

Moringa oleifera: A medicinal Super food

^[1] Suma P, ^[2] Shoghil R, ^[3] Shilpa URS, ^[4] Aswini J, ^[5] Rajeshwari C.U
Vlcc Institute of Beauty and Nutrition, Jayanagar, Bangalore

Abstract— Moringa oleifera plant is beginning to gain more popularity as a new “super food” for its highly nutritious profile and powerful anti-inflammatory, anti-oxidant and tissue protective properties among many other health benefits. Moringa oleifera is known as “Drumstick tree” or “Benzoil tree”. It has enormous benefits which is proven scientifically around the world. Moringa oleifera is a valuable food crop with highly nutritive value. It is well known as a “Miracle Tree” mainly for its prominent pharmaceutical and beneficial effects on human health. It is widely used as an antioxidant, antidiabetic, antimicrobial and anticancer agent all over the world. Moringa oleifera never becomes rancid & hence used in the manufacture of perfumes. The extra.ct from its leaves is well known galactagogue and also used to treat malnutrition.

Key words: Antimicrobial, Antioxidant, antidiabetic, Drumstick leaves.

I. INTRODUCTION

Wheat (*Triticum* spp.) is a cereal grain, originally from Moringa oleifera Lam (Moringaceae), native to the western and sub – Himalayan region, India, Pakistan, Asia, Africa and Arabia [1],[2]. Moringa oleifera is a highly valued plant, distributed in many countries of the tropics and subtropics. It has an impressive range of medicinal uses with high nutritional value. Different parts of this plant contain a profile of important minerals, and area good source of protein, vitamins, β – carotene, amino acids and various phenolics [3]. antipyretic, antiepileptic, anti-inflammatory, antiulcer[4]; Other important medicinal properties of the plant include antispasmodic[5]. Moringa oleifera seeds can also be used as a less expensive bioabsorbent for the removal of heavy metals [6]. Water supply is a basic requirement for living creatures and human being specifically. Resources available in this world to living creatures are limited; [7]. Coagulation-flocculation followed by sedimentation, filtration and disinfection, often by chlorine, is used worldwide in the water treatment industry before distribution of treated water to consumers [8,9]. Current operational procedures at many treatment works in developing countries are based on arbitrary guidelines, particularly in relation to the dosage of chemicals. Besides that, there is also the inadequate number of skilled workers and inadequate laboratory facilities to monitor process performances required to operate the plants;[10].

II. MEDICINAL PROPERTIES

Moringa oleifera is referred as a panacea and can be used to cure multiple diseases. Moringa oleifera has long been used in herbal medicine by Indians and Africans. The phytochemicals presence makes it a good medicinal agent. The effect of moringa oleifera on fighting against cancer are reviewed; [11]. The moringa tree is grown mainly tropical, and subtropical areas, It tolerates a wide range of soil

conditions, but prefers a neutral to slightly acidic (pH 6.3 to 7.0), well-drained sandy or loamy soil. In waterlogged soil, the roots have a tendency to rot. Moringa oleifera is particularly suitable for dry regions, as it can be grown using rainwater without expensive irrigation techniques; [12].

https://en.wikipedia.org/wiki/Moringa_oleifera

Anti-diabetic

The Medicinal properties of moringa oleifera are widely utilised for various remedies. The consumption of leaf powder of Moringa oleifera appears to be constructive in reducing blood glucose level in diabetic patients. This anti-diabetic effect of moringa oleifera has been compared to the presence of certain polyphenols. Certain scientific research, Moringa oleifera leaves significantly decrease blood glucose concentration in type 2 diabetes;[13]. Another impressive scientific study shows how the blood sugar level is lowered just within 3 hours after ingestion of extracts from moringa oleifera leaf ;[14].

Anti-inflammatory

Moringa oleifera acts as a utmost anti-inflammatory effect, and this is due to its richness in certain non-nutritive components such as flavonoids and phenolic acids. This anti-inflammatory activity of moringa oleifera makes it exert a profound beneficial effect on most diseases associated with inflammation. The anti-inflammatory effect of moringa oleifera has proved by scientific studies across the globe. A productive research showed how Amelioration of inflammation congenate chronic diseases can be possible with the potent anti-inflammatory undertaking of Moringa oleifera bioactive compounds. It shows lucrative effects in cases of asthma, pain, arthritis, obesity, diabetes, and stomach ulcer problems ;[15].

Anti-fungal and anti-bacterial

The utilization of moringa oleifera leaves has been proven to fight fungal and bacterial infections. These bacteria are mostly responsible for blood and urinary tract infections and

as well as digestive problems. A study conducted by;[16]. evaluated the antibacterial effect of aqueous and ethanolic moringa leaf extracts (*Moringa oleifera*) on the growth of gram-positive and negative bacteria

Other scientifically proven effects of moringa include:

- Anti-pyretic
- Anti-fertility
- Anti-tumour
- Anti-spasmodic
- Anti-ulcer
- Anti-asthmatic
- Anti-hypertensive
- Cardiac and circulatory system stimulant
- Analgesic

Nutritional importance of *Moringa oleifera*:

Moringa oleifera is not a seasonal tree, as it can grow and resist in any harsh climatic condition. It's seeds can be used as natural water purifier. The importance of *Moringa oleifera* are hidden and can be made commercialize and make huge profit. The leaves are rich in nutrients. The moringa oleifera seed oil is also called Benzoil and it is very much expensive in world market as it works as herbs. *Moringa oleifera* is rich in Vitamin A and Beta-Carotene level is higher than Vitamin A. which acts again blindness. It has a strong digestive powers. The cell structure of the body is stimulated by *Moringa oleifera* leaves. *Moringa oleifera* fights against diabetes as it balance sugar level in the body. It is a nutrition booster and it is used by lactating mothers. The *Moringa oleifera* leaves are said to contain two times the protein present in milk. Potassium and zinc is found in large quantities. *Moringa oleifera* contains more than 90 nutrients and 46 types of Antioxidants with all the health benefits of *Moringa oleifera*. It is considered most nutritious plant on the earth. *Moringa oleifera* leaves doesn't have any side-effects clinically and medically till date. *Moringa oleifera* can be consumed by children, Adult and elders in the feed of breads and pastas etc; [17]. *Moringa oleifera* is unique because, even in small amounts, It can supply daily a wide gamut of vital nutrients with few calories. It can help cholesterol and triglycerides control blood sugar and offer anti-ageing and anti-inflammatory substances, most of which have anti-cancer properties ;[18].

***Moringa oleifera* Seeds preparation and treatments**

Moringa Oleifera belongs to the family of Moringaceae. The average weight of seeds is 1.27 g ;[19]. The seed powers of *Moringa oleifera* and other local seeds were prepared just before their use, For each treatment, a paste of seed kernel powder with water was prepared and was stirred for 10-15 minutes to release the active components of seed in water;[20]. For water treatment purposes, the seedpods were

first allowed to dry naturally on the tree prior to harvesting ;[21].

Nutritive Properties

Moringa oleifera leaves also have low calorific value and can be used in the diet of the obese. The pods are fibrous and are valuable to treat digestive problems and thwart colon cancer ;[22]. *Moringa Oleifera* aqueous leaf extract down-vegetables nuclear factor-kappaB and increases cytotoxic effect of chemotherapy in pancreatic cancer cells ;[23]. *Moringa oleifera* has lot of minerals that are essential for growth and development among which, calcium is considered as one of the important minerals form human growth, while 8 ounces of milk can provide 300-400 mg, *Moringa oleifera* leaves can provide 1000 mg and *Moringa oleifera* powder can provide more than 4000 mg. *Moringa oleifera* powder can be used as a substitute for iron tablets, hence as a treatment for anemia. Beef has only 2 mg of iron while *Moringa oleifera* leaf powder has 28 mg of iron. It revealed that seasons influence the nutrient content. It was shown that Vitamin A was found abundantly in the hot-wet season. While Vitamin C and Iron were more in the cool-dry season ;[24].

Nutritional composition of *Moringa oleifera*

Moringa oleifera is rich in Vitamin A, Vitamin C, Potassium, Calcium, Iron and Protein. *Moringa oleifera* leaves are rich with all of these nutrients. It is also compared to milk, *Moringa oleifera* leaves are better as they contain 4 times more calcium. Since the chemical content of plants are affected by the type of soil or climatical condition they grow ;[25] The Crude protein (30.29 %) of dry leaves; [26], gives the measure of the total protein content and protein helps in growth and repair of body tissues among numerous other functions. *Moringa oleifera* powder, which is actually grinded dried leaves of *Moringa oleifera*, has seven times more Vitamin C compared to oranges, 36 times the amount of magnesium in eggs, 50 times more Vitamin B3 than peanuts and 50 times more than B2 than bananas.

A complete list of nutrients available in leaves, pods and seeds are shown in

Table 1.

Table 1. The nutrient compositionsa of leaves, leaf powder, seeds and pods.

Nutrients	Fres leaves	Dry leaves	Leaf powder	Seed	Po
Calories (cal)	92	329	205	-	26
Protein (g)	6.5	29.4	27.1	35.97 ± 0.1	2.5
Fat (g)	1.7	5.2	2.3	38.67 ± 0.0	0.1
Carbohydrate(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
VitaminB1 (µg)	0.06	2.24	2.64	0.05	0.0
VitaminB2 (µg)	0.05	21.3	20.5	0.06	0.0
VitaminB3 (µg)	0.2	7.6	8.2	0.2	0.2
Vitamin C (mg)	220	15.8	17.3	4.5 ± 0.17	12
Vitamin E (mg)	448	10.8	113	751.67 ± 4.	-
Calcium	440	2185	2003	45	30
Magnesium	42z	448	368	635 ± 8.66	24
Phosphorus	70	252	204	75	11
Potassium	259	1236	1324	-	25
Copper	0.07	0.49	0.57	5.20 ± 0.15	3.1
Iron	0.85	25.6	28.2	-	5.3
Sulphur	-	-	870	0.05	13

All values are in 100 g per plant material [27,28,29]

Traditional Uses of Moringa oleifera:

Moringa oleifera is now found throughout the tropics but its native is from South Asia. Its leaves have been used as part of traditional medicine for centuries, and the Ayurvedic system of medicine associates it with the prevention of about multiple diseases;[30].

Moringa oleifera, sometimes described as the "miracle tree," or "horseradish tree," has small leaves that are packed with an unbelievable amount of nutrition: protein, potassium, calcium, beta carotene, vitamin C... you can find all important nutrients in moringa. Highlight of its usage medicinally (and as a food source) for several centuries;[31]. Powdered seeds of *Moringa oleifera* had been used to flocculate contaminants and purify drinking water ;[32]. The seeds are also eaten green, roasted, powdered and steeped for tea or used in curries ;[33].

I personally grew a *moringa oleifera* tree for years and consuming it for years, it may very well prove to be a valuable source of nutrition. *Moringa oleifera* keep up a healthy cardiovascular system, and promote normal blood-glucose levels, counteract free radicals that causes cancer, provide excellent support of the body's anti-inflammatory mechanisms, enrich anaemic blood and support immune system ;[34].

Moringa oleifera offers an impressive nutritional profile that makes it appealing once it is planted and gets benefited

Dr. Mercola and other staff members saw patients at his clinic, which was called the Optimal Wellness Center. In 1999

Moringa oleifera as a Superfood:

Kale and matcha is ruled by these supergreens kingdom. But recently, a powerful new grassy-hued food has started making waves as an even healthier alternative. *Moringa oleifera* trees grow at a rate comparable to weeds, It grows 20 feet in a year and flowering in less than six months. The fragile leaves are the most popular part of the plant. They can be eaten whole but are most often dried and ground into a fine, velvety powder. "What is really exciting about *Moringa oleifera* is that it provides needed nutrition and 'nutraceutical' effects for people in places where these things are really needed," says Olson; [35].

One tablespoon of *moringa oleifera* leaf powder contains: 2 g protein

- 110 percent RDA Vitamin A
- 16 percent RDA calcium
- 28 percent RDA Vit E
- 85 percent RDA Riboflavin
- 48 percent RDA Vit C
- 10 percent RDA Iron

It's like a multivitamin in natural form; [36]

As the dry season continues here, research at the Collection continues to examine the mechanisms underlying *moringa oleifera*'s drought resistance in a world of increasingly erratic rainfall. Thanks, Amanda, for highlighting our efforts. The *Moringa oleifera* collection was just featured in a very nice piece by author Amanda Little in the New Yorker, available at

<http://www.newyorker.com/tech/elements/meet-the-moringa-tree-an-overqualified-underachieving-superfood>.

A Rich Nutritional Profile

Moringa oleifera leaves are loaded with vitamins, minerals, essential amino acids, and more. *Moringa oleifera* Leaf Powder is truly jam-packed full of nutrients. If every household had access to *Moringa oleifera* then malnutrition would be wiped out. Households would have no need to purchase artificial supplements.; [37]

NUTRIENT COMPARISONS PER 100 GRAMS;

Table.1 Nutritional value of *Moringa* compared with other food;[38]

Content of	Moringa	other food
Vitamin A	6,780 mg	Carrot : 890 mg

Vitamin C	220 mg	Orange : mg
Calcium	440 mg	cow milk : 0 mg
Potassium	259 mg	Banana : mg
Protein	6.6 g	Cow milk : 2 g

Antioxidants Galore

Moringa Oleifera leaves are rich in antioxidants, including beta-carotene, quercetin, Vitamin C and chlorogenic acid. The absorption of sugar and animal studies have found it to lower blood sugar levels. As noted in the Asian Pacific Journal of Cancer Prevention:

"The leaves of the Moringa oleifera tree have been reported to demonstrate antioxidant activity due to its high amount of polyphenols.

Moringa oleifera extracts of both mature and tender leaves exhibit strong antioxidant activity against free radicals, prevent oxidative damage to major biomolecules, and give significant protection against oxidative damage;[39]. Further, in a study of women taking 1.5 teaspoons of moringa oleifera leaf powder daily for three months, blood levels of antioxidants increased significantly. The antioxidant activity of Moringa oleifera leaves grown in Pakistan. This may be due to the fact that Moringa oleifera leaves grow in June and mature from December to March and phenolic content is the lowest in newly opened leaves, increasing gradually with the maturity of leaves;[40]. In this study, the total phenolic content of the selected samples was determined, however, the phenolic composition of the extracts was not analyzed as it was not within the scope of the present investigation.

Low blood sugar level;

Moringa oleifera have an anti-diabetic effects, likely due to valuable plant compounds contained in the leaves, including isothiocyanates. A women who took seven grams of moringa oleifera leaf powder daily for three months reduced their fasting blood sugar levels by 13.5 percent;[41]. Adding 50 grams of moringa oleifera leaves to a meal reduced the rise in blood sugar by 21 percent among diabetic patients proved a research. These results are caused by plant compounds found in Moringa oleifera leaves, like isothiocyanates. Diabetes is a metabolic disorder characterized by increased fasting and postprandial blood sugar levels. The prevalence of diabetes is likely to be increased by 35%;[42]. Fasting blood sugar was estimated using glucose kit from Human (Germany) according to the instructions of the supplier. High blood sugar is more and more common health problem in the modern society. It is a very serious health problem because it is the main characteristic of diabetes. On the long run, high

blood sugar raises the risk of many serious health problems such as heart disease. The ethanolic and aqueous extracts of roots of *Moringa oleifera* lower the blood glucose level in streptozotocin- (STZ-) induced diabetic rats ;[43]. Therefore moringa oleifera is very important to keep blood sugar within healthy limits. Type 2 diabetics, who stumbled across capsules, pills and powder made from the leaves and seeds of the remarkable Moringa oleifera tree. Dubbed as The Tree of Life or Miracle Tree they found it reduced and helped control blood sugar levels; [44]. Diabetes is now a prevalent condition that affects millions of people. Many of you will have or most of you will know, someone who has it.

<https://www.chia-direct.com/index.php/blood-sugar-levels>

III. CONCLUSION

Moringa oleifera is a super food having rich nutrient source, and has been discussed more than many other plants. If Moringa oleifera is utilized as a part of a supplemental feeding program, samples should be analyzed periodically throughout the program to ensure that planned nutrient targets are being reached. The published data on the nutrient content of this interesting plant is quite variable, both in terms of quantity of information and differences between published sources. Much of the variability is likely due to differences in soil, climate, and plant age; and processing techniques such as drying clearly impact vitamin content. So more information regarding the nutrient content and digestibility of this plant would be helpful, especially;[45], an analysis of how sun, shade, and oven drying impact vitamin content; [46], an analysis of how digestible the protein and other nutrients in the leaves are;[47], an analysis of B-vitamins and dietary fiber using current methodologies;[48], an analysis of how soil type and mineral content and plant age impact the mineral content of the leaves .

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