aqueous and alcoholic extracts are rich in maximum number of phytoconstituents like alkaloids, flavonoids, glycosides, phenols, tannins and carbohydrates. Physicochemical Parameters like foreign organic matter (2.5%), total moisture content (8.9%) Ash values (Total ash, acid insoluble ash, water soluble ash, sulphated ash) were evaluated which are found to be within standard limits.

### KEYWORDS

*Moringa oleifera*, Pharmacognostical and Phytochemical screening.

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### INTRODUCTION

*Moringa oleifera* (Lam.) has many common names such as ben oil, drumstick, horseradish, and miracle tree. *Moringa oleifera* is a widely distributed species of the family Moringaceae. It is a small graceful, deciduous plant with thin foliage and can grow up to 8m height<sup>1</sup>. Plants are unique source of food, medicinal artifacts, energy and shelter for both human and animal, many useful harvests obtained from plants directly or indirectly validate their importance to the human and other living

organisms<sup>2</sup>. *Moringa oleifera* Lam. (Moringaceae) is native to the southern foothills of the Himalayas in north-western region, India, Pakistan, Asia and Africa and it is distributed throughout the world in arid and semi-arid climate<sup>3</sup>. It is the most widely cultivated species of the genus *Moringa*. The leaves are rich source of both macro- and micronutrients, such as protein and many<sup>4</sup>. Fresh leaf juice inhibits the growth of human pathogens<sup>5</sup>. The juice from the leaf of *Moringa* can reduce glucose levels; it has purgative, anti-inflammatory and strong antimalarial properties<sup>5,6</sup>. It also serves as a treatment for piles, fever, sore throat, bronchitis, catarrh, eye and ear infections as well as healing sores and relieving headaches<sup>7</sup>.

*Moringa* contains specific plant pigments, alpha-carotene and beta-carotene, lutein and phytochemical constituents such as alkaloids, flavonoids, saponins, sterols, phenols and tannins. The therapeutic effects of *Moringa oleifera* could be due to the combined actions of various bioactive components found in the plant, including trace metal ions, vitamins, alkaloids, polyphenols and other elements<sup>8</sup> and they collectively act on broad physiological processes including metabolism and immunity<sup>9</sup>.

## MATERIAL AND METHODS

### Collection and authentication of leaflets

The leaves of *Moringa oleifera* were collected from the Dhule district and near places, in North Maharashtra region and authenticated by Dhule district of Maharashtra, and positively authenticated at Taxonomy department, SSVPS College, Dhule, Maharashtra. The voucher specimen was submitted in the Department of Pharmacognosy, Gangamai College of pharmacy Nagaon, Dhule. The *Moringa oleifera* leaves were separated from twigs and shade dried. The dried leaves were cleaned, and size reduced to coarse powder and stored in suitable container for physicochemical and microscopical analysis. The fresh leaves of selected plant used to study the histology of the leaves.

### Macroscopic evaluation

The leaves were separated from other parts, cleaned and dried for further use. The leaves of *Moringa oleifera* was subjected to macroscopic studies which comprised of organoleptic characteristics viz. colour, odour, taste, size, shape, apex, margin, Surface, texture, midrib, venation, and leaflet petiole etc. (Figure No.1). Of the drug. These parameters are considered as quite useful in quality control of the crude drug and were evaluated as per standard WHO guidelines.

### Microscopic evaluation

Microscopical studies were carried out from transverse sections of fresh leaves. Thin free hand fine transverse sections of fresh leaves of *Moringa oleifera* were cut with the help of sharp razor blade. The sections were treated with chloral hydrate solution and warmed gently. The cleared sections were stained with mounted in 50% glycerine and observed under microscope for the identification of various tissues and their arrangement. Microphotographs of sections were taken for the identification of various tissues and their arrangement. Characteristic features of leaves of *Moringa oleifera* were noted (Figure No.2).

### Physicochemical analysis

The *Moringa oleifera* leaves and powder used for physicochemical analysis. The parameters like loss on drying, foreign matter, extractive values were studied as per Rajeshwari and Tatiya<sup>10</sup>. In addition, the swelling index, foaming index, and pH of extract were studied as per WHO guidelines<sup>11</sup>. (WHO, 1998).

## RESULTS AND DISCUSSION

The present morpho-anatomical and physicochemical study *Moringa oleifera* leaflets focused to develop the standards for correct identification of selected plant

### Macroscopy

In the identification of medicinal plants, the morphological study is first analysis. For the correct identification of similar looking species, there should be well documented characteristics of plant.

The morphology of the leaves mention below. The moringa leaves are alternate.

**Morphology of leaflets and leafs**

**Colour:** Dark green

**Odour:** Faint characteristic

**Taste:** Slightly bitter

**Size:** length-7-6.5cm; Width-4.5-8.5cm

**Extra feature**

**Apex:** Broadly acute

**Leaflets:** 3-4 Pairs

**Margin:** Entire

**Shape:** Elliptical to Ovate

**Base:** Symmetrical

**Surface:** Dorsal- dark green; Ventral-light green

**Texture:** Upper surface- Smooth

Lower surface- slightly smooth

**Midrib:** Biconvex and more prominent

**Venation:** Odd pinnately Figure: No.2

**Leaflet petiole:** 1-2.5cm

**Microscopical evaluation**

The microscopic evaluation plays an important role in differentiating the adulterants. The transverse section of *Moringa oleifera* leaflets showed the typical characteristics for correct identification of plant. The transverse section of leaflet passing through midrib and lamina showed dorsiventral structure with straight walled, three layered tightly arranged, cuticulated epidermal cells. The epidermal layer contain few of the epidermal cells. The modified as non- glandular, unicellular trichomes was present. In the lamina region, the below the epidermal layer, showed the presence of single layer of elongated round shape cells followed by 4-5 layers of loosely arranged spongy parenchymatous cells. The vascular bundle present at the centre containing primary xylem vessel and phloem as sieve tubes, responsible for conduction of water and food. The parenchymatous cells containing calcium oxalate crystals. Lower epidermis consists single layer cells below its cylindrical palisade cells and broad sclerenchyma was present.

**Phytochemical analysis**

The evaluation of phytochemical parameters, was carried out the phytochemical standards for

identification of plant. The preliminary phytochemical investigations of ethyl acetate, chloroform, methanol and aqueous extracts of *Moringa Oleifera* leaflets were performed. The large Number of phytoconstituents were found in methanol and aqueous extracts of *Moringa oleifera* leaflets, with prominent presence of Alkaloids, flavonoids, tannins, Saponnins, carbohydrates, vitamins, proteins and phenols. The ethyl acetate and chloroform extracts also contain some constituents such as alkaloids, flavonoids, tannins, vitamins, phenols and steroids.

**Physicochemical analysis**

The physicochemical standards are important to check the quality, purity and adulteration of given crude drug. Foreign organic matter is matter or part of the matter other than the crude drug which is not defined and described in the prescribed monograph of sample is known as foreign organic matter. High percentage of foreign organic matter is considered as a more deteriorating quality of drug or sample<sup>12</sup>. The content of FOM in selected samples was found in appraisable limit.

Loss on drying measures the sum amount of water and volatile content present in the crude drug. The *Moringa oleifera* leaflets showed the loss on drying within the limit.

The determination of different type of ash values gives the idea about the purity and quality of crude drug. The Total ash gives the information of physiological mineral content of the plant. The high total ash indicates the plant may contains the mineral like calcium carbonate, oxalate as cell content. In the present study, *Moringa oleifera* exhibited total ash content about 11.5%. Furthermore, Acid insoluble ash and water soluble ash was determine.

The powder of the *Moringa oleifera* leaflet was exhibited higher water soluble ash content. Sulphated ash determines inorganic impurities or residual matter in an organic substance which is not volatilized from a sample when the sample is ignited in the sulphuric acid.

Extractive values are primarily useful for the determination of exhausted or adulterated drug.

*Moringa oleifera* leaflet showed alcohol extractive value more than water extractive value. This signifies that the large amount of constituents were soluble in alcohol than water. The alcohol extractive values indicated the presence of polar constituents like phenols, alkaloids, steroids, glycosides, flavonoids, etc. and the water extractive values indicated the presence of inorganic and phenolic compound. The foreign matter, LOD, ash and extractive values were determined and summarized in Table No.2.

**Table No.1: Phytochemical evaluation in different solvent extracts**

S.No	Plant Part	Leaflets powder			
		Solvents			
		Ethyl acetate	Chloroform	Ethanol	Aqueous
1	Alkaloids	+	+	+	+
2	Flavonoids	+	+	+	+
3	Glycoside	-	-	+	-
4	Tannins	+	+	+	+
5	Steroids	-	+	-	-
6	Saponins	-	-	+	+
7	Carbohydrate	-	-	+	+
8	Resins	-	-	+	-
9	Fatty acid	+	+	+	-
10	Vitamins	+	+	+	+
11	Proteins	-	-	+	+
12	Phenols	+	-	-	+

**Table No.2: Physico-chemical evaluation of powder leaves**

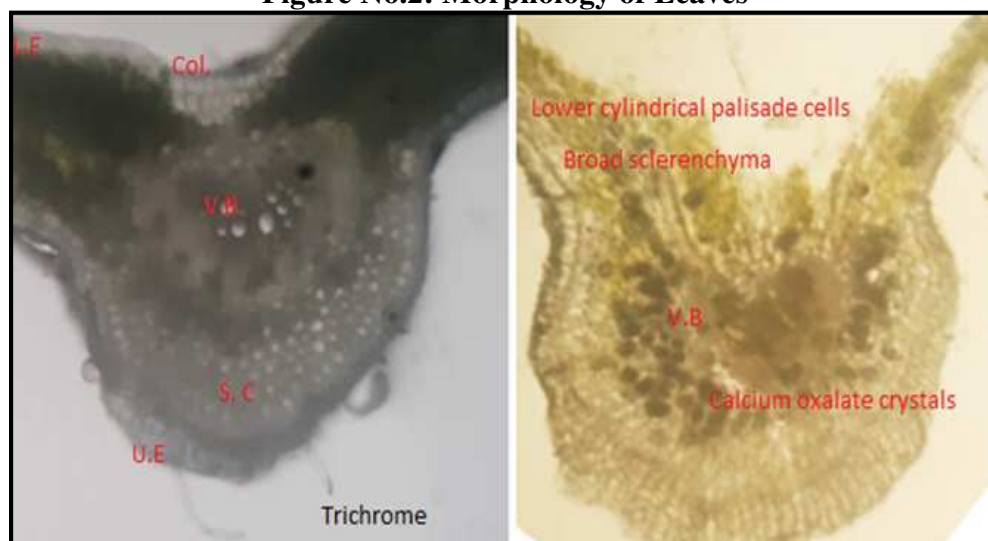
S.No	Parameters	<i>Moringa oleifera</i>
1	Foreign organic matter	3.6 %
2	Total moisture content	10.7 %
<b>Ash value</b>		
3	Total ash	11.5 %
4	Acid insoluble ash	7.5 %
5	water soluble ash	1.20 %
6	Total sulphated ash	2.64 %
<b>Extractive value</b>		
7	Water soluble ash value	15.56 %
8	Alcohol soluble ash value	18.32 %



**Figure No.1: Morphology of Leaflets**



**Figure No.2: Morphology of Leaves**



**Figure No.3: Transverse section of leaf of *Moringa oleifera***

**L.E- Lower epidermis; U.P- Upper epidermis; Col.- collenchyma; S.C- Spongy collenchyma; V.B- Vascular bundle**

## CONCLUSION

The present study provides in-depth macroscopical and microscopical features, and preliminary identification and quantification of biologically active phytoconstituents which also provide pharmacopoeia standards for easy identification of the *Moringa oleifera* leaflets. The macroscopical and organoleptic standards which include the visual and sensory characters provided the simplest and quickest indication of the identity and quality of *Moringa oleifera*. The leaf show 3.6% FOM, 10.7% moisture content, ash value is within limit according pharmacopoeial standard. The alcohol soluble extractive value is more than water soluble extractive value. Hence, differentiating it from closely related species.

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## CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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