

A Review on Nutritional Properties and Medicinal Uses of Moringa Oleifera

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Abstract: *Moringa oleifera*, also called the "tree of life" or "miracle tree," is categorized as a miraculous plant. Originating from India, *Moringa oleifera* thrives in tropical and subtropical areas globally. The Drumstick tree or Murungai tree is known by the local language name. This amazing tree possesses significant health benefits and is commonly grown for its nutritional content. Moringa leaves are utilized to treat diabetes and cancer due to their presence of phytochemicals and antioxidants. In general, the snacks were found to have satisfactory texture and enhanced nutritional value based on sensory evaluation. Developing a convenient ready-to-eat food product with excellent functional and nutritional qualities is achievable by utilizing pre-treated moringa leaf. Moringa is highly nutritious due to the various essential phytochemicals found in its leaves, pods, and seeds. It is claimed that moringa contains leaves contain fourtimes vitamin A than in carrot, seven times vitamin C in orange's, 4 times calcium in milk, three-time potassium in banana in and two times protein in milk. Moringa enhances the body's metabolism. The essential nutrients in Moringa gently assist in enhancing the body's metabolic functions gradually. The Moringa plant offers the nutritional advantages that many diets are missing. There are numerous advantages to consuming Moringa leaves for your health. One example is the moringa leaf, which can enhance your immune system, make your bones stronger, help with reduce liver damage.

Keywords: Moringa oleifera, Classification, Biological description, Nutritional property, Uses, Methodology

I. INTRODUCTION

Moringa Oleifera is commonly known as drumstick. eulogized as world most useful tree or world most nutrient plant or multipurpose tree or perennial vegetable moring or horse radish tree or radish tree or west Indian ben or ben oil tree or tree of life or miracle tree or wonder tree or mother best friend or never die or super foods on earth or indispensable plant for health management. drumstick in English, saragvo in Gujrati, soanjna in Hindi, sajna in Bengali, nugge in Kannada, sigru in Malayalam, shevga in Marathi, shobhanjana in Sanskrit, munaga in Telugu and murungai in Tamil and is the most widely cultivated variety of the genus moringa. the PKM variety of drumstick was developed in 1989 by the horticulture college and research institute of TamilNadu agricultural university. fruits (pods), leaves and flowers are useful for culinary purpose. KaSaMaDe i.e. ka kalwan, sasatara, mamalgon de deolali tehshils of Nashik are famous for cultivation. Cultivated extensively for truck gardens owing to consumer preference and industrial uses. hypercholesteraemic effect of leaves, antifertility effect of roots, hypotensive, antitumor and anti- spasmodic activity of leaf extract, anti-ulceronic effect of flower buds have been established. moringa is rich in macro and micronutrient and other bioactive compounds, which are important for the normal functioning of the body. moringa may help prevent inflammation, lower blood sugar and improve the appearance of the skin. moringa can lower cholesterol. moringa oleifera may protect against arsenic toxicity. drumsticks deserve a special space in diet. every part of tree, it leaves, flowers, long seed pods and root is edible offering numerous health benefits in traditional Indian medicines drumstick is valuable for its notable range of therapeutic properties anti-fungal, anti-viral anti-depressant and anti-inflammatory. drumsticks provide a wide range of vitamins, minerals, and necessary nutrients that can aid in maintaining overall health. drumsticks possess various vital nutrients. essential nutrients found in food vitamins. drumsticks provide a high level of vitamins such as vitamin c, vitamin a, vitamin b6, and vitamin e, which are crucial for supporting overall well-

being. minerals are essential nutrients for the body. drumsticks are a good source of minerals such as calcium, iron, magnesium, phosphorous, and potassium, which are necessary for strong bones and muscles. proteins are essential for the body's functions.



Fig No 1: Plant of Moringa Oleifera

Scientific Classification of Moringa oleifera: -

Botanical Name: -Moringa Oleifera

Family: -Moringaceae

Origin: -India, Africa

Biological source:- In India, it is commercially growth in Tamilnadan

Propagation: - Limb cutting (perennial), annual seeds

Variety: -Jaffina, PKM-1, PKM-2

Fruit weight: - 230gm containing 10-20seeds each

Geographical source – South Asia, Himalayas, Northeastern Pakistan, West Bengal in India, Northeastern Bangladesh, Sri Lanka

Kingdom: - Plantae

Species: - Moringa Oleifera (synonyms–Moringa Pteridosperm)

Biological Description:

Leaves: Leaves are known as the world greatest unknown supplement. Moringa oleifera leaves grow in a tripinnate structure on the branches of the moringa tree, which can grow up to 10 or 12 meters tall. Moringa leaves contains 24.33miligram of iron per 100g.dried moringa leaves contain 97.9microgram of iron per gram.

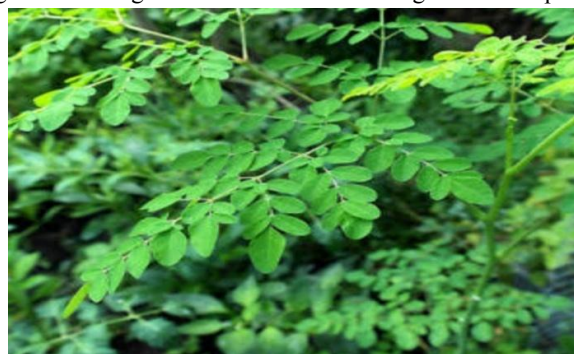


Fig No 2: Leaves of Moringa Oleifera

Moringa leaves are often used as a vegetable. leaves contain four times vitamin A than in carrot, seven times vitamin C in orange's, 4 times calcium in milk, three-time potassium in banana in and two times protein in milk. Leave powder is effective in lowering blood sugar level and increase milk in lactating mothers. Consuming Moringa leaves juice daily can help treat gastritis and ulcerative colitis, improve digestion, and maintain good health due to their high vitamin B content. Moringa leaves also helps make feel stronger and replenished lost nutrients in body. the nutrient content in moringa leaf extract plays a significant part in increasing haemoglobin levels in the blood. Moringa leaves can benefit people suffering from liver diseases such as tuberculosis, fatty liver. Leaves contain anti-inflammatory compounds can help with asthma, cough and other respiratory problems. They also contain antioxidants that can help protect the liver and promote heart health Moringa leaves contain antioxidants, vitamin C, beta carotene, Quercetin, glucogenic acid

Seeds: - Drumstick seeds have wing-shaped structures that help in their dispersal, just like other seeds with similar structures such as linchona and Pinus. average seed weight 0.288g and 10g contains 35 seeds. Seeds contains yellow coloured oil called ben oil. oil present in seed 38-40%.oil is non-drying,clear, odourless edible and never become rancid. Oil is used for illumination, soap industry and highly priced for lubricating watches and computers.



Fig No 3: Seeds of Moringa oleifera

moringa oil seed cake is used as organic substitute for water purifying chemicals such as potassium sulphate (i.e. Alum). several treatments like roasting, germination and boiling have been applied to moringa seeds to produce flour with improved nutritional properties in particular defatted moringa has been applied in different formulations. each tree can produce between 15,000 to 25,000 seeds per year

Flowers: The prominent, softyfragrant flower are borne on inflorescences 15-25 cm long and rare for the most part white to cream in colour 2.5cm in diameter and they can be tinged with pink in a few varieties.



Fig No 4: Flower of Moringa Oleifera
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Blossom between January and April, with February as the busiest month. The time of blooming can change due to the weather conditions. The flowers are a springtime delicacy in Bengali cuisine. Moringa flowers are typically cooked into charchori and fritters. It can help stimulate gallbladder contraction and increase bile flow. Petals of the flower are known as Shigru Pushpa (Moringa flower) (Shigru means strong and piercing qualities) as Drushtipathya (diet for eye diseases) Sanskrit names in Ayurveda. Flowers useful for culinary purpose.

Roots: The roots are finely chopped and utilized as a seasoning with pungent taste characteristics resulting from high levels of polyphenols. Solubility tests of Moringa root powder revealed high amounts of potassium, phosphorus, magnesium, sodium and calcium. Moringa root powder significantly reduced (87%) E. coli colonies in contaminated water.



Fig No 5: Roots of Moringa Oleifera

Moringa root powder has the potential to be used as a household point-of-use water treatment. Alkaloids such as morphine and moriginine, minerals such as calcium, magnesium, and sodium. Alkaloids help make the bark resistant to ulcers, cardiogenic and help relax muscles. Root bark acts as a cardiac stimulant, anti-ulcer, and anti-inflammatory agent.

Pods: Drumstick pods contain high levels of fibre, lipids, non-structural carbohydrates, protein, and ash. Oleic acid, linoleic acid, palmitic acid, and linolenic acid are all found within the fatty acids. PUFA in legumes are included in the diet of overweight individuals. Abundant in fibre, lipids, non-structural carbs, protein, and ash. Additionally contains fatty acids like oleic, linoleic, palmitic, and linolenic acids.



Fig No 5: Pods of moringa Oleifera

The pods are excellent for providing Vitamin A when eaten raw for Vitamin C. They also offer high levels of Vitamin B and are one of the top plant sources for minerals. Asian people have been eating drumstick pods for thousands of years as a nutritious food item. Pods contain a high amount of nutrients including phytochemicals, vitamins, minerals, and amino acids. MO pods are recognized for containing a significant amount of important amino acids, proteins, minerals, and vitamins, making them a perfect nutritional additive. Total protein is in moringa 2.10g

Moringa leaves are particularly nutrient -dense, containing:

Vitamins: high level of vitamins A, C and E.

Minerals: significant amount of calcium, potassium, and iron.

Antioxidant: rich in FL **Proteins:** contains all essential amino acids, making it a complete protein source
phenolic acid and other antioxidants.

Nutritional property of moringa oleifera:

Moringa leaves and pods are nutritional storehouse with a good amount of essential amino acids vitamins and minerals it contains remarkable number of vitamins such as vitamin A, B, B2, B3, B6 and vitamin C it's wealth of minerals includes calcium potassium iron magnesium phosphorus and zinc moringa leaves contains three time more than spinach.

Vitamin A helps from and maintain healthy teeth, skeletal and soft tissue. muscle membrane and skin. Retinol, also termed as Vitamin A, serves various purposes.

- Visual aid: Aids in vision, particularly in dim lighting, and prevents and treats night blindness and xerophthalmia.
- Défense mechanism: Supports the body's innate protection from sickness and disease.
- Skin and teeth: Aids in the development and upkeep of healthy skin, teeth, and mucus membranes.
- Reproduction is important for maintaining a healthy pregnancy and successful breastfeeding
- Growth and development: Aids in growth and development.
- Organs: Aids in the proper functioning of the heart, lungs, and other bodily organs.

Vitamin C helping to protect cells and keeping them healthy. Maintain healthy skin, bloodvessels, bones and cartilage. Helping with wound healing.

Vitamin C, also known as ascorbic acid, has several important functions This includes:

- Antioxidants shield keeps cells from harm caused by free radicals, which are produced during the body's food-to-energy conversion process.
- Collagen synthesis: Assists in the body's creation of collagen, a crucial protein for repairing wounds, keeping skin, blood vessels, bones, and cartilage healthy, and promoting hair growth. •
- Iron absorption: Helps the body absorb iron from plant-based foods.
- Assists in maintaining proper immune system function to defend the body against illness.
- Preventing gout: Could potentially lower blood uric acid levels and reduce gout flare- ups.
- Preventing cognitive decline: Keeping optimal vitamin C levels could help defend against cognitive decline linked to aging.

Vitamins E it helps keep the immune system strong against viruses and bacteria.

Vitamin E has the following functions:

- It acts as an antioxidant... It aids in maintaining the immune system's strength in fighting off viruses and bacteria.
- Aids in the production of red blood cells and expands blood vessels to prevent clotting.
- It aids in the body's utilization of vitamin K
- Cells utilize vitamin E for communication between themselves.
- Minerals are also important for making enzymes and hormones. Our body uses minerals for many different jobs including keeping our bones, heart and brain working properly.

Calcium is a necessary mineral for numerous functions within the human body, such as:

- Bone and teeth health: Calcium, the most prevalent mineral in the body, is stored in bones and teeth, providing them with structure and strength.
- Muscle function: Calcium plays a role in muscle contraction and relaxation.
- Role of calcium in nerve function: Calcium assists in transmitting signals between the brain and the body by nerves.
- Blood coagulation: Calcium aids in normal blood coagulation.

- Calcium assists in the release of hormones that impact various bodily functions.
- Heart function: Calcium plays a role in regulating heart function and sustaining a regular heartbeat.

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Potassium is a crucial electrolyte and mineral that plays a significant role in numerous bodily functions, such as:

- Maintaining heart health involves potassium supporting a steady heartbeat.
- Muscle activity: Potassium plays a role in muscle contraction, including the heart muscles.
- Nerve function: Potassium aids in nerve response to stimuli
- Strong bones: Older women can reduce their risk of osteoporosis by consuming a potassium-rich diet.

Potassium can lessen the negative impact of sodium on blood pressure.

- Potassium aids in transporting nutrients into cells and removing waste from cells.

Iron is a crucial mineral necessary for human health that participates in numerous bodily functions.

- Iron is a part of oxygen transportation.

Haemoglobin is a protein found in red blood cells which transports oxygen from the lungs to the tissues of the body.

- Oxygen levels in muscles: Iron is a crucial element found in myoglobin, a protein present in muscle cells that plays a role in storing, carrying, and releasing oxygen.
- Iron plays a role in enzyme reactions that aid in the production of energy.
- Iron is essential for a properly functioning immune system. Blood cell formation: Iron is necessary for creating fresh cells. cells within the bloodstream.
- Hormone synthesis: Iron is necessary to produce certain hormones.

Proteins contains all essential amino acids, making it a complete protein source. Proteins play a crucial role in various functions within the human body, such as:

Proteins are the basic components of the body and can be found in all cells, serving as the building blocks. They are essential for growth and development as they repair and form new cells. –

- Proteins play a crucial role in catalysing most chemical reactions within the body. Gene expression:
- Gene expression is controlled by proteins.
- The immune system is controlled by proteins.
- Muscle: The main elements of muscles are proteins. Hormones and neurotransmitters are made up of amino acids, the building blocks of proteins, that also serve as modulators. multiple bodily functions.
- Metabolism: Protein can enhance metabolism and raise the number of calories that are expended.

Table No 1: Drumstick nutritional value per 100gm

Nutrient	Amount per 100gm	%daily Value
Calorise	64	3%
Protein	9.4gm	19%
Carbohydrate	8.28gm	3%
Dietary fibre	2.0gm	8%
Total fat	1.4gm	2%
Vitamin A	387ug	42%
Vitamin C	51.7mg	57%
Vitamin B6	1.2mg	92%
Calcium	185mg	14%
Iron	4mg	22%
Magnesium	147mg	35%
Potassium	461mg	10%

Other or radiational or medicinal uses of moringa oleifera:

Look at some of the amazing benefits of moringa

- (1) Promotes liver health: - Moringa extracts are effective in protecting the liver against the damage caused due to antitubercular drugs and AIDS in speeding up the recovery process.
- (2) Treats edema: - Moringa extract is potent in treating edema a painful condition where fluid accumulates in specific tissues in the body. The strong anti-inflammatory properties of moringa are effective in preventing edema and evidence proves moringa is equally potent with medicine indomethacin in the treatment of such painful conditions.
- (3) Digestive health: - Moringa extract treats digestive disorders such as constipation, gastritis, and ulcerative colitis. The antibiotic and antibacterial properties of moringa slow down the growth of helicobacter pylori and coliform bacteria. The notable content of Vitamins in moringa leaves aids digestion and converts food into energy rather than storing it as fat.
- (4) Combats bacterial attack: The strong bacterial antifungal and antimicrobial properties of moringa extract fight against infection caused by foodborne micro-organisms. Thus, moringa extract acts as a remedy for sanitation and preservation processes.
- (5) Healthy bones: The richness of calcium and phosphorus in moringa extract works best for maintaining healthy bones. The anti-inflammatory properties are effective in treating painful conditions such as arthritis and heel bone elements such as mandibular or low bone fracture.
- (6) Protects cardiovascular system: Moringa extract is a powerhouse of antioxidants that is potential in preventing myocardial infarction.
- (7) Promotes kidney health: Moringa extract is effective in preventing kidney stones, kidney bladder, and uterus. It also aids in the reduction of stone formation and lowers the urinary excretion levels. Evidence proves that moringa acts as an effective agent for heavy metals and harmful toxins.
- (8) Balanced blood sugar levels: The chlorogenic acid in moringa has shown to help control blood sugar levels and aid the cells to release glucose as needed and functions as a natural anti-diabetic.
- (9) Nourishes the skin: Moringa possesses strong anti-bacterial, antifungal, and anti-viral compounds that shield the skin from several forms of infections that include reducing athletes' foot, lower inflammation associated with acne breakouts, treats pockets of psoriasis, getting rid of dandruff, and heel sites, burns. Viral rashes and wounds, moringa oil acts as a lubricant and hydrates the skin by restoring its natural moisture barrier.
- (10) Promotes brain health and stabilizes your mood: The abundance of protein and essential amino acids in moringa benefits neurotransmitter functions that produce the feel-good hormone serotonin. The richness of antioxidants improves thyroid health, which makes it helpful for maintaining high energy levels and fighting fatigue.

III. METHODOLOGY

Formulation of Moringa oleifera leaves powder

Drying of leaves

- **Collection:** The leaves were collected from the university campus.
- **Sorting:** Fresh, green undamaged leaves were collected to produce the best quality powder.
- **Cleaning and washing:** The stalk of the leaves was cut from the main branches and were washed 3-4 times with plenty of water to remove all the adhering dust, and dirt particles.
- **Blanching and Drying:** Moringa oleifera leaves were immersed in boiling water at 100 °C for 5 minutes and then it was immersed in cold water for 2 minutes. Blanched leaves were dried in neat and clean dust-free dark shadow place at temperature ranged from 25-30 °C. The leaves were completely dried in 24-38 hours. Dried them till leaves became brittle and crushed easily.
- **Grinding of leaves:** Dried leaves were ground into fine powder.
- **Storage:** Moringa oleifera leaves powder were stored in airtight containers protected from

moringaoleiferous leaves
↓
Cleaned
↓
Washed
↓
Balanced
↓
Shade dried
↓
Ground
↓
Pulverized into fine powder

Ayurvedic functions of drumstick

1. boost immunity According to Ayurveda, drumsticks are a blood purifier that helps amplify the body's immune system because they balance all three doshas (Vata, Pitta and Kapha) of our bodies. They are mostly kaphareducing & also boost immunity, which helps prevent seasonal ailments.
2. Supports digestion Drumsticks act as a gentle laxative, providing relief from bloating, gas, and indigestion. Vata dosha governs the operation of the digestive system, and it is believed to regulate it.
3. Improves bone health Drumsticks are commonly utilized in different Ayurvedic treatments, particularly for bone ailments. It is believed that they inhibit Vata and worsen Kapha. Therefore, they can assist in enhancing the bone.
4. enhances skin and hair health Drumsticks are utilized in Ayurveda for important beauty therapies and hair care solutions. They are known to have a cooling effect on the body and often are used for their anti-microbial and antioxidant properties. Drumsticks are a good source of protein that aids in promoting hair growth and strength.
5. regulates blood sugar level Ayurvedic experts frequently suggest using drumsticks as a natural remedy for diabetes. It is also thought that they help maintain balance in the Kapha dosha. According to Ayurvedic medicine, an imbalance can result in metabolic diseases. Many Ayurvedic formulations incorporate drumsticks to address different conditions linked to blood sugar instability. Drumsticks also possess cancerfighting properties

III. CONCLUSION

Drumsticks are high in essential nutrients, including vitamins, minerals, and antioxidants. So, they can help strengthen the immune system, promote digestive health, and support bone strength. Drumsticks have been used as a dietary and healing agent by Ayurvedic practitioners for many thousands of years.

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