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DIFFERENT THERAPEUTIC EFFECTS OF MORINGA OLEIFERA

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ABSTRACT

Moringa oleifera, commonly known as the drumstick tree or horseradish tree, is a flowering plant belonging to the Moringaceae family. It is native to the sub-Himalayan regions of northern India, Pakistan, Bangladesh, and Afghanistan. This plant grows well in tropical and subtropical climates. In Nepal, regions such as the Terai, Siwalik, and mid-hills provide suitable environmental conditions for its cultivation.

Often called the "Miracle Tree," Moringa is valued for its wide range of practical uses, high nutritional content, and potential health benefits, including its role in preventing and managing various diseases. It is a rich source of essential amino acids, vitamins, minerals, and protein, making it especially beneficial for populations with limited nutritional intake, such as rural communities in Nepal. Pregnant women and infants, in particular, can benefit from its nutrient-dense leaves.

Almost every part of the Moringa plant has useful applications, making it a promising subject for further scientific research and development. This review aims to highlight the nutritional, medicinal, and commercial importance of Moringa, examine its cultivation potential in Nepal, suggest future research and market opportunities, and analyze existing scientific literature on its diverse uses.

KEYWORDS: *Moringa oleifera*, Miracle Tree, nutrition, medicinal uses.

INTRODUCTION

Moringa oleifera is a flowering plant widely known as the drumstick tree or horseradish tree. It belongs to the genus *Moringa*, which includes about 13 different species. Among these, *Moringa oleifera* is the most commonly grown species and is native to tropical and

subtropical regions of the world. It is a deciduous, perennial tree and is classified as a dicotyledonous plant.

This plant is known by different names in different countries. For example, it is called "Shiferaw" in Ethiopia, drumstick or horseradish tree in India, and "Sitalchini," "Munga," "Sahijan," or "Saijan" in Nepal. It is a small, elegant tree with light foliage and belongs to the Moringaceae family. Typically, it grows to a height of about 5 to 10 meters.

The leaves are arranged alternately and tend to shed as they age. Each leaf can grow up to 90 cm long and contains several small leaflets arranged in pairs along a central stem. These leaflets are dark green on the upper side and lighter underneath, usually oval or rounded in shape, and can grow up to 2.5 cm in length.

Moringa produces flowers throughout the year. These flowers grow in loose clusters that can reach up to 15 cm in length. The fruit is long and distinctive, often reaching up to 90 cm in length and about 12 mm in width. It has a slightly constricted shape with ridges along its surface and tapers towards the end. The fruit is light brown in color and splits open when mature to reveal rows of round, dark-colored seeds. Each seed has three thin, wing-like structures that help in dispersal.

The tree typically branches out from the base, giving it a forked structure. Its bark is smooth and dark grey on the outside, with a thin yellowish layer underneath. The twigs and young shoots are short and covered with fine hairs. The crown of the tree is wide, open, and often shaped like an umbrella, usually supported by a single main stem. It has a deep root system, and its wood is soft.

Moringa oleifera is a bisexual plant and is mainly cross-pollinated due to differences in flower structure. Carpenter bees, particularly species like *Xylocopa latipes* and *Xylocopa pubescens*, are considered the most effective pollinators.

The purpose of this review is to discuss the nutritional, medicinal, and economic importance of Moringa, evaluate its potential for cultivation in Nepal, suggest future research and development opportunities, and review existing scientific studies on its multiple uses.

BENEFITS AND NUTRITIONAL VALUE OF MORINGA OLEIFERA

Moringa oleifera is often referred to as the "miracle tree" because of its wide range of nutritional benefits and its traditional use in supporting health. Almost every part of this plant contains valuable nutrients.

The leaves are especially rich in essential minerals such as calcium, potassium, zinc, magnesium, iron, and copper. They are low in calories, which makes them a good choice for

people trying to manage their weight. In addition, the leaves provide all the essential amino acids, making them a strong source of plant-based protein.

The pods are also highly nutritious. They contain a high amount of fiber (about 46.78%) and a good level of protein (around 20.66%). Because of this, they are often valued for helping with digestion and maintaining colon health.

Moringa is also packed with important vitamins, including vitamins A, B, and C, along with beta-carotene, pyridoxine, nicotinic acid, and vitamins D and E. These nutrients contribute to overall health and well-being.Moringa oleifera also contains many important plant compounds, known as phytochemicals. These include tannins, sterols, terpenoids, flavonoids, saponins, anthraquinones, alkaloids, and natural sugars. In addition, it has bioactive substances such as glucosinolates, isothiocyanates, glycosides, and glycerol-1-9-octadecanoate, which are linked to potential anti-cancer properties.

However, moringa leaves also contain some anti-nutritional factors like oligosaccharides and oxalates, which may affect the absorption of certain nutrients when consumed in large amounts.

Dried moringa leaves are quite stable in terms of nutrition. They can retain about 87.5% of their beta-carotene after four months of storage and around 50% after three months. Because of this, dried leaves can be processed and stored easily for later use without losing too much of their nutritional value.

NUTRITIONAL COMPOSITION OF MORINGA OLEIFERA

Table No: 1

Nutrients	Fresh Leaves	Dry Leaves	Leaf Powder	Seeds	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

Nutrients	Fresh Leaves	Dry Leaves	Leaf Powder	Seeds	Pods
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

MEDICINAL PROPERTIES OF MORINGA OLEIFERA

Moringa oleifera is widely known for its healing properties and is often used in traditional medicine to support the treatment of various health conditions. It has been used for managing illnesses such as diabetes, heart problems, anaemia, arthritis, breathing issues, skin and liver disorders, digestive troubles, and even conditions like paralysis, infertility, and rheumatism.

In India, moringa was recognized as the "Plant of the Year" in 2008 by the National Institute of Health and Family Welfare. In many African countries, it is also traditionally used to help treat conditions like ascites, pneumonia, and even snake or insect bites.

Research suggests that moringa leaves have several beneficial properties. They may act as antifungal and antiviral agents, and they also show potential as natural stimulants. In addition, the plant has been noted for its ability to help purify water (as a natural flocculating agent).

Moringa leaf powder is rich in iron and can be used as a natural alternative to iron supplements, which may help in managing anaemia. Overall, this plant offers a wide range of health benefits, and regular consumption in moderate amounts is believed to support general health and well-being.

HEALTH BENEFITS OF MORINGA OLEIFERA

Anti-inflammatory effects

Moringa is known for its strong anti-inflammatory properties, which makes it useful in managing both short-term and long-term inflammation. Chronic inflammation is linked to diseases such as diabetes, heart conditions, respiratory issues, arthritis, and obesity. Moringa helps reduce inflammation by blocking certain enzymes and proteins in the body that cause it. Studies show that extracts from moringa leaves can significantly lower inflammation at the cellular level.

Anti-diabetic properties

Moringa plays an important role in controlling diabetes. Its leaf powder can help lower blood sugar and cholesterol levels while also reducing oxidative stress, which protects body cells

from damage. It may be helpful for both Type 1 Diabetes and Type 2 Diabetes. Type 1 diabetes occurs when the body does not produce insulin, while Type 2 diabetes is linked to the body not responding properly to insulin. Moringa supports better glucose control and overall metabolic health.

Supports heart health

Moringa is beneficial for the cardiovascular system. It helps reduce cholesterol levels, control blood lipids, and prevent the buildup of plaque in the arteries. Its natural compounds also help lower blood pressure and act as mild diuretics. Moringa leaf juice is especially helpful in maintaining stable blood pressure, making it useful for people with heart-related conditions.

Boosts brain function

Moringa supports brain health and improves mental performance due to its antioxidant and nerve-protecting properties. It may help in managing conditions like Alzheimer's disease. The high levels of vitamins C and E help improve brain activity and balance important brain chemicals like serotonin, dopamine, and noradrenaline. These chemicals are important for memory, mood, stress response, and overall mental health, including conditions like depression.

Protects the liver (Hepatoprotective effect)

Moringa helps protect the liver from damage caused by toxins, oxidation, and stress. This is mainly due to the presence of polyphenols in its leaves and flowers. Moringa oil can help restore normal liver enzyme levels, reduce oxidative stress, and improve protein levels in the liver. Since the liver plays a key role in detoxifying blood, producing bile, and processing nutrients, keeping it healthy is essential for overall well-being.

Antimicrobial and antibacterial properties

Moringa has strong antibacterial and antifungal effects that help the body fight infections. It can act against certain fungi that cause skin infections, as well as bacteria linked to blood infections, urinary tract infections, and digestive issues. The roots of the plant are especially known for their antibacterial properties and contain natural antimicrobial compounds. Extracts from the bark also show antifungal activity, while juice from the bark and stem has been found to work against bacteria like Staphylococcus aureus.

Supports wound healing

Moringa can help speed up the healing of wounds. Its leaves, roots, and seeds contain compounds that promote blood clotting, which helps reduce bleeding time for cuts and injuries. Some studies have shown that extracts from moringa leaves have both fever-reducing (antipyretic) and wound-healing effects. Research on animals has also found that certain extracts from the seeds and leaves can improve healing in different types of wounds when applied as an ointment.

Anti-Obesity Potential of Moringa oleifera

Moringa may help in managing obesity and body weight. In one study, rats with high cholesterol were given moringa leaf powder for about 49 days, which led to a noticeable reduction in their body mass index (BMI).

This effect is believed to be linked to how moringa influences certain hormones and genes in the body. It helps reduce the activity of hormones like leptin and resistin, which are associated with fat storage and obesity, while improving the function of adiponectin, a hormone that supports fat metabolism and insulin sensitivity.

Further research has shown that moringa can improve the overall lipid profile by lowering body weight and fat levels. It also helps the body handle glucose more effectively and reduces levels of obesity-related hormones such as vaspin, leptin, and resistin. These combined effects suggest that moringa may play a useful role in weight management and metabolic health.

Anti-ulcer and Gastroprotective Effects of Moringa oleifera

Moringa may help protect the stomach and prevent ulcers. Compounds such as polyphenols and flavonoids present in its leaves have been shown to reduce different types of ulcers, including those caused by stress and medications like Ibuprofen.

Moringa extracts can lower the production of harmful free radicals and help reduce the acidity of gastric juices, which protects the stomach lining. These effects contribute to preventing the formation of gastric ulcers.

Flavonoids in moringa also strengthen small blood vessels and improve blood circulation in the stomach lining. This helps reduce damage to cells and supports overall stomach health.

Fertility and Anti-Fertility Effects of Moringa oleifera

Although moringa has many health benefits, some parts of the plant may affect fertility. Research suggests that certain extracts of moringa can have anti-fertility and abortion-

inducing (abortifacient) effects. For example, aqueous extracts taken at specific doses have shown a strong ability to reduce fertility in experimental studies.

Recent studies on both hot and cold extracts of moringa leaves indicate that consuming moringa before, during, or after pregnancy may not be safe. It may negatively affect fetal development by causing strong contractions of the uterus.

Because of these potential effects, moringa should be used with caution, especially during pregnancy, and medical advice is recommended before regular use.

CONCLUSION

Moringa oleifera is a highly valuable plant rich in nutrients and antioxidants. However, there is still limited knowledge about its full potential as a food supplement and in food fortification.

Although moringa has many possible uses, it has not been fully explored. It could be used to develop nutritious food products that may help reduce malnutrition. Existing research provides a good overview of its chemical composition, nutritional value, health benefits, and medicinal properties.

Further studies are needed to properly identify, isolate, and standardize its active compounds. This will help in developing effective food products with added health benefits, which could play an important role in managing lifestyle-related diseases as well as addressing malnutrition.

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