



## Overview: Study on Therapeutic Applications of *Moringa oleifera*

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### Abstract

The most extensively grown variety of the genus *Moringa* is *Moringa oleifera*, a pan-tropical plant also known as Drumstick in English, Saragvo in Gujrati, Soanjna in Hindi, Sajna in Bengali, Nugge in Kannada, Sigru in Malyalam, Shevga in Marathi, Shobhanjana in Sanskrit, Munaga in Telgu, and Murungai in Tamil. It belongs to the fourteen species family Moringaceae. The tree itself is rather little, reaching a height of around 10 metres, and has drooping branches. It is a very nutrient-dense vegetable tree with several possible applications. Numerous studies outlining its nutritional and therapeutic qualities have been published in scholarly publications throughout the previous 20 years. The literature on pharmacognosy, phytochemistry, and conventional and biologically supported therapeutic applications of *Moringa oleifera* is thoroughly reviewed in this study.

**Keywords:** Drumstick; *Moringa Oleifera* Lam; Murungai; Medicinal Uses; Pharmacology; Phytochemistry

### Introduction

The most extensively grown species of the monogeneric Moringaceae family, which is indigenous to the sub-Himalayan regions of Afghanistan, Bangladesh, Pakistan, and India, is *Moringa oleifera*. Although it produces low-quality softwood, this tree has been used for generations in both traditional medicine and industrial applications. In tropical India, Africa, tropical America, Mexico, Malabar, Malaysia, and the Philippine Islands, it is widely grown and naturalised. In tropical Africa, tropical America, Mexico, Sri Lanka, India, Malabar, Malaysia, and the Philippine Islands, it is extensively grown and allowed to naturally occur. Humans have traditionally consumed all of the edible components of the moringa tree. Fuglie lists a variety of applications for moringa, such as: alley cropping (biomass production); animal forage (leaves and treated seed-cake); biogas (from leaves); domestic cleaning agent (crushed leaves); blue dye (wood); fencing (living trees); fertiliser (seed-cake); foliar nutrient (juice expressed from the leaves); green

manure (from leaves); gum (from tree trunks); honey- and sugar cane juiceclarifier (powdered seeds); honey (flower nectar); medicine (all plant parts); ornamental plantings; biopesticide (soil incorporation of leaves to prevent seedling damping off); pulp (wood); rope (bark); tannin for tanning hides (bark and gum); and water purification (powdered seeds) Ben oil, or moringa seed oil (yield 30–40% by weight), is a pleasant, nonsticking, non-drying oil that does not go rancid easily. It's been utilised in salad dressings, delicate machine lubrication, and the production of hair care and scent items. The use of powdered moringa seeds to filter pollutants and clean drinking water is one of the plant's most well-known applications in the West. However, the seeds may also be consumed raw, roasted, powdered, steeped in tea, or used to curries. A valuable food item, *Moringa oleifera* has drawn a lot of interest as the "natural nutrition of the tropics." An extremely nutritious vegetable, the leaves, fruit, blossoms, and immature pods of this tree are consumed in many nations, especially in Hawaii, India, Pakistan, the Philippines, and many regions of Africa. The leaves of the

moringa plant are rich in  $\beta$ -carotene, protein, vitamin C, calcium, and potassium. They also function as a good source of natural antioxidants, which can extend the shelf life of foods that contain fat because they contain ascorbic acid, flavonoids, phenolics, and carotenoids, among other antioxidant compounds. It is occasionally given for anaemia and is regarded as “mother’s best friend” in the Philippines due to its use in boosting a woman’s milk supply. Several portions of this highly valued tree have been attributed with therapeutic benefits. In South Asian traditional medicine, nearly every part of this plant—root, bark, gum, leaf, fruit (pods), flowers, seed, and seed oil has been used to treat a variety of conditions, including infections and inflammations as well as haematological, gastrointestinal, cardiovascular, and hepatorenal disorders. Moringa seeds are bitter, caustic, and thought to have antipyretic and antibacterial properties. The seed can be eaten raw as peas or ground, roasted, or pressed to make pleasant, non-desiccating oil that is sold as premium “Ben oil” [1-3].



**Figure 1:** Image of Drums Stick Plant.

### Botany and Nomenclature

The tree is a medium-sized member of the Moringaceae family. The family is made up of just one species, *Moringa*, whose botanical name is *Moringa oleifera* Lam. The elongated, non-dehiscent berry, three valved fruit, winged seeds, and parietal placentation are characteristics that set this family apart. Native to the tropical regions of the Old World, Philips (1951) recorded four species, while Pax (1936) and Puri (1942) claimed ten. Wettstein (1935) and Bessey (1915) classified the family as Rheadales. Although Datta and Mitra (1947) thought it was more closely linked to the Violaceae of the Violales, Hutchinson (1926) placed it in the Capparidales. In agreement with Bessey, Engler (1964) placed it in the order Rheadales, suborder Moringineae. *M.*

*oleifera* and *M. concanensis* are the two prevalent species; the former is the vegetable species. *M. oleifera* may be identified by its medium-sized tree, yellow or white petioles without red streaks, leaflets that are typically 12–18 mm long, and typically tripinnate leaves. *M. concanensis* is distinguished by its huge tree, bipinnate leaves, and leaflets that are 15–30 mm long. The petals also have crimson streaks or a reddish base [4,5].



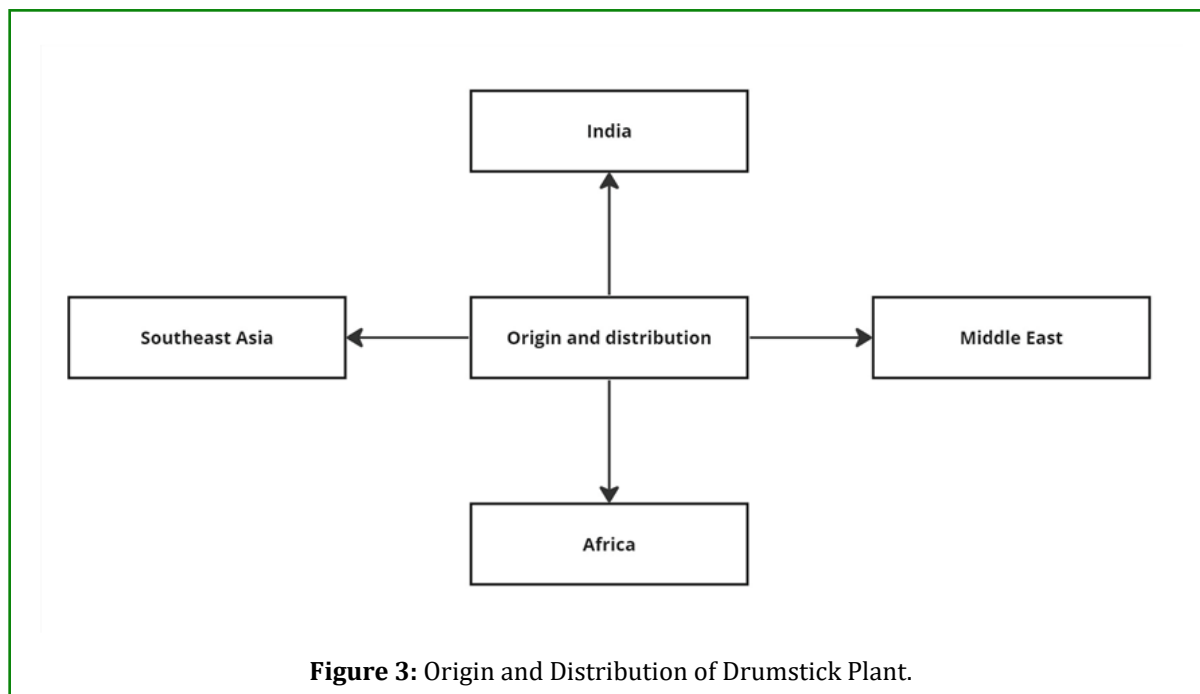
**Figure 2:** Image of Moringineae Plant.

### Origin and Distribution

Drumsticks have a long cultural and culinary history that dates back to ancient South Asian civilizations. They originate from the *Moringa oleifera* tree. Drumsticks are a native of the Indian subcontinent and have long been used as a main ingredient in African, Thai, Indian, and Filipino cooking. They grow best in warm, well-drained soil, lots of sunshine, and tropical and subtropical climates, where they are extensively grown. Beyond their original homeland, drumsticks are now grown commercially in nations including Nigeria, Ethiopia, Kenya, and the Philippines. In traditional herbal medicine systems, drumsticks are prized for their therapeutic qualities in addition to their culinary usage. Throughout South and Southeast Asia, Africa, and portions of Latin America, they are frequently discovered at neighbourhood markets and grocery shops. Because of their flexibility in the kitchen and growing knowledge of their nutritional advantages, drumsticks are now more widely available worldwide. Drumsticks are becoming a more regular part of Western diets thanks to diverse cuisines and health food shops, as customers become more health-conscious. Products like powders, supplements, and teas made from drumsticks have become more and more well-liked in global health and wellness industries in recent years. Drumsticks, which are symbolic of health, vigour, and culinary diversity, are still firmly ingrained in the culinary and cultural traditions of their originating areas even after being widely distributed.

Planting limb cuttings that are 1-2 m long is how it is propagated between June and August. Begins to yield pods 6-8 months after planting, but yields fruit beyond the second year. Additionally spread via seed, culture is predicated on

creating an ideal habitat for the plant. In well-draining soil, seeds are sown an inch below the surface and germinate all year round. The factory produces between 1.1 and 1.3 million tonnes annually from a 380 km<sup>2</sup> area [6-8].



### Vernacular Names

- **Bengali:** Sajina, Sajna, Sujana.
- **English:** Drumstick tree, horseradish tree, oil of been tree.
- **Gujarati:** Midhosaragavo, saragavo, segto, seyla.
- **Hindi:** Mungna, sahjan, saijna, sanjna, Shajna, Soanjana, Soajna, Sohajna.
- **Kannada:** Guggala, mochaka, nugge, moxing.
- **Malayalam:** Moringa, Murinna, Sigru.
- **Marathi:** Achajhada, shevgi.
- **Oriya:** Munigha, munika, sojina, sojaba.
- **Punjabi:** Sanjna, Senjna, soanjna
- **Sanskrit:** Shobhanjana, sigru, sigruh, sobhanjana.
- **Tamil:** Moringa, murungai.
- **Telugu:** Mulaga munaga, munga, sajana, tellamunaga.
- **Urdu:** Sahajna [9,10]

### Chromosomal Number

The tree is a true diploid with  $2n = 28$  [11]

### Tree Description

A small to medium-sized tree that may grow up to 10 metres tall, with tomentose twigs and thick, velvety, corky bark

that is severely fissured. Roots: Bitter, acrid, aromatic, and thermogenic typically, leaves are 45 cm long, tripinnate, deciduous, with pinnate and opposing pinnules; leaflets are 1.2-2 cm in length and 0.6-1 cm in width. The terminal obviates the lateral elliptic. Flowers: huge panicles of fragrant white flowers. Fruits: (Pods) Pendulous, green, triangular, nine-ribbed, and ranging in length from 22 to 50 cm. The wings of trigonous seeds are angled. Depending on the region, flowers and fruits may appear once or twice a year. For example, in central India, where trees lose their leaves in December and January and February and March and February through June, blooming and fruiting occur most often as seen in Table 1 [12,13].

Sr.	Parts	Size
1	Stem	1.5-2 m in height
2	Branch	Disorganized manner
3	Leaves	1-2 cm in long
4	Fruits	30-120 cm long 1.8 cm wide
5	Seeds	0.39/ seed in weight

**Table 1:** Description of Parts of Plants.



**Figure 4:** Drum Stick / Moringa (Medium Tree)

### Plant Parts and their Composition

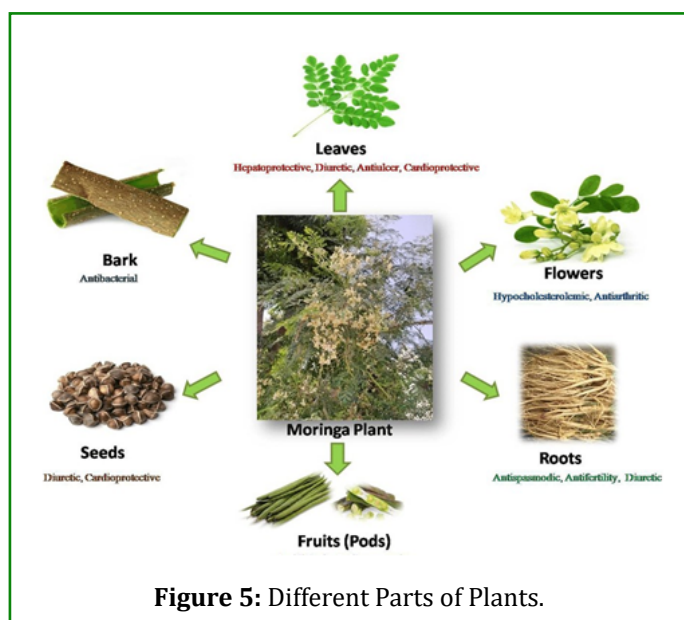
The sensitive pods on the tree are prized as vegetables and are the major reason for its worth. They are also pickled and sliced for use in food preparations. In addition, the flowers and leaves are used as vegetables. After being fried, seeds are eaten. They have a peanut-like flavour. Twigs and leaves are occasionally used as feed.

The makeup of the cake and seed kernels that remain after extraction reveals the cake's fertilising value and the seed's oil worth. The edible oils extracted from the seeds of *Moringa oleifera* and *Moringa peregina* Fiori (*M. aptera* Gaerlin) are referred to in commerce as Ben or Behn oil. They are utilised in cosmetics and lighting. It was falsely claimed that ben oil was resistant to rancidity and that it was especially good for enflourage and as a lubricant for fine machinery. But the oil becomes rancid just like any other vegetable oil does. It resembles olive oil and might have some use as an ingredient in plasticizing alkyds that don't dry out or become yellow. As a lubricant, watchmakers greatly appreciate the oil. It's interesting to note that, despite the tree being widely grown in India, little oil is ever recovered from it, making it unsuitable for export. Perfumers hold it in high regard due to its exceptional ability to capture and hold onto even the most elusive scents. It's commonly referred to as a "Miracle Tree." Due to its simple growing in unfavourable climatic circumstances and widespread availability, the drumstick tree, also known as moringa in scientific literature, might be a focus for health and economic related possibilities in numerous developing nations. Because of its ability to resist

both extreme dryness and light cold, it is grown all over the world. The traditional medicine of South Asia has utilised every component to treat a wide range of illnesses. This wonder tree's nutrients are used for a number of things.

Known for being "one of the most amazing trees God has created," this tree has a rich reservoir of proteins, vitamins, and minerals found in all parts of it, including the root, seed, fruit, leaves, flowers, gum, and bark. Known as a panacea, *moringa oleifera* is said to be able to treat over 300 conditions, including dementia, diabetes, malnourishment, cardiovascular disease, cancer, and liver fibrosis. Secondary metabolites such as tannins, saponins, alkaloids, coumarins, flavonoids, resins, and steroids are responsible for this tree's therapeutic potential. *M. oleifera* is regarded as the most beneficial tree in the world because of its many uses as a medication, nutraceutical, and functional food.

*M. oleifera* is a veritable wonder tree due to its pharmacological qualities and traditional usage. In summary, this article aims to enlighten readers on the nutritional and medicinal qualities of drumstick trees [14,15].



**Figure 5:** Different Parts of Plants.

### Soil and Climate

With the exception of hard clays, *M. oleifera* grows well in nearly all soil types; sandy loams work best. It thrives on the lowlands and is exclusively a tropical plant. It is mostly a crop grown in dry, arid areas where it has shown to be productive and well-performing [16-18].

### Medicinal Uses of Drumsticks

The tree *Moringa oleifera* is a small to medium-sized tree that grows throughout nearly all of India. It is a plant that is utilised for food, cosmetics, medicine, and practically every other use. In conventional medicine, it was a significant medicinal

herb. Antioxidant, antimicrobial, anticancer, antidiabetic, hepatoprotective, anti-inflammatory, antipyretic, analgesic activity, hypocholesterolemic impact, cardioprotective function, anti-asthmatic, and water purification capabilities are only a few of its many medical qualities [19,20].

**Nutritional Supplement:** Drumstick is a useful nutritional supplement since it is high in critical nutrients, minerals (calcium, potassium, iron), vitamins (A, C, E, and K), and proteins.

**Anti-inflammatory Properties:** Its leaves and pods have anti-inflammatory components that can help relieve rheumatism and arthritis, two illnesses that are associated to inflammation.

**Antioxidant Property:** Drumstick is a rich source of antioxidants, including flavonoids, polyphenols, and vitamin C. These compounds have the ability to counteract free radicals and minimise oxidative stress, hence reducing the likelihood of developing chronic illnesses.

**Immune Booster:** Drumsticks' high vitamin C content is said

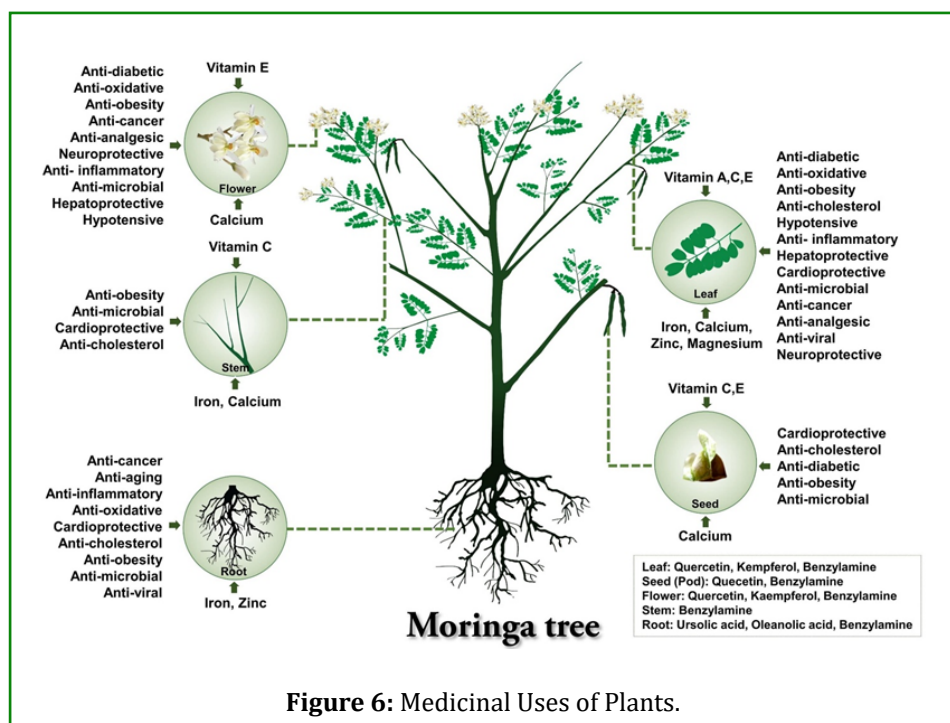
to fortify the immune system, assisting the body in fending off infections and illnesses.

**Blood Sugar Regulation:** Based on certain research, drumsticks may be able to assist control blood sugar levels, which is advantageous for people who already have diabetes or are at risk of getting it [21].

**Cardiovascular Support:** Drumstick contains compounds including quercetin and chlorogenic acid that may help decrease blood pressure and cholesterol, which may improve heart health and lower the risk of cardiovascular illnesses [22,23].

**Antimicrobial Effects:** Drumstick has antimicrobial qualities that may aid in the fight against bacteria, viruses, and fungus, among other diseases, promoting general health and lowering the chance of infection [24].

**Skin Care:** Because drumstick leaf or seed oil is moisturising and anti-inflammatory, it is said to nourish the skin, enhance its look, and relieve skin disorders including psoriasis, acne, and eczema [25].



## Conclusion

In short, *Moringa oleifera*, sometimes referred to as the drumstick tree, is a rich and adaptable natural resource with a wide range of uses. Its nutrient-rich profile and therapeutic qualities, along with technological breakthroughs, present promising opportunities for the creation of pharmaceuticals and nutraceuticals. Furthermore, because of its adaptability and quick development, it is a viable option for phytoremediation and the generation of biofuels to solve environmental problems. Research on the full potential of

*Moringa oleifera* is still on-going, which emphasises how crucial it is to use nature's abundance to find long-term solutions to environmental and public health problems.

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