



MORINGA: THE 'MIRACLE TREE' BACKED BY SCIENCE

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INTRODUCTION:

Products made from a variety of plants and herbs contain bioactive compounds and multipurpose curative agents. substances, are regarded as reasonably safe for ingestion. Roughly 70–80% of people worldwide, particularly in poor nations, use herbal medicine to prevent and treat illnesses, according to a research by the Food and Agriculture Organization (FAO) (Ekor, 2014), while roughly 25% of synthetic medications are made from medicinal plants.

Moringa oleifera Lam is a perennial angiospermic plant that belongs to Moringaceae family commonly known as Drumstick tree, Ben tree, Horse-radish tree, Sohjna or Saijna. It is indigenous to South Asian countries mainly in India, Nepal, Bangladesh, Afghanistan, Sri Lanka and largely scattered in many tropical and subtropical countries around the around. *Moringa oleifera* is still considered as underutilized plants which have nutritional as well as medicinal values in its almost all parts like leaves, flowers, fruits (pods), seeds etc. Its gum (liquid sap), roots and bark also used traditionally as medicines. Due to its diversified nutritional benefits, medicinal properties as well as uses of commercial products of this plant, it is popularly known as 'Miracle Tree' which has potentialities in agriculture and industry as well. Moringa plants are highly nutritious that provides daily nutritional supplement boosting the immune system both uses in human and animals. Moringa leaves might be used to combat malnutrition, especially among infants and nursing mothers (Sobhy *et al.*, 2015). India is the largest producer of moringa. Every part of the drumstick tree is enriched with varieties of ingredients that contribute to its magical health benefits. Moringa leaves are round shaped with wild leafy flavour and slight bitter taste. They are the significant source of calcium, iron, vitamin C, fibre,

protein and β -carotene. Due to its antibacterial and anti-inflammatory action it can be used as a treating agent for diarrhoea, urinary disorder and gastric ulcer. Moringa leaves can successfully purify blood along with lowering of blood glucose and cholesterol level. In addition to its antioxidant qualities, moringa has a high protein level that includes all of the essential amino acids and a micronutrient composition that suggests it might be utilized as food. Intercropping is an option with many fruits and vegetables crop species to boost socioeconomic status of the rural population. Because they include higher levels of ascorbic acid, flavonoids, phenolics, carotenoids, glycosides, glucosinolates, and other compounds, it is clear that leaves and immature pods function as natural antioxidants. Alkaloids including moringine and moringinine, which function as cardiac and circulatory stimulants, antiulcer, and anti-inflammatory medicines, are also abundant in stem bark and roots (Adeyemi and Elebiyo, 2014).

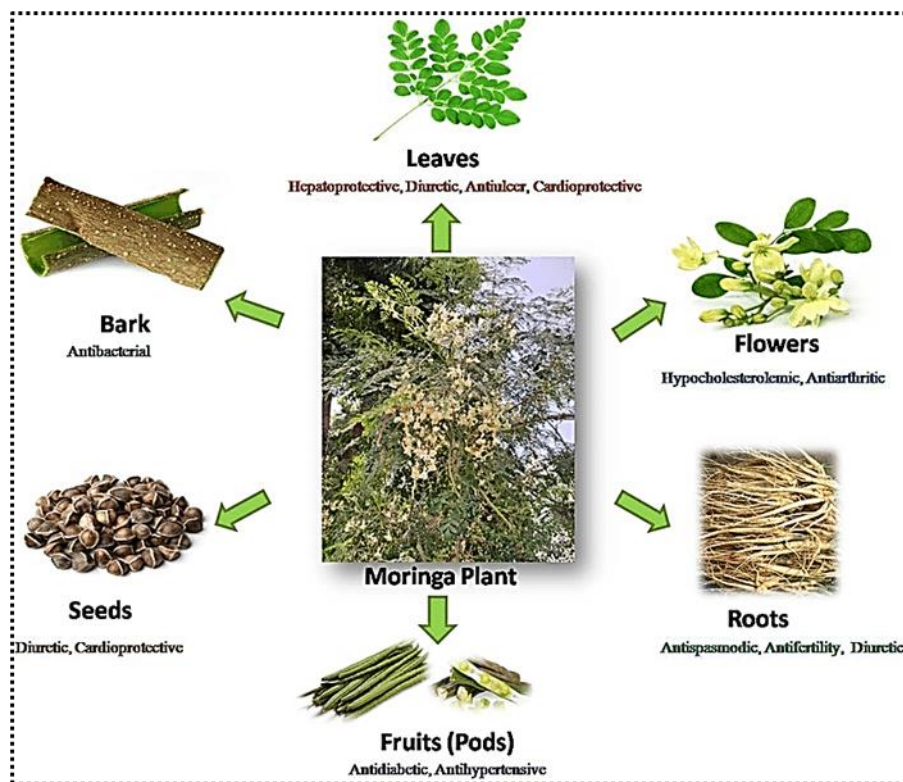
Table 1: Ethnomedicinal and pharmacological uses of different parts of *Moringa oleifera* plants

S. No.	Traditional uses	Plant part used
1	Used for prevention and treatment of several diseases like gastric ulcer, hay fever, fatigue, skin diseases and bronchitis, psychosis, eye diseases, fever and as an aphrodisiac in the Unani and Ayurvedic systems of medicine.	Different parts
2	Act as cardiac and circulatory stimulants, antipyretic, antiepileptic; possess antitumor, anti-inflammatory, antiulcer.	Leaves, roots, seed, bark, fruit, flowers and immature pods.
3	Used for the treatment of respiratory, gastrointestinal, inflammatory, cardiac, nutritional and skin diseases.	Different parts
4	Used for the treatment of asthma, epilepsy, eye and skin diseases, fever, headache, hemorrhoids, anti-helminths, kidney stones and arthritis.	Different parts
5	Used to treat arthritis, pain in joints, head, and stomach, and ears, act as a cardiac and circulatory stimulant, to treat colds, fever, kidney and liver problems.	Leaves, stems and roots
6	Used for treatment of fever (typhoid, malaria), ear and eye infections, skin diseases, common cold, diarrhea, blood sugar and blood pressure.	Leaves, stems and roots

HEALTH BENEFITS OF MORINGA:

Constipation and Digestive Strengthening: Constipation can be relieved by consuming a drumstick seed powder with lukewarm water. Because of their high fiber content, these seeds help the body rid itself of toxins. By controlling the liver's bile juice release, they also lower blood and stomach acidity levels and support a healthy digestive tract.

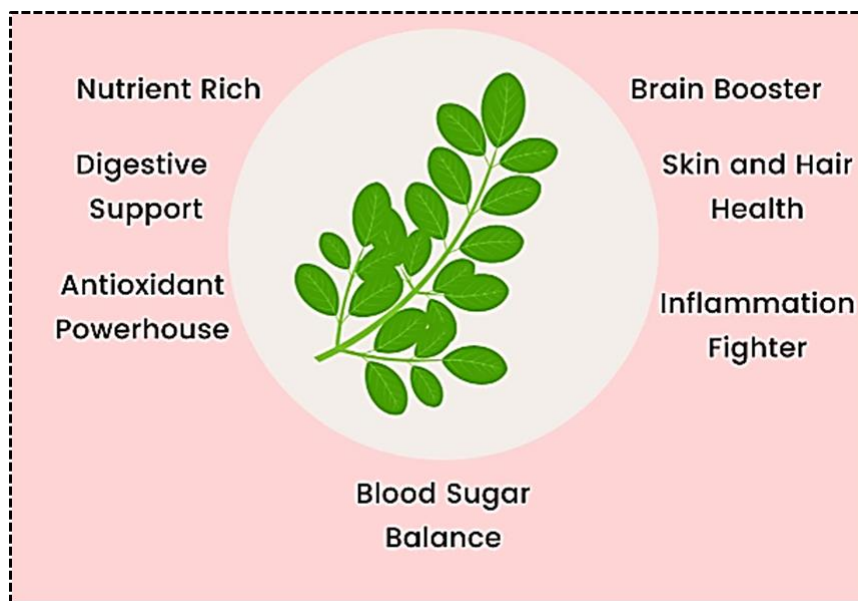
Panacea for Blood Sugar and Diabetes Patients: Abundant amount of zinc is found in the seeds which prevents the sugar level from increasing in the blood. Drumstick seeds are like a lifesaver for diabetic patients because its consumption is extremely beneficial for both type-1 (insulin non-production) and type-2 (insulin resistance) diabetic patients.



Formation of Heart Tissue and Support to Heart Health: Drumstick seeds reduce the presence of oxidized lipids in the body, thereby protecting heart tissues from structural damage. They also regulate blood circulation in the arteries, lower LDL (Low-Density Lipoprotein) or bad cholesterol levels, and increase HDL (High Density Lipoprotein) or good cholesterol levels. This

combination reduces the risk of heart attacks. Using seed-derived powder can provide relief from high blood pressure (Saa *et al.*, 2019).

Pain Relief and Cancer Prevention: Drumstick seeds are rich in calcium, which contributes to strong bones. They possess anti-analgesic properties, offering relief from bone-related pain and joint pain when used as massage oil. Additionally, these seeds contain glucosinolates, which are known for their ability to combat cancer-causing cells. Consumption of drumstick seeds can thus reduce the risk of developing cancer.



Pain Relief and Cancer: Calcium, which is abundant in moringa seeds, strengthens bones and eases discomfort associated with them. They reduce joint discomfort because of their analgesic qualities. The seeds' glucosinolate content lowers the risk of cancer by assisting in the destruction of cells that cause it. Therefore, eating Moringa seeds can reduce the risk of getting cancer.

Improvement in Immune System: While Moringa seeds indeed offer numerous medicinal benefits, it's essential to note that prolonged and unrestricted use can lead to certain physical issues, such as stomach irritation and increased menstrual flow in women. Women should avoid consuming seeds during their menstrual periods. Consumption of seeds during menstruation can lead to excessive blood flow and skin irritations. Therefore, it is advisable to consume them with caution and complete knowledge.

NUTRITIVE PROPERTIES OF MORINGA:

Every part of *M. oleifera* is a storehouse of important nutrients and anti-nutrients. The leaves of *M. oleifera* are rich in minerals like calcium, potassium, zinc, magnesium, iron and copper. Vitamin like beta-carotene of vitamin-A, vitamin-B, pyridoxine and nicotinic acid are also available. Moringa leaves also have a low calorific value and can be used in the diet of the obese. The pods are fibrous and are valuable to treat digestive problems and thwart colon cancer. Phytochemical such s tannins, alkaloids and reducing sugar present along with anti-cancerous agents like glucosinolates, isothiocyanantes, glycoside compounds and glycerol-1-9-octadecanoate. The minerals requisite for development and growth are present in Moringa, like calcium. Moringa leaves powder is a wealthy resource of calcium than milk. It also has iron which could be an alternative source in the treatment of ane mia due to iron deficiency compared with beet and spinach. Likewise, it contains vitamin C, vitamin A, protein, and potassium in comparison with oranges, carrots, yogurt, and bananas, respectively (Islam *et al.*, 2021).

INDUSTRIAL POTENTIAL OF MORINGA SEEDS:

Ben Oil Production: Moringa seeds yield precious oil known as Ben oil. Extracted through high-pressure cold press methods, this oil is highly regarded for its diverse uses. Packed with vitamins, amino acids, oleic acid, tocopherols, and sterols, it is prized for its therapeutic properties. Ben oil is often employed in skincare products to address various skin conditions and boost immune function. Moreover, it is an ally in promoting hair growth and development.

Bio-Diesel Production: Bio-diesel, also referred to as 'organic' diesel, serves as a sustainable alternative fuel source. Typically derived from plant oils, animal fats, waste oil, and leftover cooking oil, bio-diesel can be produced via a process called transesterification. The beauty of using bio diesel lies in its compatibility with standard vehicle engines, requiring no intricate modifications. This makes it a highly suitable and convenient choice for powering agricultural equipment (Azad *et al.*, 2015).

Flour Production Supplementation: A valuable dietary supplement and a potent remedy for childhood malnutrition, flour made from the seeds of the drumstick tree successfully resolves nutritional deficits due to its high content of vital components.

Facial Skincare: The oil derived from the drumstick tree, often referred to as Ben oil, is a prized ingredient for facial care. Its natural properties make it an excellent choice to reduce or eliminate facial blemishes, spots, and wrinkles. Additionally, it acts as a potent shield against free radicals, contributing to radiant and youthful-looking skin.

Scar Reduction: Drumstick tree oil is rich in collagen protein, a vital component that enhances skin health. This protein assists in reducing the appearance of scars on the skin, promoting a smoother complexion.

Purification of Water Using Seeds: Seeds of the drumstick tree are also used to purify water. Thus, it is straightforward to make dirty water or contaminated water clean and drinkable by using these seeds. Before starting the purification process, the mature pods are left on the tree for some time to dry. Once the pods are dry, they are collected from the tree. The seeds are separated from the pods before the purification process. The seeds are powdered, and a paste is made by mixing a small amount of the powder with water. Typically, it is stirred for about 10-15 minutes. After stirring, the paste is left undisturbed for about 2 hours, allowing impurities to settle at the bottom. The purified water is then carefully collected, leaving the sediment behind.

CONCLUSION:

Moringa oleifera Lam. is a 'miracle plant' as its different parts contains important phytochemicals uses as nutritional supplement and traditional folk medicines. Moringa seeds represent a sustainable solution for health and commerce, addressing nutrition and health challenges while offering economic opportunities to individuals and communities. These plants have high medicinal and therapeutic properties as well as have an enormous nutritional benefit that provides future development in the arena of medical, socioeconomic, agricultural, industrial, commercial (cosmetics and water purifier), nutraceutical and

pharmacological etc. Moreover, further researches are needed for optimum production of these crops, identification and isolation of phytochemicals for the diversified utilization of humankind and animals.

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