



Health Benefits of Moringa

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Introduction:

Medicinal plant research and applications are expanding each day due to therapeutic phytochemicals, which can stimulate the progress of novel medicines. Most plant-based phytochemicals, e.g., carotenoids, phenolic acids, flavonoids, tannins, saponins, alkaloids, and glucosinolates, have beneficial effects on well-being and avoidance of malignancy. Phytochemicals are secondary aromatic plant metabolites that prevent disease and are extensively present in plants. They are widely recognized for preventing and reducing chronic diseases risk (e.g., cancer cardiovascular, and neurological) and for beneficial mediation in treating these diseases. *Moringa oleifera* L. am is the most widely cultivated multipurpose tree species of a monogeneric family, Moringaceae in which immature fruits, fresh leaves and flowers are used for the culinary purpose. The plant is also known as Drumstick, Sahjan or Sohanjana in India which has different vernacular names pertaining to each region (ElSohaimy *et al.*, 2015). Its drought resistance properties, i.e., water-logging of roots,

make this plant grow well in drier regions. Moringa plants can grow on different soil types, but well-drained loamy and sandy soil with a pH of 5-9 is best suited for its growth (Adebayo *et al.*, 2017). Important nutrients and antinutrients are stored in every section of *M. oleifera*. Minerals like calcium, potassium, zinc, magnesium, iron, and copper are abundant in *M. oleifera* leaves. Vitamins like beta-carotene of vitamin A, vitamin B such as folic acid, pyridoxine and nicotinic acid, vitamin C, D and E also present in *M. oleifera*. Phytochemicals such as tannins, sterols, terpenoids, flavonoids, saponins, anthraquinones, alkaloids and reducing sugar present along with anti-cancerous agents like glucosinolates, isothiocyanates, glycoside compounds and glycerol-1-9-octadecanoate. Additionally, moringa leaves are low in calories and can be incorporated into an obese person's diet. The fibrous pods are useful for treating digestive issues and preventing colon cancer (Berkovich *et al.*, 2013). Among the several minerals included in moringa, calcium is said to be one of the most vital for human development. While 8 ounces

of milk can supply 300–400 mg, moringa leaves can supply 1000 mg, and moringa powder can supply over 4000 mg. Moringa powder can be used to treat anemia by replacing iron tablets. While moringa leaf powder has 28 mg of iron, beef only contains 2 mg. It has been observed that moringa has more iron than spinach. PUFAs are linoleic acid, linolenic acid and oleic acid; these PUFAs have the capacity to reduce cholesterol. With four times the β -carotene of carrot, moringa has a unique potential for programs dealing with avitaminosis or hypovitaminosis syndrome known as vitamin A deficiency that causes 70 percent of childhood blindness. Presence of various types of antioxidant compounds makes this plant leaves a valuable source of natural antioxidants and a good source of nutraceuticals and functional components as well (Anwar *et al.*, 2007).

Table 1: Vernacular Names of Moringa Pertaining to Different Region

Latin	:	<i>Moringa oleifera</i>
Sanskrit	:	Danshamula, Shobhanjana
Arabian	:	Rawag
Spanish	:	Ben, Moringa
Chinese	:	La ken
English	:	Drumstick tree, Radish tree
Tamil	:	Morunga
Gujarati	:	Midho-saragavo
Marathi	:	Sujna, Shevga
Punjabi	:	Sanjna, Senjna, soanjna
Rajasthan	:	LalSahinjano
Oriya	:	Munigha, Sajina

Nutritional Composition of Moringa Leaves:

Significant nutritional and nonnutritive components can be found in every section of *Moringa oleifera*. *Moringa oleifera* Lam, also referred to as the "miracle tree," is a highly significant plant that has been used for a wide variety of purposes. This is also commonly referred to as miraculous tree, horseradish, or drumstick. An extremely important source of food, fiber, medicine, and other goods is moringa. Even though the entire Moringa plant is referred to as a miracle tree, this suggests that every portion of the plant benefits living things. As the use of Moringa beans/ pods is popular all over the world for vegetable purposes, its leaf application or nutritional potential is comparatively unnoticed. The published data on the nutrient content of this interesting plant is quite variable, both in terms of quantity of information and differences between published sources. Much of the variability is likely due to differences in soil, climate, plant age, and processing techniques such as drying emphasis on vitamin content. The substantial variation in the nutritional composition may be due to factors such as growth environment, stage of harvest, soil type, and method of processing. Despite being low in fat and carbohydrates, moringa oleifera leaf is considered a complete dietary supplement because it is a great source of protein and vital amino acids. Furthermore, Moringa oleifera has a substantial nutritional content with roughly

205–350 calories per gram, high in protein (19-29%) and dietary fiber (19-37%). Significant concentrations of vital minerals, vitamins, amino acids, and fatty acids can be found in the leaves and seeds. In addition to micronutrients like iron, magnesium, and folate, it also contains B complex vitamins like B6 and vitamins A, C, and E. Extracts from leaves, pods, and seeds contain a range of phytochemicals that offer multifaceted nutrition, such as vitamins A, B, C, D, E, folic acid, and nicotinic acid, which function as natural antioxidants (Gopalakrishnan *et al.*, 2016). Moringa contains nutrients like calcium that are necessary for growth and development. More calcium can be found in moringa leaf powder than in milk. Compared to beets and spinach, it also contains iron, which may be an alternative source for treating anemia caused by iron deficiency. Similarly, compared to oranges, carrots, yogurt, and bananas, it has protein, potassium, vitamin C, and vitamin A. Zinc is necessary for DNA and RNA production as well as for healthy sperm cell proliferation. The daily need for zinc from the food is satisfied by the leaves of *Moringa oleifera* (25.5–31.03 mg/kg) (Barminas *et al.*, 1998).

Health Benefits of Moringa:

It is Known as "the miracle tree," "horseradish tree," or "Ben oil tree," *Moringa oleifera* Lam (syn. *M. pterygosperma*) is the most well-known and extensively distributed species in the Moringaceae family. It has a remarkable

array of medicinal uses and high nutritional value all over the world. For a very long time, people have eaten every part of this plant and used it for a variety of domestic purposes, such as treating domestic water, alley cropping, biogas, animal feed, fertilizer, spraying nutrients for plants, green manure, gum (from tree trunks), juice-clarifier for sugar cane and honey, tannin for tanning hides ornamentally, biopesticide, pulp, oil for machine lubrication, rope, and hair care products. Moringa has many important vitamins and minerals. It also contains various minerals, iron, protein, and fiber that retains body healing and muscle building. It has antioxidant compounds which protect the cells from damage and enhance the immune power. Antioxidants work to lower blood pressure and fat reduction. Moringa leaves and natural products have long been used in periodic diets to promote mental well-being and skin smoothness. Every component of moringa is useful for oil manufacturing, water purification, medicine, and nutraceuticals. These are mostly used to treat diseases and provide nutrition for both humans and animals.

Culinary Use:

Moringa is used in a variety of culinary dishes. Nearly every part of the plant is used as a vegetable or for flavor. Pods are used in South India to make fried curries, curries with dals, and a variety of sambars. They are also used to flavor cutlets and other foods. It is used in a

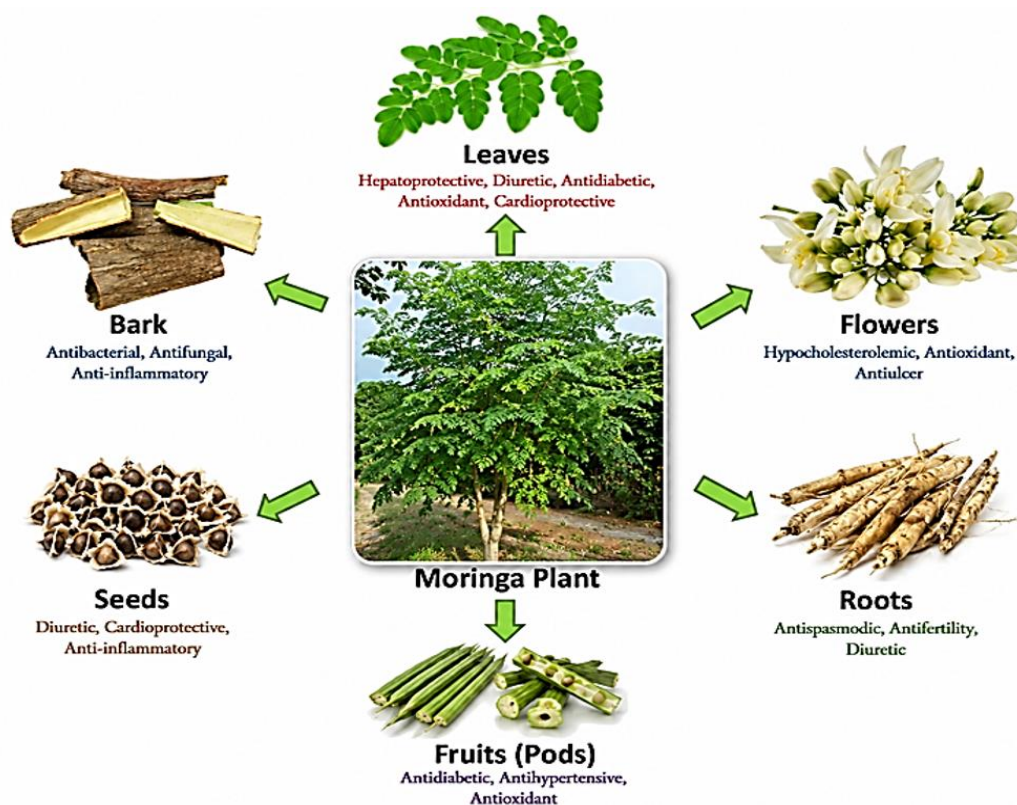
number of cuisines in West Bengal and Bangladesh by combining it with mustard, coconut, or poppy seeds, boiling it until the moringa pods are semi-soft, and then eating them straight out without further processing or cooking. The pods are used in Maharastra's "Aamatee," a sweet and sour curry. Tender moringa leaves are carefully chopped and added to salads, dals, sambar, and vegetable meals as a garnish.

Therapeutic and Pharmacological Properties of Moringa:

Moringa has therapeutic and preventive qualities in addition to its high nutritional content. Nearly every component root, bark, gum, leaf, pods, flowers, seed, and seed oil has been utilized to treat a variety of illnesses. This Plant has a wide range of pharmacological qualities, including anti-tumor, anti-pyretic, anti-inflammatory, anti-spasmodic, diuretic, anti-hypertensive, anti-diabetic, hepatoprotective, anti-bacterial, and anti-fungal qualities. The pharmacological and therapeutic qualities of moringa were the subject of extensive research and development programs, which are outlined here.

Anti-Microbial Activity:

As resistance strain incidences of pathogens increase, resulting in higher death rates worldwide, new and improved antimicrobial drugs must be developed. In this regard, medicinal plants are coming into the limelight, having a superior approach to health and being devoid of synthetic pharmaceutical side effects. The leaf extracts of *Moringa oleifera* have been tested against *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Helicobacter pylori*, *Klebsiella pneumoniae*, *Micrococcus Kristina* for antimicrobial activity (Patel *et al.*, 2009). Using a disk-diffusion technique, Caceres *et al.* (1992) investigated the antibacterial properties of moringa leaves, roots, bark, and seeds against bacteria, yeast, dermatophytes, and helminths. *Pseudomonas aeruginosa* and *Staphylococcus aureus* are inhibited in their growth by fresh leaf juice and seed aqueous extracts. They deduced that no activity was shown against other pathogens, such as *Candida albicans* and Gram-positive and Gram-negative bacteria. The stem bark's juice shown antibacterial activity against *S. aureus*.



Anti-Oxidant Activity:

Ashok Kumar and Pari (2003) investigated antioxidant potential of moringa on hepatic marker enzymes, lipid peroxidation and antioxidants. The result of this study revealed that moringa extract and silymarin significantly decreased hepatic marker enzymes and lipid peroxidation with a simultaneous increase in the level of antioxidants. Siddhuraju and Becker (2003) reported the antioxidant and free radical scavenging property of water, aqueous methanol and ethanol extracts of freeze-dried moringa leaves. The major bioactive compounds of phenolics were flavonoid groups such as quercetin and kaempferol. Various types of antioxidant compounds present in leaves and roots of moringa make this plant as a valuable source of natural antioxidants.

Antidiabetic Properties:

Diabetes mellitus (DM), a chronic illness brought on by a lack of insulin or its activity, or both, causes delayed hyperglycemia, which eventually affects the body's metabolic functions. If left untreated, it will seriously harm tissue and blood vessels, leading to retinopathy, neuropathy, nephropathy, cardiovascular problems, and ulceration. According to the World Health Organization (WHO), 150 million individuals worldwide have diabetes mellitus. By 2025, the figure is predicted to rise to 300 million. In another study, 100 Type II diabetic patients were provided with a tablet formulated with 98.34% dehydrated *Moringa oleifera* leaf powder in a private clinic, and it was found that after 90 days of trials, postprandial blood glucose and

glycosylated hemoglobin was reduced up to 28.57% and 7.4%, respectively, as compared to the initial value (Momoh *et al.*, 2013).

Dietary Application of Moringa Leaves in Food Products:

Since many chronic illnesses have become more common, functional meals are becoming increasingly significant in today's daily life since they can either prevent or lessen their severity. Following a number of studies on functional foods, it was determined that these goods play a significant role in meeting consumer demands because of their health-promoting qualities. The body's overproduction of free radicals can break down big macromolecules like proteins, lipids, and DNA, which can lead to a number of chronic illnesses. Therefore, antioxidants may play a significant role in the prevention and management of chronic illnesses. Because of the enhanced nutritional value of its edible sections and the presence of strong antioxidant chemicals, *moringa oleifera* is becoming more and more recognized as a functional food. Moringa leaves, with high nutritional value, help combat malnutrition problems worldwide and may be used as nutraceuticals and functional foods due to natural antioxidants. Recent studies showed that moringa leaves are widely used for the development of functional foods. The nutrient content of several baked products was significantly increased with the addition of moringa leaves. Rich

nutrients including proteins and antioxidant compounds derived from vitamins and polyphenols are responsible for many of the benefits of moringa leaves, making them essential to a balanced and healthful diet and potentially useful foods.

Conclusion:

Native to India, *Moringa oleifera* thrives throughout the world's tropical and subtropical climates. It is frequently referred to as "horseradish tree" or "drumstick tree." Moringa is grown all across the world because it can tolerate both severe drought and moderate frost. Every portion of the tree can be used for commercial or nutritional reasons because to its high nutritional qualities. Minerals, vitamins, and other vital phytochemicals are abundant in the leaves. Leaf extracts are used to treat malnutrition and help nursing women produce more breast milk. It is employed as an antibacterial, anti-inflammatory, antidiabetic, antioxidant, and anticancer drug.

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