

Drumstick is a Nutritional Tree

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Abstract: *Moringa oleifera*, native to India, grows in the tropical and subtropical regions of the world. It is commonly known as 'drumstick tree' or 'horseradish tree'. *Moringa* can withstand both severe drought and mild frost conditions and hence widely cultivated across the world. With its high nutritive values, every part of the tree is suitable for either nutritional or commercial purposes. The leaves are rich in minerals, vitamins and other essential phytochemicals.

Extracts from the leaves are used to treat malnutrition, augment breast milk in lactating mothers. It is used as potential antioxidant, anticancer, anti-inflammatory, antidiabetic and antimicrobial agent. *M. oleifera* seed, a natural coagulant is extensively used in water treatment. The scientific effort of this research provides insights on the use of *moringa* as a cure for diabetes and cancer and fortification of *moringa* in commercial products. This review explores the use of *moringa* across disciplines for its medicinal value and deals with cultivation, nutrition, commercial and prominent pharmacological properties of this "Miracle Tree".



Keywords: *Moringa oleifera*, antioxidants, phytochemicals, bio accessibility, therapeutic applications

I. INTRODUCTION

Dependency on chemical drugs to fulfil nutritional Requirements and to cure various diseases of humans and animals is increasing with time. There is need of hour to minimize use of chemical drugs and increase use of plant-based products to cure diseases and deficiencies to avoid side effects of chemical drugs. There is long list of medicinal plants but nowadays *Moringa* plant has gained a respectful position in this list due to its high nutritional and medical properties. *Moringa* is also known by different names like Moonga, Sahjan, drumstick tree and Moorunga in different locations and it is native to Northern India. This plant is rich source of micronutrients, vitamins, antioxidants, antibiotics, carotenoids, essential and non-essential amino acids, protein, carbohydrate and lipid. It is perennial tree and every part of this tree is used for curing different diseases. Since ancient time, different parts of this tree are being used to cure impurity of blood, skin diseases, anemia etc.

Medicinal uses of different parts of Maringa:

M. oleifera is often referred as a panacea and can be used to cure more than 300 diseases. *Maringa* has long been used in herbal medicine by Indians and Africans. The presence of phytochemicals makes it a good medicinal agent. In this section, the effect of *Maringa* on diseases like diabetes and cancer are reviewed.

1. Food: The tender green pods, eves and flower are used as vegetable. The leaves contain 38% protein with all essential amino acids which fulfil the diet needs of vegetarians. An ordinary tree can yield about 150 kg leaves and 250-270 year.

2. Fodder: Leaves are used as a quality fodder. Is helps to increase 30-40% milk in cows, buffaloes and goats.

3. Wood: - Drumstick wood is soft light corks and perishable and also used for shuttles and picking sticks for textile industry.

4. Seed:

- a) Seed oil:- Moringa seed oil is known as ‘Benoil’ hence the tree is often called benoil thee. This oil is edible and resembles olive oil in its fatty acid composition and is desirable to replace polyunsaturated vegetable oil with monounsaturated fatty acids which is current trend, seed oil is also used as lubricant and in perfumes and hair dressing.
- b) Seed powder: is used to clarify turbid, dirty water it is mixed with for purification. Moringa seeds and pods are effective sorbet for removal of heavy metal and volatile organic compounds in the aqueous system.
- c) Seed Cake: This is used as organic manure which is rich in crude protein (36%) (Singh, 1995).
- 5) Bio pesticide: Root and seed powder exhibited comparatively lower YVMV disease incidence, white fly population and also recorded higher fruit yield in okra (Srabani, 2004)

Nutritional Facts

Drumstick pods and leaves are a storehouse of essential nutrients, whereas the leaves are the most nutrient part of the plant and one of the finest sources of calcium, iron, zinc, selenium and magnesium. Fresh pods and seeds are a great source of oleic acid, a healthy fatty acid which is known to promote heart health. Moringa leaves is unique among all the greens as it is heaped with a good amount of protein about 9.8 gram of protein per 100 grams. Dry powdered leaves are an amazing source of good quality essential amino acids. Also Check Out: Drumstick Tree: The Many Benefits of Moringa Oleifera- Infographic

Nutrient Volum:

Table 1. The nutrient compositions^a of leaves, leaf powder, seeds and pods.

Nutrients	Fresh leaves	Dry leaves	Leaf powder	Seed	Pods
Calories (Cal)	92	329	205	–	26
Protein (g)	6.7	29.4	27.1	35.97 ± 0.19	2.5
Fat (g)	1.7	5.2	2.3	38.67 ± 0.03	0.1
Carbohydrate (g)	12.5	41.2	38.2	8.67 ± 0.12	3.7
Fibre (g)	0.9	12.5	19.2	2.87 ± 0.03	4.8
Vitamin B1 (mg)	0.06	2.02	2.64	0.05	0.05
Vitamin B2 (mg)	0.05	21.3	20.5	0.06	0.07
Vitamin B3 (mg)	0.8	7.6	8.2	0.2	0.2
Vitamin C (mg)	220	15.8	17.3	4.5 ± 0.17	120
Vitamin E (mg)	448	10.8	113	751.67 ± 4.41	–
Calcium (mg)	440	2185	2003	45	30
Magnesium (mg)	42	448	368	635 ± 8.66	24
Phosphorus (mg)	70	252	204	75	110
Potassium (mg)	259	1236	1324	–	259
Copper (mg)	0.07	0.49	0.57	5.20 ± 0.15	3.1
Iron (mg)	0.85	25.6	28.2	–	5.3
Sulphur (mg)	–	–	870	0.05	137

All values are in 100 g per plant material

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MEDICINAL USES:

The Moringa oleifera leaves contain nutrients especially essential amino acids, vitamins, minerals and β -carotene (Sharma et al., 2012). For this reason, it is used as an alternative source for nutritional supplements and growth promoters in some countries

Anti-inflammatory activity: -Several parts of Moringa plant have been shown to possess anti-inflammatory activity. Poultice of leaves helps in glandular swellings. Moringa oleifera has antioxidant galore (Kumar et.al. 2013). Aqueous extracts of leaf, fruit and seed of Moringa act as an antioxidant (Singh et.al. 2009). Methanol and ethanol extracts of Indian origin Moringa were shown to have the highest antioxidant activity of 65.1% and 66.8%, respectively in a study on freeze dried Moringa leaves.

Antinociceptive activity: - Several Moringa species have demonstrated analgesic activity. The antimigraine potential of leaf juice alcoholic fraction of Moringa, which is traditionally used in the treatment of migraine, was studied. The study showed that Moringa may be effectively used in the treatment and management of migraine.

Antifertility activity: - Moringa oleifera leaf extracts were 100% abortive with doses equivalent to 175 mg/kg of starting dry material in a study analysing anti reproductive potential of folk medicine plants (Nath et.al., 1992).

Cardio protective, antihypertensive, and cholesterol lowering activities:- A study performing comparison of Moringa oleifera leaf extract with atenolol (a selective β 1 receptor antagonist drug, used for cardiovascular diseases) reported leaf extract as hypolipidemic, lowering body weight, heart weight, serum triglyceride level and serum cholesterol level in experimental animals (Ara et.al., 2008). Moringa leaves contain sitosterol, a bioactive phytoconstituent, having cholesterol reducing effect. This compound has been shown to decrease cholesterol level in high fat diet fed rats (Ghasi et.al. 2000).

Protection in eye diseases: - Vitamin A deficiency is a major cause of blindness. Consumption of Moringaoleifera leaves, and pods and leaf powder, rich source of vitamin A, can prevent night blindness and eye problems in children. Consumption of drumstick leaves with oils can improve vitamin A nutrition and can delay the development of cataract (Pullakhandam, 2007)

Antidiabetic activity- Moringa oleifera potential as a therapeutic agent for diabetes has been explored. In type 2 diabetic rats, Moringa oleifera leaves significantly reduce blood glucose concentration. Leaves are potent source of polyphenols, responsible for hypoglycemic activity (Ndong et.al. 2007). The extract from its leaf decreases sugar levels in the blood within 3 h after intake (Bello et.al. 2017). Moringa has been used as a traditional medicine around the world, for anemia, skin infections, blackheads, anxiety, bronchitis etc.

Side Effects of Drumstick: Over the last few years, drumstick has been significantly researched due to its natural origin and fewer side effects. It is an anti-allergic agent and might be used as a herbal remedy under the supervision of an Ayurvedic physician.^{4,5} However, some people might experience allergic reactions to the seedpods of the drumstick. The most common side effects are:

Facial angioedema (swelling underneath the skin)

Hypotension (low blood pressure)

Irritation of skin in lower limb

Occupational asthma is caused by exposure to inhaled irritants.⁵

II. CONCLUSION

Moringa oleifera Lam is considered to have large ecological plasticity because of its adaptability to the most diversified soil and climatic conditions.

At present the area under moringa is very meagre. Because of its numerous nutritional value and nutraceutical value and considering as a nutraceutical tree

Moringa is the most suited tree for traditional agroforestry systems in home gardens since its canopy will allow diffusion of light which facilitates intercropping and its deep root system avoids resource competition with under storey crops

Now being an under-exploited vegetable may be exposed as major perennial vegetable tree crop in future for the coming new generation. Moringa can play a vital role to meet nutritional deficiency as well as to help to alleviate rural poverty.

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