



Moringa's Role In Modern Health: From Traditional Use To Cutting-Edge Nutritional Insights

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Abstract: Moringa oleifera, generally alluded to as the Drumstick tree, is a flexible plant commended for its uncommon nourishing, restorative, and horticultural advantages. Local to districts across Asia, Africa, and the Indian subcontinent, all aspects of the tree is plentiful in fundamental supplements, including nutrients, minerals, proteins, and dietary fiber, alongside bioactive mixtures like flavonoids and carotenoids. Its therapeutic properties incorporate cancer prevention agent, antidiabetic, antifungal, mitigating, and anticancer exercises. Generally, Moringa has been utilized to treat sicknesses like asthma, weakness, and stomach related messes.

Regardless of its advantages, the plant presents likely dangers, including hypersensitive responses and cooperations with specific meds, especially antihypertensives and anti-infection agents. In horticulture, Moringa is an important asset for upgrading crop yields through its biofertilizer and biopesticide properties, while filling in as a wellspring of plant supplements. Development rehearses range from seed engendering to vegetative cuttings, with flexibility to different cultivating frameworks. This audit features Moringa's diverse applications, underscoring its importance in nourishment, medication, and feasible cultivating.

Keywords: moringa olifera , antioxidant ,antidiabetic,antifungal

1. Introduction:

Moringa oleifera, or Drumstick tree, offers diverse nutritional and medicinal benefits.^[1]

M. oleifera is widely distributed worldwide, but its indigenous origin is in India, Arabia ^[2]to South Asia, Sri Lanka, Pakistan, Bangladesh, Afghanistan; North Eastern and South Western Africa, Madagascar, and Arabia^[3]

Every part of the tree is rich in essential nutrients and phytochemicals, making it suitable for nutritional and commercial purposes^[4]

Phytochemicals such as vanillin, omega fattyacids, carotenoids, ascorbates, tocopherols, beta-sitosterol.moringine, kaempferol, and quercetin have been found in its flowers, roots, fruits, and seeds. ^[5]is also used as natural feed supplement for poultry. It belongs to the family Moringaceae.

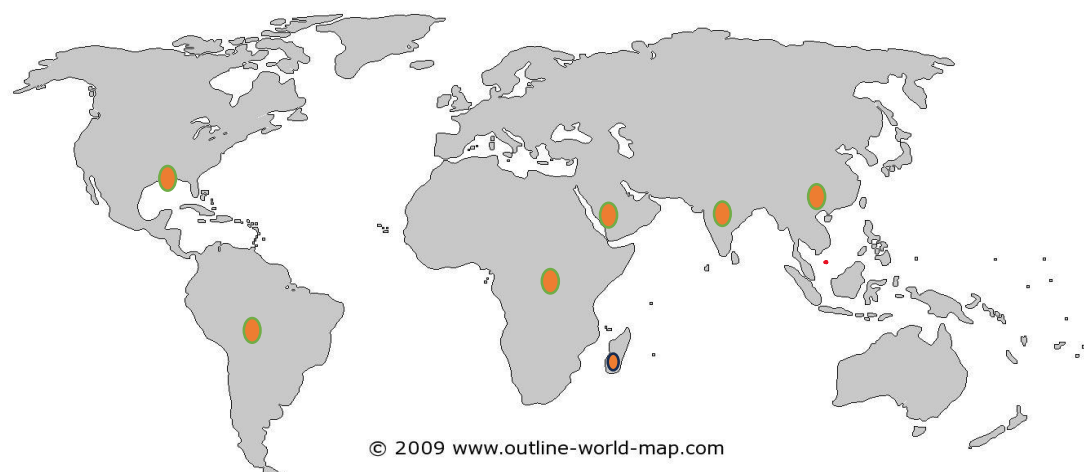


Fig A: Distribution of moringa around the world. The picture of world map was acquired from www.outline-world-map.com [royalty free]

2. Nutritional Content of Moringa:

Moringa oleifera is an herbal plant that has numerous vitamins like ascorbic acid [vit c],thianin[vit B1],niacin[vit B3],riboflavin[vitB2]^[6]also, contains minerals like zinc,calcium,iron,magnesium,manganese,phosphorous,potassium,sodium^[7]also protein,deitry fibre^[8]amino acids like theonine,lysine,leucine,isoleucine are present ^[9] contents are showed in table 1,2 and 3.

Magnesium	35.1 mg
Manganese	0.119 mg
Phosphorous	70.8 mg
Potassium	471 mg
Zinc	0.85 mg
Calcium	99.1mg
Iron	1.3 mg
Sodium	70 mg

Table 1: Minerals contents in Moringa oleifera L. trace metals all in 10%.

Ascorbic acid	Vitamin C	0.72 mg
Thianin	Vitamin B1	0.22 mg
Niacin	Vitamin B3	1.48 mg
Riboflavin	Vitamin B2	1.48 mg

Table 2: Vitamin contents in moringa olifera per 100 mg

Proteins	46.4 g
B- caratone	45.172
Diatery fibre	24.3 to 39.9 g per 100 g

Table 3: content in moringa

3. PROPERTIES OF MORINGA:

3.1 Antioxidant property:

The leaves are rich in antioxidants, which help protect against oxidative stress and inflammation.^[10] Moringa olifera leaves contains polyphenols and flavonoids which have antioxidant property^[11] several studies were done and, in a study, moringa olifera leaves extracted with methanol and dichloro methane also showed antioxidant activity. Also, another study was performed in which aqueous and acetone extracts of M. oleifera leaves were taken which showed strong antioxidant activity^[12] it also improves the activity of antioxidant enzymes like Superoxide Dismutase (SOD), Catalase, and Glutathione, helping to manage oxidative stress caused by free radicals^[13]

3.2 Antidiabetic property:

Several studies were conducted on rats a rat model was used in which they were induced to hypoglycemic condition and consumption of moringa olifera showed that it could be beneficial in diabetes mellatus in rat model over glucose levels^[14]

Also, another study was performed in which moringa seed powder was given to rats suffering from STZ in the study it was seen that blood glucose levels were reduced after consumption^[15]

3.3 Antifungal activity:

A study was done and the antifungal activity was determined by agar well diffusion method^[16]

Moringa olifera shows high susceptibility to aspergillus flavus while aspergillus Niger showed the least^[17] In another study performed in which methanolic and ethyl acetate extracts were prepared in which the ethyl acetate extract was effective against Gypsum while R. stolnifer was sensitive to the methanolic extract^[18]

3.4 Anticancer Properties:

Moringa has shown anticancer movement in vitro against various malignant growth cell lines, including human B-lymphocyte plasmacytoma, cervical disease, and hepatocarcinoma cells^[19]

The green blend of gold nanoparticles utilizing Moringa oleifera extricates has shown a guarantee in malignant growth treatments. These nanoparticles are powerful because of their small size and enormous surface region^[20]

3.5 Anti-inflammatory:

leaf extracts have been shown to inhibit the production of pro-inflammatory cytokines such as TNF- α , IL-6, and IL-8 in human macrophages^[21] The extract also inhibit the expression of genes involved in inflammation, such as iNOS and COX-2^[22] In a carrageenan-induced rat paw edema model, MSE significantly reduced inflammation, comparable to the effects of aspirin. In vitro, MIC-1 reduced the production of nitric oxide (NO) and the expression of inflammatory genes (iNOS, IL-1 β , and IL-6) in LPS-stimulated macrophages^[23]

4 Bioactive compounds:

It contains various phytochemicals like glucosinolates, isothiocyanates, and phenolic acids, flavonoids^[24]

5 SAFETY AND SIDE EFFECTS:

5.1 Potent allergies:

According to a study indicates that Moringa oleifera leaf proteins (MLP) can elicit allergic responses. Mice sensitized with MLP showed increased levels of mast cells, IgE, and IgG, along with severe systemic anaphylaxis symptoms and reduced body temperature. Elevated levels of histamine and Th-related cytokines (IL-4, IL-9, IL-17A) were also observed in sensitized mice^[25-26]

5.2 Drug interactions:

Moringa oleifera extract can effectively reduce blood pressure, its combination with antihypertensive drugs may not enhance the therapeutic effect. Both in vitro and ex vivo studies showed that Moringa oleifera extract inhibited angiotensin-converting enzyme (ACE) activity, similar to enalapril, an ACE inhibitor^[27] some combinations of Moringa extracts with antibiotics can enhance antibacterial efficacy, others may be antagonistic and reduce the effectiveness of the antibiotics. Certain combinations, particularly with gentamicin, were found to be antagonistic, reducing the antibiotic's effectiveness^[28]

6 Traditional uses:

Moringa oleifera has been used for various medicinal purposes, including treating anaemia, anxiety, asthma, bronchitis, and more^[29] Leaf juice or bark paste is consumed as a drink for constipation and piles. Bark, leaves, and roots are taken to promote digestion^[30] also used for their anti-scorbutic properties (preventing scurvy) Utilized in ophthalmic preparations. Act as anti-inflammatory, purgative, and tonic agents^[31]

7 Cultivation practices:

Significant differences were observed between populations of *Moringa oleifera* in different Phyto districts regarding tree height, leaf length, petiole diameter, and pod characteristics. The primary method of cultivation is by cuttings (92.85% to 97.8%) and row planting (91.83% to 98.03%). The adoption rate of *Moringa oleifera* varies between 89.79% and 97.05%.^[32] *Moringa* can be propagated by sowing seeds or by cuttings. Seeds are preferred in some regions, while vegetative propagation is common in others.^[33] Intensive production involves close spacing and frequent harvesting, while semi-intensive and agroforestry systems have wider spacing and longer harvest intervals.^[34] Seeds germinate within two weeks, and seedlings can be transplanted when they reach about 30 cm in height.^[35]

8 Moringa role in agriculture:

Moringa can produce up to 650 metric tons of green matter per hectare, supplying essential nutrients like calcium, phosphorus, and potassium. *Moringa*'s phytohormones can increase crop yields by 20-35%. *Moringa* has natural biopesticidal properties and can be used as a windbreak and mulch material.^[36] MLE contains bioactive compounds such as phytohormones, amino acids, and nutrients that enhance plant growth and stress tolerance.^[37] In a study performed on wheat, MLE significantly increased the nutrient content (N, P, K, S) in both grain and straw, with the highest levels observed in the treatment where MLE was applied at tillering, jointing, and booting stages.^[38] According to the study performed, the study concludes that MLE can enhance growth and silybin production in *S. marianum*, particularly in non-saline conditions, and can mitigate some negative effects of salinity stress.^[39]

Conclusion: All in all, *Moringa oleifera* stands apart as a diverse plant with gigantic likely in sustenance, medication, and farming. Its supplement rich piece, including fundamental nutrients, minerals, proteins, and bioactive mixtures, makes it an important expansion to eat less. Restoratively, it offers a scope of advantages, for example, cell reinforcement, antidiabetic, antifungal, calming, and anticancer properties, exhibiting its true capacity for further developing wellbeing and tending to different circumstances.

Besides, its applications in horticulture, including use as a characteristic compost, biopesticide, and crop enhancer, feature its part in advancing supportable cultivating. Nonetheless, it is vital to be aware of conceivable secondary effects, like hypersensitive responses and medication associations, to guarantee safe use. By tending to these worries, *Moringa* can act as a fundamental asset for propelling human prosperity and farming manageability.

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