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A Review Article on Moringa olifera

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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 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; Miracle Tree; Antidiabetic; Anticancer, Anti-inflammatory.

Introduction

Shajna is the native name of Moringa oleifera. "Sigru" is the Sanskrit word known as for Moringa oleifera. it is original from the Indian subcontinent, this plant has spread throughout tropical and subtropical region Moringa belonging from thirteen species, ranging in size from short trees to lush bushes The tree is between 7and 10meters tall numerous names for the plant exist involves drum stick tree and Miracle Tree.

SCIENTIFIC Kingdom	CLASIFICATION Plantae
Clade	Angiosperm
Order	Brassicles
Family	Moringaceae
Genus	Moringa
Species	Moringa oleifera
Binomial name	Moringa oleifera Lam
Synonym	• *Guilandina moringa* L. • *Hyperanthera moringa* (L.) Vahl • *Moringa pterygosperma* Gaertn. nom. illeg.

Plantation and solid conditions:

Any tropical or subtropical climate with temperatures between 25 and 35 degrees Celsius is suitable for M. oleifera cultivation. It requires 250–3000 mm of net rainfall and sandy or loamy soil with a pH that is slightly acidic to slightly alkaline. Owing to the elevated rates of germination, the direct seeding method is employed.

A 2 cm depth in the ground is suitable for sowing moringa seeds, which should sprout in 5–12 days. A tree grown in Nigeria and one grown in India have somewhat different nutritional contents.

The higher temperatures in the Savannah region were blamed for the latter's lower nutritional value than the former. Higher temperatures cause proteins and enzymes to denature, which could account for the variation in nutritional content.

Propagation:

With the help of direct seed planting, seedling transplanting and mature stem cutting, moringa can be propagated. Direct sowing is possible due to its high germination rate. In well-draining soil moringa seeds can germinate all year round. For vegetative propagation, cuttings of 1 m length and 4 cm diameter can be used. The distance between Moringa rows is usually 2-4 seedlings are grown in soil filled polyethylene bags. Sowing the seeds to a depth of 2 cm. Washing once in every 2-3. After showing, they should be placed in slightly shaded place and also protect from heavy rains. The young moringa plants should be nursed for 4 weeks before planting

for better preservation when they are about 30 cm tall. Delete the polyethylene bags when planting ensuring that the roots of the plant are not faulty.

Harvesting:

A moringa leaf is a multi-lobed compound leaflet First time harvest can be done 3-4 months after seed After the first harvest, successive harvesting can be made every 30-40 days, depending on the species and local conditions It is best to harvest branches at 50 cm from the ground and ignore branches with excessive yellow leaves. Collected leaves should not be
happened together because they are easily spoiled. The best time of harvesting is early morning which prevents excessive water loss. If you sell fresh leaves, they should be sold same day because they lose moisture quickly after harvesting. Moringa can also be harvested from a height of 50 cm above the ground, which facilitates mechanical harvesting. It can be done breaking leaves with hand, cutting with harvesting shears and using other mechanical methods.

Origin and distribution:

M. oleifera is local of the western and sub- Himalayan, India, Pakistan, Asia Minor, Africa and Arabia but now distrusted in the Philippines, Cambodia, Central America, North and South America and the Caribbean Islands . For a variousness of purposes, it is now cultivated in the whole tropical and subtropical regions of the world.

Cultivation:

Moringa oleifera is a small to medium-sized deciduous or evergreen tree that is mostly found in the tropical hills and some mid-mountain regions of Nepal. It grows to a height of 25 to 30 feet and is best suited for cultivation in mid-hill, Siwalik and grain areas. Moringa tolerates different soil conditions, but prefers neutral or slightly acidic (pH 6.3-7.0).The best temperature is 12 and 13 degrees Celsius, but the tree tolerates up to 48 degrees in shade. [1]

Preservation Method:

Moringa can be stored for long time without loss of nutrients. The leaves can be preserved by drying and freezing. The leaves can be preserved by drying or freezing show that the low-temperature oven used to dry leaves retained more nutrients than vitamin C in freeze-dried leaves. Therefore, drying can be done with an economical household appliance, such as an oven, to maintain a constant supply of nutrients to the leaves. Storage by drying improves the preservation of Moringa without changing its nutritional value. Overdose of moringa can cause excessive iron accumulation. High levels of iron can cause gastrointestinal problems and hemochromatosis. Therefore, a daily dose of 70 g of moringa is recommended to be good and avoid excessive accumulation of nutrients.

Phytoconstituents of plant *Moringa oleifera:*

Sr. No	Plant part	Extract	Phytoconstituents
1	Leaves	Aqueous and alcoholic	Niazirin and Niazirinin – nitrile glycosides,4-[(4′-O-acetylalpha- L- rhamnosyloxy) benzyl isothiocyanate, Niaziminin A, and Niaziminin B, three mustard oil glycosides, niaziminin, a thiocarbamate,4-(alpha-1-rhamnopyranosyloxy)-benzyl glucosinolate, quercetin-3-O-glucoside and quercetin-3-O-(6″-Malonyl-glucoside),Niazimicin. Pyrrole alkaloid (pyrrolemarumine 400-O-a-L-rhamnopyranoside) and 40- hydroxyphenylethanamide(marasmoid A and B) 4 alpha and gamma-tocopherol.2

[1]

2	Seeds	Aqueous and Hydro alcoholic	Methionine, cysteine, 4-(alpha-L- rhamnopyranosyloxy) benzyl glucosinolate, Moringine, benzylglucosinolate, niazimicin niazirin.
3	Pods	Hydro-alcoholic	Isothiocyanate, nitrites, thiocarbamates, O-(1heptenyloxy) propyl undecanoate, O-ethyl-4-(alpha-L-rhamnosyloxy) benzyl carbamate, methyl- p-hydroxybenzoate, beta- sitosterol.
4	Bark	Alcoholic	4-(alpha-L- rhamnopyranosyloxy) benzylgiucosinolate.
5	Flowers	Hydro-alcoholic	D-glucose, quercetin, isoquercetin, kaemopherol, kaempferitin and ascorbic acid, protein, D-mannose.
6	Root	Alcoholic	Moringine, moringinine, spirachin, 1,3-dibenzyl urea, alpha- phellandrene, p-cymene, Deoxy-niazimicine, 4-(alpha-L-rhamnopyranosyloxy)benzylglucosinolate.
7	Stem	Aqueous and Hydro-alcoholic	4-hydroxyl mellein, vanillin, octacosonoic acid, beta-sitosterone

Properties:

Anti-inflammatory and anti-analgesic activity:

In several animal models, it has been discovered that nearly every component of this "miracle tree" have analgesic properties and Moringa reduces inflammation by suppressing inflammatory enzymes and proteins in the body, and leaf concentration in the cell. Rats were used in a study to examine the anti-inflammatory properties of M. oleifera root extracts. The rats' left paws were inflamed through injection with 0.1 mL of 1% carrageenan in saline. Depending on the concentration, M. oleifera extract decreased edema by 35%–45%. Tannins, phenols, alkaloids, flavonoids, carotenoids, β-sitosterol, vanillin, hydroxymellein, moringine, moringinine, β-sitostenone, and 9-octadecenoic acid are active component s that contribute to the anti-inflammatory function.

Anti-cancer activity:

In research using mouse melanoma tumour models, alcoholic and hydromethanolic extracts of leaves and fruits shown a substantial growth delay in tumour kinetics. The introduction of leaf extract into chick chorioallantois membrane resulted in an antiangiogenic impact, which was dose dependent, demonstrating its extraordinary anticancer potential. This effect investigated in relation to the conditions for cancer metastasis. A root and leaf extract demonstrated cytotoxic activity against cisplatin-resistant ovarian cancer cells as well as hepatocarcinoma, colorectal cancer, and breast cancer cells in vitro. Extracts from the stem and leaves of M. oleifera effectively inhibited the growth and triggered apoptosis in 4T1 breast cancer cells obtained from mouse BALB/c strain mammary gland tissue. Rats using a urethane model of M. oleifera leaf extracts were studied. A human myeloma cell line was used to examine M. oleifera leaf extracts' anticancer properties. In the investigation, extracts of M. oleifera leaves were used, including methanol, ethanol, ethyl acetate, and chloroform. The neutral red uptake assay was used to quantify the antitumor activity. The anticancer activity of

the methanol extract against U226B1 cells was the highest (IC50 = 0.32 µg/mL). The research conducted on M. oleifera has indicated its potential as an anticancer agent.

Antioxidant activity:

Leaf extract was also demonstrated in a model of acetaminophen-induced nephrotoxicity in male BALB/c rats. Antioxidant effects have been demonstrated to be contribute triterpenoids, beta-carotene, campesterol, stigmasterol, β-sitosterol, avenasterol, MO leaves and fruits are antioxidant-rich. A dose-dependent nephroprotective effect of MO monopalmitic and di-oleic triglycerides, and vitamin A. The antioxidant activity of *M. oleifera* extracts was evaluated *in vivo* in a mouse model. these studies suggests that *M. oleifera*, particularly its seed protein hydrolysate, leaf extracts, stem extracts, and seed oil, possesses notable antioxidant potential.

Anti-aging activity:

anti-aging potential of *M. oleifera* has low solubility, degradation, and poor bioavailability of the extract components necessitate innovative approaches. The strategy by combining *M. oleifera* seed extract with nanoliposomes is a good solution for this issue. The nanoparticles also enhanced antioxidant enzyme activity, offering protection against UVB-induced free radicals and reducing the expression of matrix metalloproteases linked to photoaging. While these results are applicable for nanoliposomes in the prevention and therapy of photoaging.

Anti-diabetic activity Anti-cancer activity:

Leaf extract of M. oleifera decreased monosaccharide-induced protein glycation, which prevented the production of advanced glycation end products. The antidiabetic properties of glucomoringin, phenols, flavonoids, quercetin-3-glucoside, fibre, and phenol have been identified. Rats with lower oxidative stress indicators, poor renal function, and elevated blood glucose levels were administered the extract. In comparison to the individual extracts, oral administration of the combined extracts resulted in a significant reduction of fasting blood glucose levels to normal levels; concurrently, there was an increase in antioxidant biomarkers and a significant decrease in liver enzymes, triglycerides, cholesterol, creatinine, and oxidative markers. An additional test used to assess the ethanol leaf extract of M. oleifera was the pancreatic α-amylase enzymatic inhibition test.

Antimicrobial and antibacterial activity:

Moringa fights infections with its antibacterial and antifungal qualities. It has been helpful against strains of bacteria that cause blood and urinary tract infections, digestive issues, and fungal infections that cause skin diseases [21]. Moringa oleifera roots are said to be abundant in antimicrobial compounds and to possess antibacterial properties. It has been discovered that Moringa bark extract has antifungal properties, and that the juice from the bark and stem has antibacterial properties against Staphylococcus aureus. Using both aqueous and ethanol leaf extracts, as well as Gram-positive (Enterococcus faecalis and Staphylococcus aureus) and Gram-negative (Aeromonas caviae, E. coli, Pseudomonas aeruginosa, Salmonella enteritidis, and Vibrio parahaemolyticus) bacterial strains, the antibacterial activity of M. oleifera was evaluated. P. aeruginosa, S. enteritidis, and E. coli were resistant to the tests

Conclusion:

The correct use of the Moringa tree solves many problems related to nutrition, health and general well-being of the masses and saves the exchange rate that currently used to import synthetic vitamins and minerals, decomposition chemicals, anticonvulsants, body, skin and hair care products and to add funds to the Rural Development Program. The Government should launch various programmes by providing trainings and other resources for the resource poor rural farmers, assist them in harvesting and processing, and pay them according to their yield. This form of empowerment reduces poverty and makes the Moringa Tree accessible to all households. Finally, agricultural extension and extension services can play an important role in addressing the challenges and helping rural farmers to use the huge potentials of Moringa Tree production and utilization. Thus, the moringa tree becomes one of the most possible cash crops in the context of developing countries like Nepal.

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