ABSTRACT

Moringa - The Key to Better Food and Nutrition and So Much More.....! Moringa oleifera is a tropical species that is known by various regional names as benzolive, drumstick tree, kelor, marango, mlonge, mulangay, nebeday, saijhan, and sajna. Over the past two decades, many reports have been published describing its nutritional and medicinal properties. It has an impressive range of medicinal uses with high nutritional value. Different parts of this plant contain a profile of important minerals, and are a good source of protein, vitamins, β-carotene, amino acids and various phenolics. Various parts of this plant such as the leaves, roots, seed, bark, fruit, flowers and immature pods act as cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, anti hypertensive, cholesterol lowering, antioxidant, antidiabetic, hepatoprotective, antibacterial and antifungal activities, and are being employed for the treatment of different ailments in the indigenous system of medicine. In developing countries, Moringa has the potential to improve nutrition, boost food security, foster rural development, and support sustainable landcare. It may be used as forage for livestock, a micronutrient liquid, a natural anthelmintic, and possible adjuvant. Moringa trees have been used to combat malnutrition, especially among infants and nursing mothers.

KEYWORDS: Moringa, Taxonomy, Ecology, Nutrition, Traditional Medicine.

INTRODUCTION

The plant Moringa oleifera is a native to the Indian sub-continent and naturalized in tropical and sub-tropical areas around the world, it belongs to the family Moringaceae and is a
deciduous tree or shrub, fast-growing, drought resistance, average height of 12 meter at maturity.\cite{1} Since the beginning of human civilization, medicinal plants have been used by mankind for its therapeutic value. Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources. Many of these isolations were based on the uses of the agents in traditional medicine. The plant-based, traditional medicine systems continues to play an essential role in health care, with about 80% of the world’s inhabitants relying mainly on traditional medicines for their primary health care.\cite{2}

![Figure showing the Complete Plant & Fruits of Moringa oleifera Plant](image)

According to the World Health Organization (WHO, 1977) “a medicinal plant” is any plant, which in one or more of its organ contains substances that can be used for the therapeutic purposes. The term “herbal drug” determines the part/parts of a plant (leaves, flowers, seeds, roots, barks, stems, etc.) used for preparing medicines. In India, the ayurvedic system has described a large number of such medicines based on plants or plant product and the determination of their morphological and pharmacological or pharmacognostical characters can provide a better understanding of their active principles and mode of action. In the last few decades there has been an exponential growth in the field of herbal medicine. It is getting popularized in developing and developed countries owing to its natural origin and lesser side effects.\cite{6}

*M. oleifera* is one of the best known medicinal plants. The *Moringa* plant has been consumed by humans.\cite{7} It is one of the richest plant sources of Vitamins A, B, C, D, E and K.\cite{8,9} The vital minerals present in *Moringa* include Calcium, Copper, Iron, Potassium, Magnesium, Manganese and Zinc. It has more than 40 natural anti-oxidants. *Moringa* has been used since 150BC by ancient kings and queens in their diet for mental alertness and healthy skin. The leaves, pods, seeds, gums, bark and flowers of *Moringa* are used in more than 80 countries to
relieve mineral and vitamin deficiencies, support a healthy cardiovascular system, promote normal blood-glucose levels, neutralize free radicals, provide excellent support of the body's antiflammatory mechanisms, enrich anemic blood and support immune system. It also improves eyesight, mental alertness and bone strength. It has potential benefit in malnutrition, general weakness, lactating mothers, menopause, depression and osteoporosis.

**Figure Showing the Leafs & Fruits of** *Moringa oleifera*

**TAXONOMY**

*Kingdom Plantae* – Plants  
*Subkingdom - Tracheobionta – Vascular plants*  
*Superdivision - Spermatophyta – Seed plants*  
*Division - Magnoliophyta – Flowering plants*  
*Class - Magnoliopsida – Dicotyledons*  
*Subclass - Dilleniidae*  
*Order - Capparales*  
*Family - Moringaceae – Horse-Radish Tree Family*  
*Genus - Moringa*  
*Species - oleifera Lam. – Horse Radish Tree*  
*Scientific Name – Moringa oleifera*

**Figure Showing the Fruits of** *Moringa oleifera*
ORIGIN AND HABITAT

*M. oleifera*, an important medicinal plant is one of the most widely cultivated species of the family Moringa in the *Moringaceae*, that is native to the sub-himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. The rapidly grown tree (also known as Ben oil tree, horseradish tree, drumstick tree benzolive tree, kelor, marango, mlonge, moonga) was utilized by the ancient Romans, Greeks and Egyptians. It is highly valued from time immemorial because of its vast medicinal properties. It is now widely cultivated and has become naturalized in many locations in the tropics. *M. oleifera* is a short, slender, deciduous, perennial tree, grows to about 10 m tall, rather slender with drooping branches; branches and stem are brittle, with corky bark; leaves are feathery, pale green, compound, tripinnate, (30-60 cm long), with many small leaflets, 1.3-2 cm long, 0.6-0.3 cm wide, lateral ones somewhat elliptic, terminal ones obovate and slightly larger than the lateral ones; flowers are fragrant, white or creamy-white, (2.5 cm in diameter), borne in sprays, with five (5) at the top of the flower; stamens are yellow; pods are pendulous, brown, triangular, splitting lengthwise into 3 parts when dry, (30-120 cm long, 1.8 cm wide), containing about 20 seeds embedded in the pith. The pod is tapering at both ends, nine (9) ribbed; seeds are dark brown, with 3 papery wings.[10]

![Figure Showing the Seeds of *Moringa oleifera*](image)

ECOLOGY AND CULTIVATION

*M. oleifera* is strictly a tropical plant and grows well at lower elevations, both under wet and seasonal conditions, but can be found up to 1300 m altitude. It can be grown in various soils but thrives best in fertile, well-drained sandy loams. In India the plant is propagated by planting limb cutting 1-2 m long, from June to August, 2018 preferably. The plant starts bearing pods 6-8 months after planting but regular bearing commence after the second year.
The tree bears for several years. The plant thrives best on forest zone ranging from subtropical dry to moist through tropical very dry to moist forest life zones. *M. oleifera* reported to tolerate annual precipitation of 4.8 to 40.3 dm, annual temperature of 18.7 to 28.5°C and pH of 4.5 to 8. The plant thrives in subtropical and tropical climates, flowering and fruiting freely and continuously grows best on a dry sandy soil and is Drought resistant. *M. oleifera* is easily cultivated by cutting or by seeds. Seeds can be sown either directly or in containers. No seed pretreatment is required and seeds sprout readily in 1-2 weeks. Plants raised from seed produce fruit of unpredictable quality. Shield budding is successful, and budded trees begin to bear in 6 months and continue to give a good crop for 13 years. As it is essentially a vegetative propagation crop, breeding methods like single-plant selection, mass selection and exploitation and maintenance of vigour are transgressive. Stem cuttings are usually preferred because they root easily. When grown for its roots, seeds are sometimes planted in row like vegetable.\(^\text{[10]}\)

*M. oleifera* is a fast-growing, deciduous tree\(^\text{[14,15]}\) that can reach a height of 10–12 m (32–40 ft) and trunk diameter of 45 cm (1.5 ft).\(^\text{[15,16]}\) The bark has a whitish-grey colour and is surrounded by thick cork. Young shoots have purplish or greenish-white, hairy bark. The tree has an open crown of drooping, fragile branches and the leaves build up a feathery foliage of tripinnate leaves. The flowers are fragrant and bisexual, surrounded by five unequal, thinly veined, yellowish white petals. The flowers are about 1.0-1.5 cm (1/2") long and 2.0 cm (3/4") broad. They grow on slender, hairy stalks in spreading or drooping flower clusters which have a length of 10–25 cm.\(^\text{[17,18]}\) Flowering begins within the first six months after planting. In seasonally cool regions, flowering only occurs once a year between April and June. In more constant seasonal temperatures and with constant rainfall, flowering can happen twice or even all year round.\(^\text{[15,18]}\) The fruit is a hanging, three-sided brown capsule of 20–45 cm size which holds dark brown, globular seeds with a diameter around 1 cm. The seeds have three whitish papery wings and are dispersed by wind and water.\(^\text{[19]}\) In cultivation, it is often cut back annually to 1–2 m (3–6 ft) and allowed to regrow so the pods and leaves remain within arm's reach.\(^\text{[19]}\)

**TRADITIONAL USES**

Traditionally, the plant is used as antispasmodic, stimulant, expectorant and diuretic. Fresh root is acrid and vesicant (has the taste of horse-radish). Internally it is used as stimulant, diuretic and antilithic. Its gum is bland and mucilaginous. The seed are acrid and serves as
stimulant. The bark is emmenogogue, abortifacient, antifungal and antibacterial. Its flowers are claimed to becholagogue, stimulant, tonic and diuretic and useful to increase the flow of bile. The plant is also used as cardiac circulatory tonic and antiseptic. The pods are believed to be antipyretic, anthelmintic; fired or pods are used in diabetes. The root juice is employed as cardiac tonic, antiepileptic, used for nervous debility, asthma, enlarged liver, spleen. Almost every part of plant is of value for food.

Seed is said to be eaten like a peanut in Malaya. The foliage is eaten as greens, in salads, in vegetable curries, as pickles and for seasoning. The leaves are pounded up and used for scrubbing utensils and for cleaning walls. Seeds yield 38-40% of non-drying oil, known as Ben oil, used in arts and for lubricating watches and other delicate machinery. The oil is clear, sweet and odorless, never becoming rancid; consequently it is edible and useful in the manufacture of perfumes and hairdressings. *M. oleifera* wood yield blue dye. Leaves and young branches are relished by livestock. The *Moringa* is commonly planted in Africa as a living fence (Hausa) tree. Trees planted on graves and are believed to keep away hyenas and its branches are used as charms against witchcraft.\[11\]

**NUTRITION**

*Moringa* trees have been used to combat malnutrition, especially among infants and nursing mothers. Three non-governmental organizations in particular- Trees for Life, Church World Service and Educational Concerns for Hunger Organization have advocated *Moringa* as “natural nutrition for the tropics.” Leaves can be eaten fresh, cooked, or stored as dried powder for many months without refrigeration, and reportedly without loss of nutritional value.

*Moringa* is especially promising as a food source in the tropics because the tree is in full leaf at the end of the dry season when other foods are typically scarce. A large number of reports on the nutritional qualities of *Moringa* now exist in both the scientific and the popular literature. Any readers who are familiar with *Moringa* will recognize the oft-reproduced characterization made many years ago by the Trees for Life organization, that “ounce-for-ounce, *Moringa* leaves contain more Vitamin A than carrots, more calcium than milk, more iron than spinach, more Vitamin C than oranges, and more potassium than bananas,” and that the protein quality of *Moringa* leaves rivals that of milk and eggs. These readers will also recognize the oral histories recorded by Lowell Fuglie in Senegal and throughout West Africa, who reports (and has extensively documented on video) countless instances of...
lifesaving nutritional rescue that are attributed to *Moringa*.[12] In fact, the nutritional properties of *Moringa* are now so well known that there seems to be little doubt of the substantial health benefit to be realized by consumption of *Moringa* leaf powder in situations where starvation is imminent. Nonetheless, the outcomes of well controlled and well documented clinical studies are still clearly of great value. In many cultures throughout the tropics, differentiation between food and medicinal uses of plants (e.g. bark, fruit, leaves, nuts, seeds, tubers, roots, flowers), is very difficult since plant uses span both categories and this is deeply ingrained in the traditions and the fabric of the community.[13]

![Figure Showing the Raw Fruits of *Moringa oleifera* Plants](image)

**MALNUTRITION RELIEF**

*Moringa* trees have been used to combat malnutrition, especially among infants and nursing mothers.[20,21] Since *Moringa* thrives in arid and semiarid environments, it may provide a versatile, nutritious food source throughout the year.[22] *Moringa* leaves have been proposed as an iron-rich food source (31% Daily Value per 100 g consumed, table) to combat iron deficiency.[23] However, further study is needed to test practical applications of using this dietary source and its iron bioavailability. Malnutrition in its various forms (kwashiorkor, beriberi, anemia, scurvy) is a major factor in the often high rates of infant mortality in West Africa. Many previous approaches that have attempted to address the problem of malnutrition have had a common, major drawback: the "solution" was dependent on imported goods and outside personnel, neither of which are sustainable over the long-term. Additionally, new foods are often very difficult to introduce in West Africa, and many seemingly exotic imported foods and other non-local nutrition supplements were not accepted by families and incorporated into their diets. Poor nutrition is a very important factor in children’s vulnerability to diseases. In the Ziguinchor region of southern Senegal, for example, nearly one in ten infants dies before the age of five from parasites, diarrhea, or malaria. But there
just may be a local, sustainable solution to the problem of malnutrition and associated
diseases that is within reach of everyone in the region, something indigenous and familiar to
the people of Senegal, in particular, the **Moringa tree**!

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**REFERENCES**


