

## Moringa in human health

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*Moringa oleifera* Lam (synonym: *Moringa pterygosperma* Gaertner) belongs to an *onogeneric* family of shrubs and tree, *Moringaceae* and is considered to have its origin in Agra and Oudh, in the northwest region of India, south of the Himalayan Mountains. Although the name “Shigon” for *M. oleifera* is mentioned in the “Shushruta Sanhita” which was written in the beginning of the first century A.D., there is evidence that the cultivation of this tree in India dates back many thousands of years.

*Moringa oleifera* is a widely cultivated tree considered as a multi-purpose plant and grows widely in many tropical and subtropical countries.

It is grown commercially in India, Africa, South and Central America, Mexico, Hawaii, and throughout Asia and Southeast Asia. It is known as the drumstick tree based on the appearance of its immature seed pods, the horseradish tree based on the taste of ground root preparations, and the ben oil tree from seed-derived oils. The Indians knew that the seeds contain edible oil and they used them for medicinal purposes. This tree can be found growing naturally at elevations of up to 1,000 m above sea level. It can grow well on hillsides but is more frequently found growing on pastureland or in river basins.

In the Philippines, the leaves of the *Moringa* are cooked and fed to babies. It is called mother’s best friend or *Malungga*, while the leaves are used for salad and in soups. In Sudan, the flowers are made into paste and fried; the leaf powder is put in the diet of children and pregnant/lactating women, while whole, pounded or the seed cake, a residue from oil extraction have long been used to purify water. In Nigeria seeds are eaten like groundnuts or added locally to sauces for their bitter taste. The seed oil known as “Ben oil” or “Behen oil” can be used for cooking, in hair dressing as a lubricant, in perfume industry as a base for fragrance and as volatile compounds in perfumes. Moringa acid oil, consisting of fatty acids from the seeds

oil, is used as a lubricant and in soap making

**Morphology and physical characteristics :** Moringa is a fast growing, perennial tree which can reach a maximum height of 7-12 m and a stem diameter of 20-40 cm at 1.5 meter. The stem is normally straight but occasionally is poorly formed. The tree grows with a short, straight stem that reaches a height of 1.5-2 m before it begins branching but can reach up to 3.0 m. The extended branches grow in a disorganized manner and the canopy is umbrella shaped. The alternate, twice or thrice pinnate leaves grow mostly at the branch tips. They are 20-70 cm long, grayish-downy when young, long petiole with 8-10

pairs of pinnae each bearing two pairs of opposite, elliptic or obovate leaflets and one at the apex, all 1-2 cm long with glands at the bases of the petioles and pinnae (Morton, 1991). The flowers, which are pleasantly fragrant, and 2.5 cm wide are produced abundantly in axillary, drooping panicles 10 to 25 cm long. They are white or cream colored and yellow-dotted at the base. The five reflexed sepals are linear-lanceolate. The five petals are lender-spatulate. They surround the five stamens and five staminodes and are reflexed except for the lowest (Morton, 1991). The fruits are three lobed pods which hang down from the branches and are 20-60 cm in length. When they are dry they open into 3 parts. Each pod contains between 12 and 35 seeds. The seeds are round with a brownish semi-permeable seed hull. The hull itself has three white wings that run from top to bottom at 120-degree intervals. Each tree can produce between 15,000 and 25,000 seeds/year. The average weight per seed is 0.3 g and the kernel to hull ratio is 75: 25 (Makkar and Becker, 1997).

**Climate and soil condition :** Moringa is widely adapted to the tropics and subtropic climate. Optimum leaf and pod production requires high average daily temperatures of 25–30°C, but will tolerate up to 48°C in the shade and can survive a light frost. Moringa requires a well-drained loamy or sandy soil for optimal growth. It will not survive



under prolonged flooding and poor drainage. Moringa tolerates a soil pH of 5.0–9.0.

**Propagation :** Moringa can be propagated from seed. Direct germination of Moringa is possible because its germination rate is very high. Compared to trees planted from seed, trees from hard wood stem cuttings grow faster but develop a shallow root system that makes them more susceptible to moisture stress and wind damage. For stem cutting branches of one year old tree is selected. Cutting 45–150 cm long with diameters of 4–16 cm generally selected from hard wood rather young green stem. Cuttings can be dried in the shade for three days before planting in the nursery or in the field.

**Disease and pest :** In India, several insect pests are seen, including various caterpillars such as the bark eating caterpillar, the hairy caterpillar or the green leaf caterpillar. The tree is a host to *Leveillula taurica*, a powdery mildew which causes damage in papaya crops in south India. Other common pests are grasshoppers, crickets. These insects bite and chew parts of the plant, causing the destruction of leaves, buds, flowers, shoots, fruits or seeds as well as the interruption of sap flow. These outbreaks are frequent in dry zones where moringa leaves strongly attract insects.

**Harvesting :** Leaves can be harvested after plants grow 1.5– 2.0 m, which frequently takes at least one year.

Leaves are harvested by snapping leaf stems from branches. Harvesting of young shoot tips will promote development of side branches. If plants are grown at closer spacing and higher density, plants are cut about 10–20 cm above ground. After harvesting leaves can easily lose the moisture, therefore the harvest are doing in morning and subsequently selling in the market on the same day.

Harvesting can also be done by removing the leaves, picking them directly off the tree. It can easily remove at the base of the petiole.

**Nutritional value of moringa :** Moringa trees have been used to combat malnutrition, especially among infants and nursing mothers. Moringa leaves having high contain of vitamin A, calcium, iron, vitamin C, beta-carotene, vitamin E and potassium compare than other some fruits and vegetables. Moringa leaves having the high protein quality compare of milk and eggs.

**Edible plants parts and uses :** *Moringa oleifera* is suitable for eating plant. A wide variety of nutritional and medicinal qualities

have been recognized to its roots, bark, leaves, flowers, fruits, and seeds. The leaves of *Moringa oleifera* are used by the Indians in their herbal medicine as a hypocholesterolemic agent in fatty patients. The effect of the seed oil cake of *Moringa oleifera* on the turbidity of the water and waste/effluent water samples is a considerable reduction in turbidity was obtained in the range of 25.00 – 94.64 per cent (Singh *et al.*, 2014). Vitamins A, B and C, riboflavin, nicotinic acid, folic acid, pyridoxine, ascorbic acid, beta-carotene, calcium, iron, and alpha-tocopherol are found rich amount in the leaves.

**Medicinal value of Moringa :** Moringa can act as cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, 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. Traditional cultures in various parts of the world have long used moringa in their herbal medicine collection for ailments ranging from gout to various inflammations and fevers. Leaves rubbed against the shrine can relieve headaches Extracts can be used

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**Table 1 : Mean nutritional values of 100 g *Moringa oleifera* leaf powder**

Dry matter	90-95%
Proteins	20-26 g
Total ash (total minerals)	8-11 g
<b>Minerals</b>	
Calcium (Ca)	1600-2200 mg
Potassium (K)	800-1800 mg
Magnesium (Mg)	350-500 mg
Phosphorus (P)	200-600 mg
Iron (Fe)	18-28 mg
Manganese (Mn)	5-9 mg
Zinc (Zn)	1.5-3.0 mg
Copper (Cu)	0.7-1.1 mg
<b>Vitamins</b>	
Vitamin C	15-100 mg
Vitamin A	4000-8000µg
Vitamin E	80-150 mg

Sources: Growing and Processing Moringa leaves, Using Moringa leaves for nutrition (Page-55).

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