



## A CRITICAL OVERVIEW ON MORINGA OLEIFERA

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### ARTICLE INFO

#### Key Words

Moringa oleifera  
Medicinal Uses

Access this article online  
Website:

<https://www.jgtps.com/>

Quick Response Code:



### ABSTRACT

The main objective of this study was to review the Benefits and uses of this multipurpose tree for treat& cure various diseases. Moringa oleifera is a highly nutritive multipurpose, valued plant. It is widely distributed in Tropical and subtropical regions in the world. Plant contains many bioactive compounds, nutritive compounds, phenolic compounds, flavonoids, Terpenes and also contain protein due to the presence of these compound the plant exhibit many biological/ Pharmacological activity and the all parts of plant such as Leaves, seed, flower, fruits and root also useful for the treatment of various diseases includes cancer treatment, Cardiovascular disease, Liver diseases, Eye disease, it is also useful for the treatment of Diabetes mellitus and possess various activity like anti hypertensive activity, diuretic activity, hypocholestraemic activity etc. Various plant part are also beneficial for preparation of Neutraceutical products, cosmetic products such as skin care products, hair care products.

### INTRODUCTION

**Moringa Oleifera** (MO) is commonly known as Drumstick Tree/ ben oil tree or horseradish tree and its belonging to the Moringaceae Family. The plant is native of India and its grown in Tropical and Subtropical Regions of the world. MO is a Valued medicinal Plant/ Miracle Tree and 5000 years ago this was mentioned in charak samhita its known as African Folk Medicine (1,2). The plant is easily tolerates a heavy rainfall with minimum annual rainfall and its grows best in temperature range of 25–35 °C, under direct sunlight, its requires soil with pH Range 5.0–9.0. The plant alsotolerate excess temperature range up to 48 °C, frost in winter, altitude, and a wide variety of soil conditions and the tree height is 10 to 15m, diameter is 20-40 cm (3)and every leaf Up to 7-60 cm long. They are 5cm away from the central stalk of the plant. MO contains slightly larger terminal leaves with leavesin opposite pairs. The Leaves of the plant isdark green in above side and pale on the bottom side and they are varying in

Shape& size but commonly ovate shape (4). According to the study Moringa Oleifera is Fast growing, multipurpose and one of the most useful tree in the world because all parts of the plant are used in food, pharmaceutical products, industrial purposes and they exhibit many medicinal properties etc (2). The plant are highly nutritious value and rich in amino acids, vitamins, proteins, minerals, other essential Phytochemicals and the plant is a good source of natural antioxidants thus enhance the shelf-life of fat containing foods due to the presence of various types of antioxidant compounds like ascorbic acid, flavonoids, phenolicand carotenoids etc. Some Research study shown all Parts of Plant such as Leaves, Stem, Seed and Flowers, whole pod are useful for treat various diseases and they exhibit various pharmacological/medicinal properties such as analgesic, anti-inflammatory, antipyretic,anti tumour, anticancer activity, antioxidant, hepatoprotective property, gastro protective, anti-ulcer, cardiovascular and

circulatory stimulant, anti-obesity, antiepileptic, antiasthmatic, antidiabetic, anti epileptic , diuretic, local anaesthetic, anti allergic, anthelmintic, wound healing, antimicrobial agent, Malnutrition and the leaves of plant are useful for breast milk in lactating mothers etc (5). It is also useful for the Production of biodiesel and water purification, nutraceuticals, also useful for making food products and consumption of food such as cake, bread, biscuits, soup etc(2).

- 1) **Appearance of MO plant:-**The plant contains heights up to 10-15 m long, diameter is 20-40 cm (7). The tree is deep rooted and the wood of tree is soft (4).
- 2) **Leaves:-**The plant leaves is long up to 7-60 cm and the colour of leaves is dark green. The leaves of plant are varying in shape and size with opposite pairs with elliptical shape (4).
- 3) **Flower:-** The flower petals of MO plant is yellowish white and long up to 1.0-1.5cm, 2.0cm broad.MO bearing Fragrant flower these are bisexual and surrounded with five unequal petals bearing thin veined (7).
- 4) **Fruit:-**Fruit of MO long up to 90 cm and 12 mm broad (4). They contain a hanging type fruit in plant and the fruit of MO contains globular seed which is 1cm in diameter (7).
- 5) **Bark:-** Bark of the MO plant is smooth, dark brown/yellowish green in colour (4).

**Benefits/Uses of MO Plant:** Numerous Research study shown the many uses/benefits of MO tree in various fields such as useful in Pharmaceutical, useful for making food, water purification, useful as a pesticide for crop field. Some other benefits of MO includes useful as a cleaning agent, production of Biofuel and the some research study also report the use of parts of Drumstick Tree detailed discussed in below(2).

**Medicinal use of parts of *Moringa Oleifera*:** All parts of the drumstick Plant are useful for Many preparation like pharmaceutical preparation, food preparations, nutraceuticals and also useful for production of biodiesel and water purification. They contain a rich source of Vitamins, Minerals, Protein and some other phenolic compounds etc. whole parts of plant are used such as Leaves, stem, Fruit, Seeds, Pod, Root discussed in below:-

**Leaves:-** The leaves of the plant is used in various Pharmaceutical Preparations for treat various diseases and it is also used in Preparation of food Products and the plant leaves is rich in vitamins, minerals, phenolic compounds includes quercetin and kaempferol and they contain some other nutritious compounds. they possess strong antioxidant activity (4).

Numerous study shown Plant leaves are good role play for carbon dioxide (CO<sub>2</sub>) assimilation and utilisation. The rate of absorption of CO<sub>2</sub> by drumstick tree is 20 times greater than general/other vegetation.

According to Japanese study in 2009, Drumstick contains more amount of vitamin C compare to Oranges, Contains 10 times more amount of vitamin A compare to carrots and the plant are also in rich source of Calcium, Protein and they contains more amount of calcium compare to milk, contains more (9 times) Protein than yoghurt and (15 times) more quantity of potassium than bananas and contain (25 times) more amount of iron compare to spinach (4).

**Medicinal use of leaves:-** Purgative (used to treat constipation), eye and ear infection, juice of leaves is used to control the glucose level in blood, scurvy (Lack of vitamin C) and some other disease like useful in bronchitis (Respiratory Infection), catarrh (excessive discharge/Inflammation in mucous membrane), Headaches, fever, Piles etc.(8)

**Root:-** Many Scholars study shown the root of MO is used to cure and treat Gastric Ulcer and Gastric mucosal lesion. It is also used to decrease the acidity Hence, Drumstick exhibits antiulcer activity (4).

**Medicinal use of root:-** It is used as Antilithic agent (Prevent formation of kidney stones), carminative (Facilitate the expulsion of gas), antifertility, act as anti-inflammatory agent, used as a cardiac/circulatory tonic, abortifacient agent (Agent that induce abortion), Useful in pain such as lowerback pain or kidney pain and constipation (8).

**Flower:-** The Drumstick flower possess anti inflammatory activity, antiarthritic activity and its also exhibit high medicinal value as a stimulant.

**Medicinal Properties:-**, aphrodisiac (agent that Increases sexual Pleasure), hysteria

(Uncontrollable emotion), hypercholesterolemia (decreased cholesterol in blood). Heart and aorta in hypercholesterolemia rabbits and increased the excretion of faecal cholesterol. (8)

**Pods:** Numerous study shown that Drumstick pods is used to treat liver diseases, diarrhoea and spleen problems, and also used in Pain such as Joint pain (2).

**Stem bark:** Stem of the Plant Possess high medicinal value its Possess antitubercular activity and the juice of the root bark is used to ear pain and also used as painkiller for Dental cavity.

**Medicinal use of stem bark:-**It is used to treat eye diseases and also used for the treatment of delirious patients (Rapid changes in brain function) , prevent enlargement of the spleen and formation of tuberculous glands of the neck, tumors and possess anti ulcer activity/ heal ulcer(8).

**Seed:-** The Seed of drumstick plant is contain a variety of phytochemical compounds, Antioxidants includes beta- carotene, Vitamin C, Vitamin A, beta- sitosterol, Protein, Phenolic compound, quercetin, Kaempferol and the plant contain some bioactive compounds such as flavonoids, Saponins and trypsin inhibitor etc. The Plant seed is not only useful for its protein and nutrition it is also useful for the presence of Lipids and fibres(3). Numerous research study shown that the full grown seed of drumstick plant is rich in oil and contain 20 to 40% crude fat. Evaluation of the seedoil chemical composition that shown the oil Contains a higher amount of monounsaturated fatty acid (MUFA) includes oleic acid. The extract of MO seed is possess anti malarial property and the seed extract is also useful for prevent Inflammation through some mosquito vector, seed extract is useful for pest control in crop field and the seed oil is also useful for production of biodiesel(4).

**Medicinal use of seed:-** It possess Anti microbial/Antibacterial Property, anti hypertensive Property (8).

#### **Pharmacological use of Moringa oleifera**

**MO is beneficial and used to treat and cure many chronic diseases such as:**

- Cardiovascular disease
- Cancer Treatment

- Chronic obstructive pulmonary disease (COPD, lungs disease that block the air flow)
- Type 2 diabetes (used as a hypoglycaemic agent)

It is useful to treat some common other diseases includes high blood pressure, high blood cholesterol, overweight, liver diseases etc and possess various pharmacological activity such as anti-inflammatory, anti-tumour, anti spasmodic, anti-ulcer. Detailed discussed below:-

#### ➤ **Antihypertensive, diuretic activity**

Leaves Juice of MO possess stabilizing effect for blood pressure due to the presence of various compound which is useful for lowering the blood pressure compounds such as Nitrile, thiocarbamate glycosides, mustard oil glycoside etc. Evaluation of the ethanol extract of MO leaves contain various essential/natural compounds such as niacinin A, niacinin B, Niazimicin and niacinin A&B. These compounds possess a hypotensive effect (lowering the blood pressure) in rats. In another research shown that ethanol and aqueous extract of whole pod parts that useful for lowering the blood pressure and study also indicate that the hypotensive activity widely distributed in pods. Evaluation of the ethanol extract of MO pods that shows the pods also contain the thiocarbamate and isothiocyanate glycoside which is useful for hypotensive activity. In other hand the study also indicate the pods of MO contains some other compounds such as methyl phydroxybenzoate, sitosterol which is also exhibit promising hypotensive activity. MO roots, leaves, flower contains many chemical compound which is useful for diuretic activity and the presence of diuretic component of plant which play a major role in compound hypotensive activity (8).

#### ➤ **MO useful for Eye Diseases**

MO plant parts contain a high concentration of vitamin and minerals and the leaves powder of MO exhibit high concentration of vitamin A which is beneficial for eye disease such as Night Blindness (the major cause of this disease is lack of vitamin A). These study shown that the MO leaves is beneficial for eye diseases.

**Taxonomical/Scientific Classification (6)**

Category	Botanical description
Kingdom Plantae	
Subkingdom	- Tracheophytes(Vascular plant)
SuperdivisionSpermatophyta (Seed plants)	
Division Magnoliophyta	
Class	- Magnoliopsida
Subclass Dilleniidae	
Order Capparales/Brassicales	
Family	Moringaceae
Genus <i>Moringa</i>	
Species <i>M. oleifera</i> (Drumstick Tree)	
Binomial Name	<i>Moringa oleifera Lam</i>

**Vernacular name (7)**

Language	Vernacular Name
Marathi	Shevga
Punjabi	Surajana
Hindi	Sahjan
English	Drumstick Tree
Malayalam	Muringa,
Nepali	Sajiwan or
Swejan	
Bengali	Sojnedanta
Telugu	Munagachettu
Tamil	MurungaiMaram

**Botanical Description of *Moringa Oleifera***



Fig 1: *Moringa Oleifera*

In another study shown the use of plant leaves with oil these improve the vitamin A deficiency results decrease the risk of cataract (9).

➤ **Hypocholestraemic activity**

The leaves extract of MO plant play a significant role for reducing cholesterol level/hypocholestraemic effect in serum of high

fat diet. The MO plant fruit exhibits a activity like low cholesterol, phospholipids, triglycerides, low lipid density, very low lipid density which shows the plant is useful for reduced the lipid profile of liver(8).

➤ **Antispasmodic and Antiulcer activity**

Ethanollic extract of leaves of MO possess anti spasmodic activity and the extract contains a o-methyl thiocarbamate due to the presence of this

compound is traditional use in treatment of diarrhoea, furthermore, presence of different chemical compounds they possess spasmolytic (anti spasmotic) activity and the plant is also traditionally useful in GI motility disorder. The roots of plant also possess spasmolytic activity. Numerous study reported the methanolic extract of plant leaves extract shown anti ulcer activity in rats and the evaluation of the extract they shows the anti ulcer compounds widely distributed in plant (8,10,11).

#### ➤ **Hepato Protective activity of plant**

The methanolic extract of leaves exhibits a hepatoprotective effect due to the presence of quercetin and the aqueous extract of flower also possess the hepatoprotective activity because it also contain a similar compound such as quercetin (it is a flavonoid) possess hepatoprotective property (8). MO leaves helps to reduce the level of Plasma aspartate amino transferase (AST), alanine amino transferase (ALT), alkaline phosphatase (ALP), Creatinine and also useful for the reduction of lipids and lipid peroxidation level in the rat liver and Numerous study shows the administration of leaves extract of plant in rats result decrease serum AST, ALT, ALP, creatinine. In other hand the administration of leaves extract in guinea pigs results prevent non- alcoholic fatty liver disease (NAFLD) (9).

#### ➤ **Anti bacterial and anti fungal activity of MO**

Roots of *Moringa oleifera* possess antimicrobial activity and numerous researchers study reported they exhibit powerful anti bacterial and fungicidal effect. The ethanol extract of root bark contains a deoxy-niazimicine, benzyl isothiocyanate responsible for the anti fungal and anti bacterial activity and the bark extract of MO also shown anti fungal activity while the juice of MO stem bark possess anti bacterial activity against *Staphylococcus aureus*.

The juice of plant leaf Inhibits the growth of micro organisms like *Pseudomonas aeruginosa*, *Staphylococcus aureus*,

A flower of these plant also contain a similar chemical compound which also used as a fungicidal (Used to destroy the fungi) (8).

#### ➤ **Antitumour and anticancer activity of MO**

According to 1997 researchers study shown that the leaves of drumstick plant contain a many essential compounds which possess a anti tumour

activity some compounds includes benzyl carbamate, benzyl iso thiocyanate, niazimicin and sitosterol evaluation of these compound they shown the potential anti tumour promoting activity and in vitro evaluation to these compound they shown the inhibitory effect on **Epstein-Barr virus (EBV, belonging to herpes virus family)** early antigen. Niazimicin is a bioactive compound which also possess a potential anti cancer activity and useful as a chemo preventive agent. The extract of MO seed also exhibits a antioxidant activity and hepato protective activity for hepatic cancer. And the leaves of MO also contain niaziminin, thiocarbamate which possess anti tumour activity. In other hand the chemical compound iso thiocyanates they significantly inhibit the tumour promotin induced EBV activation (8).

#### ➤ **Other Pharmacological activity of MO**

Numerous research study shown that the MO tree is consist a various other pharmacological activity includes aqueous extract of leaves used to treat and cure hyperthyroidism and also possess anti oxidant property. In evaluation of leaves extract they study the plant leaves contain a thyroid hormone. Another study shown that the plant leaves extract also useful as a medicine for the treatment of Herpes simplex virus type 1 (HSV type 1) and the leaves extract may be useful against acyclovir-resistant variant. The flower & leaves of plant also exhibit beneficial effect against helminths ( parasitic worm) and the juice of leaves also useful for reducing the blood glucose level (useful in treatment of Diabetes mellitus). Other part of MO plant also useful for the preparation of marketed formulation. Various company are involved for making the highly reputed drugs/remedies such as :-

- the Himalaya Drug Company, Bangalore, India
- Walter Bushnell Ltd, Mumbai, India
- Pharma Products Pvt. Ltd, Thayavur, India
- Herbals APS Pvt. Ltd, Patna, India

In another study shown that the MO seed contains a variety of nutrient/ proteins which is essential for skin/hair care products. Some preparation contains a peptides of MO seed which is Purisoft® . It is useful for prevent/ protect the skin from environmental hazards and MO seed extract is exhibits anti pollution activity, hair conditioning/strengthening property etc (8).

### Other Uses of *Moringa Oleifera*

- **Used in Water purification:-**According to numerous researches reports shown that the Powder of the drumstick tree is used as a cleaning agent for dirty/impure water. It is a very simple method for cleaning the impure water. The Powder of the MO seeds joining/binds with the solids in impure water & sink to the bottom. This action can remove/destroy the bacteria in impure water up to 90-99% Alternatively used aluminum sulphate  $(\text{NH}_4)_2\text{SO}_4$ , which are dangerous/harmful for the people health. It is very cheap & quick method for the purification of impure water. Method for the purification of water discussed below: Add 2 gm of MO seed powder in 20 L. of filled water bottle and water bottle is continuously shake for 5 min. After the shaking process water will be filtered through the clean cloth until the water becomes clear/Pure in container. Leave the container undisturbed for 1 hour and after then the water is again filtered through clean cloth. Before using the water should be boiled and after this the water is pure for people use. (12,13,14).
- **Used as a Growth hormone:** According to various researchers study MO is a Miracle tree (15). It possess high nutritive value, Pharmacological property and It also have Many scope includes water purification, biodiesel production are detailed discussed in above and In another hand drumstick is also useful as growth Hormone because the leaves in 80% ethanol extract that contains a growth hormone such as **Zeatin**. It is useful for plant growth, Facilitate seed growth, promote Leaf formation etc. The extract of MO Leaves will be used in the form of foliar spray (applying liquid fertilizer directly in plants ) to Promote the growth of plant. The diluted MO leaves extract will be spray in the plant that shown many benefits such as longer/ Increase life span of plant, Promoteroots growth, Accelerate the growth of stems and leaves of the plant, Promote fruits growth etc (12).
- **MO used as a skin care Product:** Seed oil of this plant contains a various bioactive compound which is essential

for skin such as tannins, saponins, zeatin, flavonoids etc. the compound exhibit a various pharmacological activity which is useful foe skin includes anti inflammatory activity, anti oxidant property and it also possess antiseptic property (15,16).

- **MO used as a Fertilizer** (A chemical agent or substance useful for growth of plant and contain a many nutrient compound which is essential for plant growth). According to researchers study shown that the plant seed oil extract contain a various/many chemical/nutrient compound which is used as a fertilizer for plant growth such as potassium, nitrogen, magnesium, copper, phosphorus, calcium etc (15,17).
- **Used as a machine lubricant:-**Seed oil of this plant possess a high kinematic viscosity. Which is used as a lubricant in machines/engines (18, 19)
- **Useful for hair care products:-**seed oil of MO contains a many nutritional compound, also contain a minerals which is essential for hair products (15,20).

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