

# Moringa oleifera: A Review on Nutritional and Therapeutic Values of Miracle Tree

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## Abstract

Nowadays, there has been significant change in socioeconomic status, prompting individuals to be increasingly concerned about their lifestyle and health. They understand the negative consequences of manmade items. They express interest in natural items as a result. Over time, the usage of natural products derived from plants that have fewer adverse effects has grown in popularity. There is vast potential for natural products that may provide health benefits beyond conventional nutrients. Among these trees, *Moringa oleifera* has exceptional nutritional and therapeutic benefits. It is abundant in macro- and micronutrients as well as various bioactive compounds that are crucial for the body's normal functioning and for preventing certain illnesses. Nearly every component of this tree, including the leaves, blossoms, and seeds, can be eaten and has important medicinal qualities, including antioxidant, anticancer, antiulcer, antidiabetic, and antibacterial activities. *Moringa* should be used as a functional component in food, according to most of the recent study. This review investigates the application of moringa, the "Miracle Tree", across various fields for its medicinal value and examines its chemical constituents, nutritional aspects, traditional medicinal uses, and therapeutic properties.

**Keywords:** *Moringa oleifera*, nutrients, therapeutic properties of Miracle Tree, chemical constituents, traditional medicinal uses

## INTRODUCTION

One of the uncommon plant species that has tasty and incredibly nourishing seeds, flowers, leaves, and stems is the drumstick. *Moringa*, often known as drumstick, is considered a "super plant" because of its special yet potent qualities that help us fight off various illnesses. Our forefathers employed this nutrient-dense plant as medicine, and its roots can be found in Ayurveda. Indian cooks primarily use the stems of the moringa plant to make delicious treats. The Tamil town of Murungai is where *Moringa* got his name. For more than a century, Indian cuisine has made extensive use of this humble vegetable. Whether you're cooking a tasty sambal, meat curry, soup, cucumber, etc., drumsticks add a special taste to your food. It originates in South Asia's tropical regions, including India. "Moringa" is derived from the Tamil word "murungai," meaning "twisted pod." For almost a century, Indian cuisine has made considerable use of this unassuming vegetable. Drumstick adds a distinct flavor to any meat curry, soup, pickle, or dish, including the delicious sambhar or avail.

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The Moringaceae family includes the drought-tolerant *Moringa oleifera*, also known as the drumstick. The drumstick is native to tropical regions of South Asia, and India is the world's top grower, producing 1–1.3 million tons of fruits annually. According to the World Centre of

Vegetable Research, it is also grown in various Asian nations, including Taiwan, Malaysia, Sri Lanka, the Philippines, and Indonesia [1–3].

### MORINGA: THE “MIRACLE TREE”

The tree *Moringa oleifera* is sometimes referred to as the “wonder tree” since every portion of its diet has medicinal uses. Like a new superfood, it gained popularity very quickly. There is an abundance of natural minerals and compounds present in it. Moringa Health Food Supplement Plants states that it has four times as much as vitamin A as in carrot, three times Potassium as in bananas, four times calcium as in milk and seven times vitamin C as in oranges and iron comparable as in spinach and nine times more protein in yogurt. Additionally, it is said to be a tonic for skin, hair, and nails. There are compelling indications that moringa can enhance human nursing and combat infectious diseases and colds [4, 5].

### Chemical Constituents

The chemical makeup of the plant varies depending on its section (Table 1).

**Table 1.** Chemical constituents in Moringa [6, 7].

Plant Part	Chemical Constituents
Pods	Polysaccharides, globulin, and prolamine
Seeds	Glycosides and moringyne, fatty acid
Oil	Sterols and fatty acids
Flowers	Kemphoral & Ourcetin
Leaves	Arrtino, glycine, serine, and aspartic and glutamic acids
Entire plant	Iron, phosphorus, calcium, tergospermin, byrenol, indole-acetic acid, carotins, and vitamins A and C
Leaf juice	is equivalent to nine eggs, nine cups of badam milk, eight cups of milk, six oranges, eight apples, sixteen bananas, or twenty mangoes.

### Nutrition

Drumstick pods and leaves are a storehouse of essential elements, but the leaves are the most nutrient-dense part of the plant and one of the greatest sources of calcium, iron, zinc, selenium, and magnesium. Oleic acid, a good fatty acid that is known to support heart health, is abundant in fresh pods and seeds. Among all the greens, moringa leaves are special because they contain a substantial amount of protein – roughly 9.8 grams per 100 grams. An excellent supply of high-quality necessary amino acids is dried leaf powder. Lack of Nutrition Beta-carotene, vitamin B complex, vitamin C, and vitamin K are among the essential vitamins that are rich in moringa leaves. The foliage is filled with a variety of minerals, such as calcium, iron, zinc, manganese, magnesium, as well as a healthy quantity of dietary fiber and protein. Moringa leaves contain high levels of two powerful antioxidants, quercetin and chlorogenic acid. Moringa leaf supplements are also known to increase blood antioxidant levels. Seeds’ nutritional value is also immense. The mature pods are roasted and consumed as a snack, like peas or almonds, and are high in vitamins C and B. The main purpose of seeds is to extract oil. Like soybean seeds, *M. oleifera* leaves contain more sulfur-containing essential amino acids than the Food and Agriculture Organization’s (FAO) recommended levels (Tables 1, 2) (Figure 1) [8, 9].

**Table 2.** Traditional medicinal uses of Moringa Plant.

Part Used	Traditional Medicinal Use	System of Medicine/Region	Benefits
Leaves	Treating malnutrition	Africa, India	Rich in nutrients (vitamins A, C, calcium, iron, protein).
Leaves	Managing diabetes	Ayurveda, African traditional medicine	Helps regulate blood sugar levels.
Leaves	Anti-inflammatory & pain relief	Ayurveda	Reduces inflammation in joints and muscles.
Leaves	Boosting immunity	Traditional Indian & African medicine	Strengthens the immune system.

Leaves (juice)	Treating skin infections and wounds	Traditional medicine	Antibacterial and antifungal properties.
Seeds	Water purification, treating bacterial infections	Africa, India	Natural coagulant and antimicrobial agent.
Seeds (oil)	Skin moisturizer, treating fungal infections	Traditional African medicine	Nourishes skin, antifungal properties.
Bark	Digestive issues, fever, and pain relief	Ayurveda, African medicine	Analgesic and antipyretic (fever-reducing) effects.
Roots	Digestive aid, anti-helminthic (expels worms)	Ayurveda	Helps in treating intestinal parasites.
Flowers	Aphrodisiac, treating urinary problems	Unani, Ayurveda	Used for reproductive and urinary health.
Pods (Drumsticks)	Enhancing digestion, treating respiratory issues	Indian traditional medicine	High fiber helps digestion and bronchial health.
Whole Plant	General tonic, blood purifier, anti-cancer (folk belief)	Folk medicine (various regions)	Believed to detoxify and support overall health.

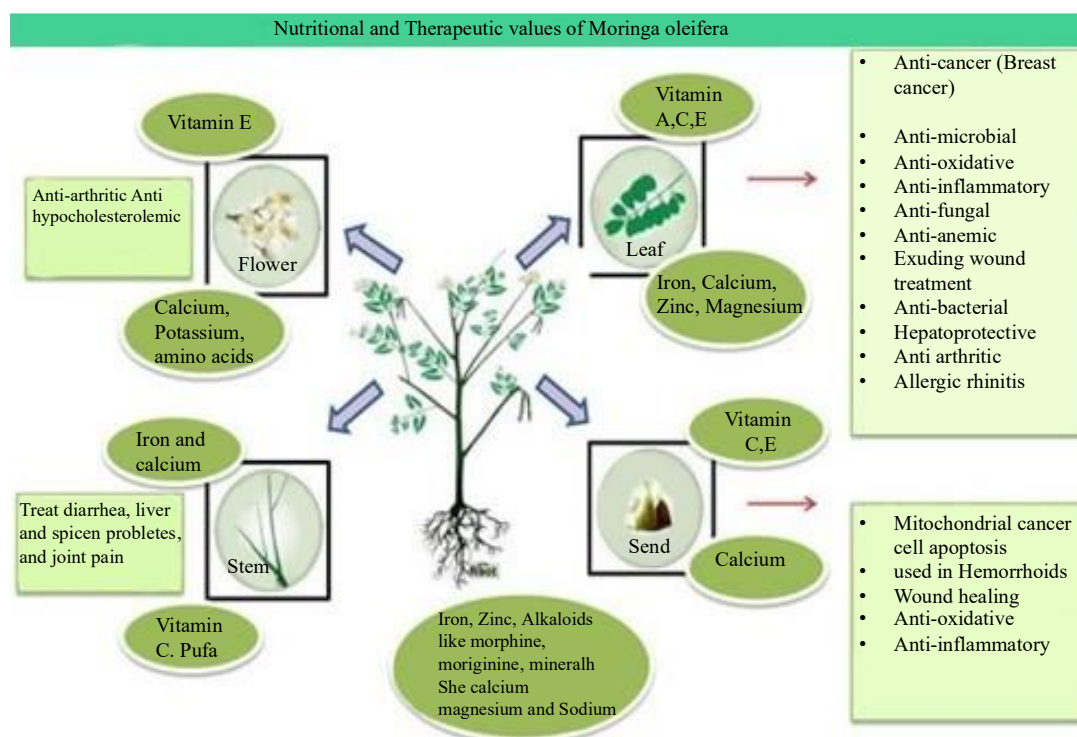


Figure 1. The nutritional and therapeutic values of Moringa of whole plant.

## TRADITIONAL MEDICINE

### Therapeutic Properties

#### Antimicrobial and Anthelmintic

Extracts derived from the leaves, flowers, roots, bark, and stem bark of *Moringa oleifera* exhibit both antimicrobial and anthelmintic properties. Pterygospermin has been found to have strong antibacterial and fungicidal properties in the leaves and flowers, respectively, by Das et al. and Rao et al. Moreover, ethanolic extracts from seeds, leaves, and flowers have shown antibacterial efficacy against several pathogens, such as *Streptococcus*, *Salmonella typhi* A, *E. coli*, *P. aeruginosa*, *Enterobacter species*, *K. pneumoniae*, *S. aureus*, *Proteus mirabilis*, and *Candida albicans*. The anthelmintic qualities of *Moringa oleifera* flowers and leaves have also been validated by numerous research. For example, ethanolic

extracts from the leaves have been shown to suppress the Indian earthworm *Pheretimaposthuma* [10–14].

#### ***Antiasthmatic***

*M. oleifera* seed kernels improved the treatment of patients with bronchial asthma and their concomitant respiratory functioning without causing any negative side effects [15].

#### ***Antidiabetic and Wound Healing***

According to reports, moringa plays a significant role in diabetes management. It has been discovered that moringa leaves significantly lower blood glucose levels right after consumption. Moringa aqueous extracts demonstrated excellent wound healing properties and notable prohealing effects [16–18].

#### ***Cardiac and Circulatory Stimulant***

Moringa tree alkaloids, a bioactive molecule, function as cardiac stimulants that regulate blood pressure, impact diuretic action, and lower fat and cholesterol to prevent hyperlipidemia. They also lower serum cholesterol and triglycerides.

#### ***Anticancer Agents***

The anticancer properties of the leaves, seeds, bark, and roots of the *M. oleifera* tree have all been investigated. Nonetheless, the leaf extracts have been the subject of the most thorough investigation into *M. oleifera*'s anticancer properties. With an estimated yearly yield of six tons per hectare, the moringa tree is evergreen that produces new leaves all year long. Polyphenols and polyflavonoids, which are antioxidants and possibly anticancer substances, are abundant in the leaves [19–23].

#### ***Antioxidants***

The human body typically keeps the ratio of oxidants to antioxidants in balance. Animal bodies constantly generate reactive oxygen species because of environmental stressors in daily living. Antioxidants are created by the body's cells to counteract these free radicals. Oxidative stress is an imbalance in these systems. Numerous illnesses or an imbalance in the body's regular physiological system might cause it. The oxidative stage at the severe level transforms the cell damage into several chronic illnesses. According to Kattappagari et al., antioxidants have a beneficial effect on certain chronic illnesses by halting additional damage.

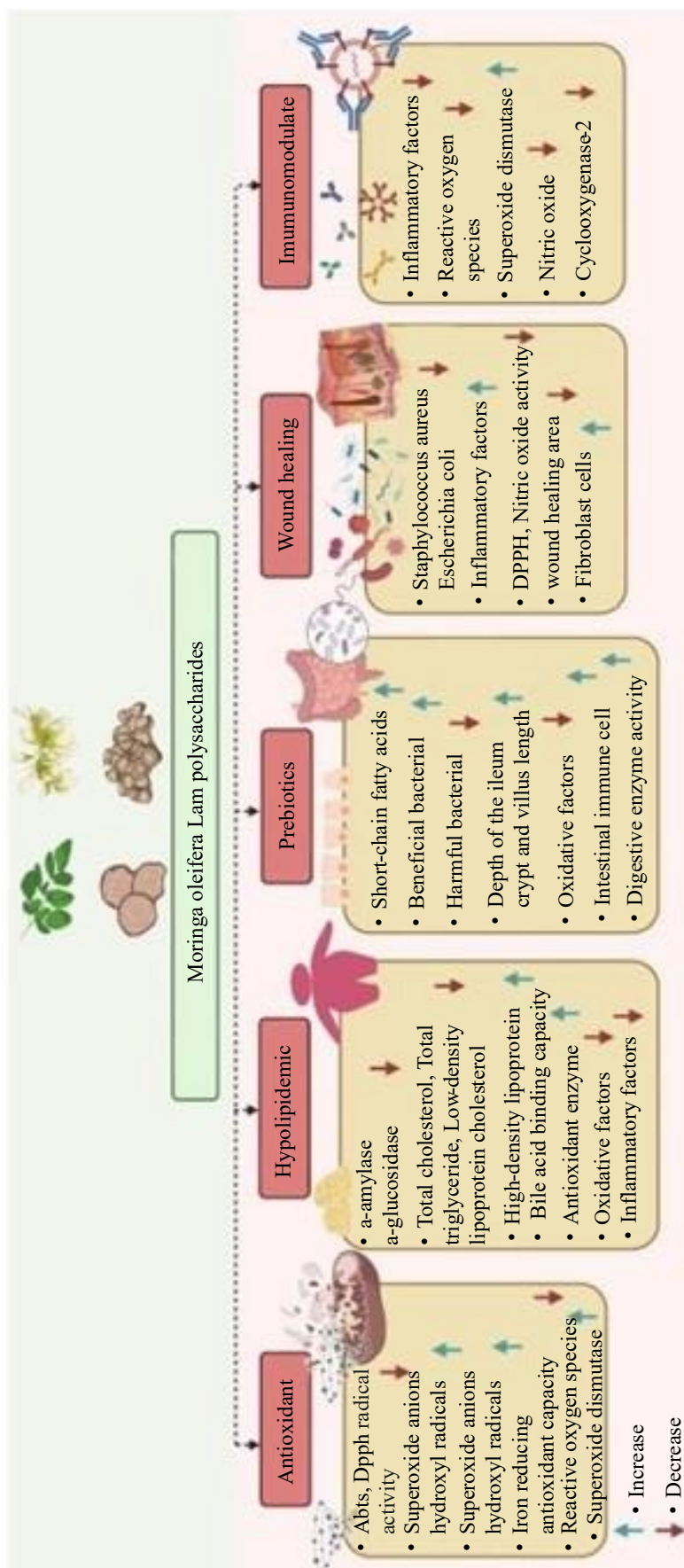
#### **Other Benefits**

*M. oleifera* also does analgesic activity, antidiuretic, antipyretic activity, hepatoprotective activity, antispasmodic and antiulcer effects, bone strengthening, improved skin health, delayed signs of aging, kidney health, gut health, good vision, and a drumstick for boosting sperm count and vitality [10–17] (Figure 2).

#### **FUTURE PROSPECTS**

*M. oleifera* is a real miracle of nature because of its many advantages. The most affordable and reliable substitute for not only offering wholesome nourishment but also curing and preventing a variety of illnesses is the *Moringa oleifera* plant. Given that the plant is edible, more human studies can be conducted to produce a medication with a variety of effects that will be in the market in future. In Asia, the moringa tree may be simply and affordably farmed. Instead of waiting for abundant food aid from the wealthy west, the impoverished nations can encourage the growth and usage of moringa. Malnutrition, starvation, poverty, illnesses, unemployment, and the export of edible oil are all issues that India might readily combat by using it [3].

#### **Recent Developments in *Moringa oleifera* Lam. Polysaccharides**



**Figure 2.** Lam Polysaccharides in Moringa [22].

## CONCLUSIONS

Drumsticks are widely valued for their nutritional value and vital medicinal qualities. Minerals including calcium, magnesium, and iron, as well as essential vitamins A, C, K, and B complexes, are abundant in this versatile vegetable. A regular inclusion of drumsticks to the diet is believed to improve libido, alleviate erectile dysfunction, increase bones, improve skin health, and control diabetes and hypertension. Traditional medicine uses a variety of plant parts, such as roots, bark, leaves, pods, flowers, fruits, and seeds. Overall scenarios of the system's pharmacological action, nutritional value, possible applications, and chemical makeup are included in published literature.

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