

Nutritional and Medicinal Importance of *Moringa oleifera*

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Abstract

Moringa oleifera, also known as drumstick tree, moringa, horseradish tree and ben oil tree, is a small to medium-sized, evergreen tree genus native to Africa and southern Asia. It is also grown in northern India, Pakistan and Nepal. The tree usually grows with a spreading, open crown of drooping, brittle branches, feathery foliage. It is valued mainly for its edible fruits, leaves, flowers, roots, and seed oil. It is also known as miracle tree for its nutritive values and medicinal properties. 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. Based on the results of this study it can be concluded that *Moringa oleifera* had high nutritive values. Eating Moringa food products is good for those suffering from malnutrition. This review is carried out or elaborates to focus on nutritional and medicinal properties of *Moringa oleifera* which is beneficial for health and to get further research in possible future applications.

Keywords: *Moringa oleifera*; Drumstick; Miracle Tree; Drumstick Leaves; Antidiabetic

Introduction

Moringa oleifera is a tropical or subtropical plant belonging to a diverse genus native to Africa and southern Asia. India is the largest producer of moringa, with an annual production of 1.2 million tonnes of fruits from an area of 380 km² [17]. Moringa is grown in home gardens and as living fences in Africa, South Asia and Southeast Asia, where it is commonly sold in local markets. In the Ghana and other West African nations, Philippines and Indonesia, it is commonly grown for its leaves which are used as food. Moringa is also actively cultivated by the World Vegetable Center in Taiwan, a center for vegetable research and Frolic Moringa in Ghana. More generally, moringa grows in the wild or is cultivated in Central America and the Caribbean, northern countries of South America, Africa, Southeast Asia and various countries of Oceania.

A preparation of the leaves, fruits, or other parts of the drumstick tree used chiefly as an herbal or dietary supplement. It's a fast-growing, drought-resistant tree (Shown in figure 1) of the family Moringaceae, native to tropical and subtropical regions of Africa and South Asia. Common names include moringa, drumstick tree, horseradish tree, and ben oil tree or benzolive tree [19]. It is widely cultivated for its young seed pods and leaves used as vegetables and for traditional herbal medicine. The seed is also used for water purification.

It is a perennial softwood tree with timber of low quality, but which for centuries has been advocated for traditional medicinal and industrial uses. It is already an important crop in India, Ethiopia, the Philippines and the Sudan, and is being grown in West, East and South



Figure 1: *Moringa oleifera* tree.

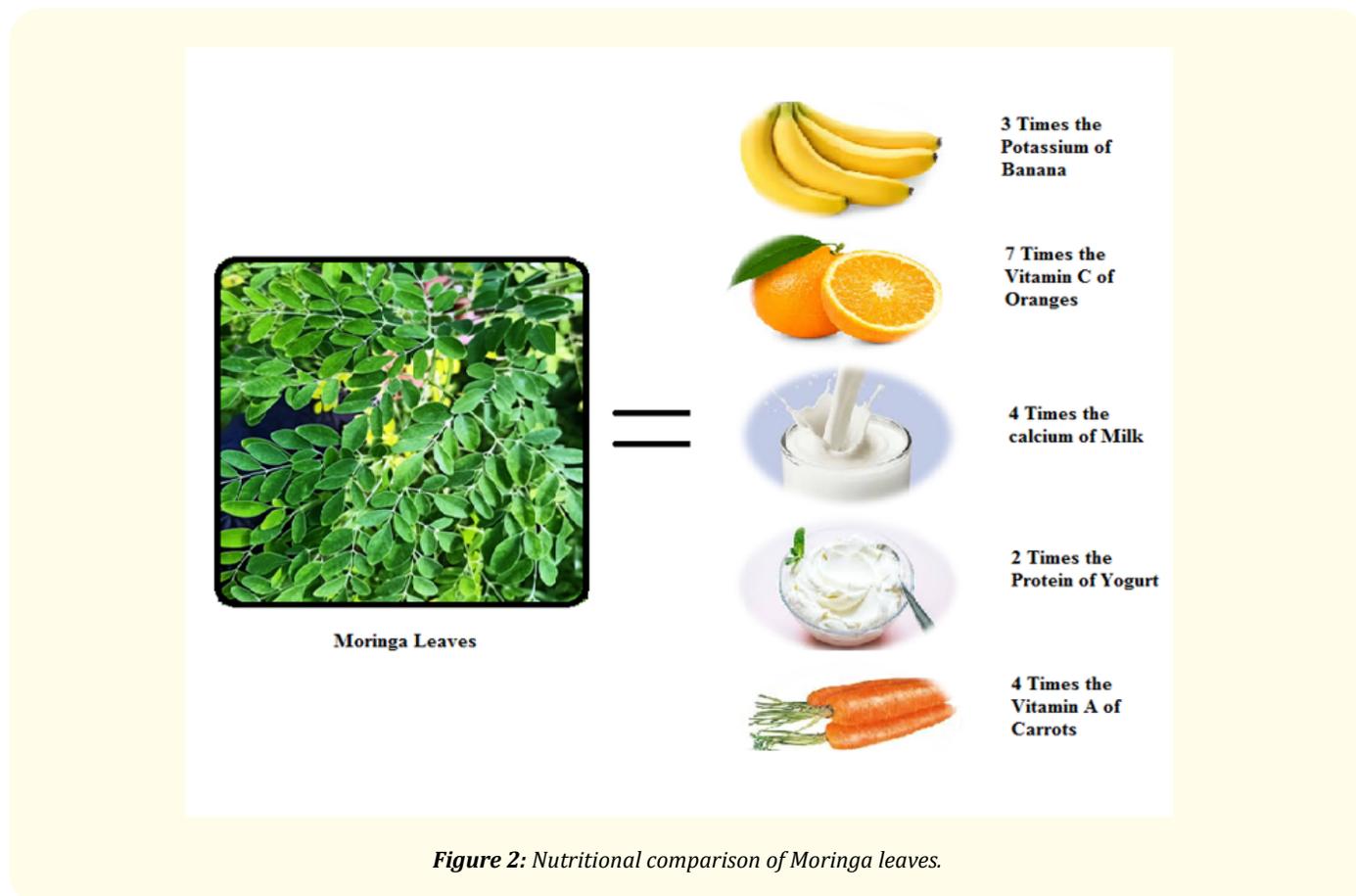
Africa, tropical Asia, Latin America, the Caribbean, Florida and the Pacific Islands. All parts of the Moringa tree are edible and have long been consumed by humans. According to Fuglie, the many uses for Moringa include: alley cropping (biomass production), animal forage (leaves and treated seed-cake), biogas (from leaves), domestic cleaning agent (crushed leaves), blue dye (wood), fencing (living trees), fertilizer (seed-cake), foliar nutrient (juice expressed from the leaves), green manure (from leaves), gum (from tree trunks), honey- and sugar cane juice-clarifier (powdered seeds), honey (flower nectar), medicine (all plant parts), ornamental plantings, biopesticide (soil incorporation of leaves to prevent seedling damping off), pulp (wood), rope (bark), tannin for tanning hides (bark and gum), water purification (powdered seeds). Moringa seed oil (yield 30 - 40% by weight), also known as Ben oil, is a sweet non-sticking, non-drying oil that resists rancidity [7]. It has been used in salads, for fine machine lubrication, and in the manufacture of perfume and hair care products [18]. In the West, one of the best known uses for Moringa is the use of powdered seeds to flocculate contaminants and purify drinking water [7], but the seeds are also eaten green, roasted, powdered and steeped for tea or used in curries [2]. This tree has in recent times been advocated as an outstanding indigenous source of highly digestible protein, Ca, Fe, Vitamin C, and carotenoids suitable for utilization in many of the so-called “developing” regions of the world where under nourishment is a major concern. The objective of this study is to focus or review on nutritional and medicinal properties of *Moringa oleifera* which is beneficial for health.

Nutritional and medicinal importance

The Moringa’s incredible medicinal usage which is claimed by many cultures and communities based on real life experiences are confirmed by science. The Moringa contains many essential nutrients, vitamins, minerals, amino acids, beta carotene, antioxidants, anti-inflammatory nutrients and omega 3 and omega 6 fatty acids [9]. It was found that, carbohydrates 9.1g, dietary fiber 2.1g, fat 1.7g, protein 8.1g also rich in vitamins such as vitamin A 80 µg, thiamine (B1) 0.103 mg, Riboflavin (B2) 0.112 mg, Niacin (B3) 1.5 pantothenic acids (B5) 0.48 mg. vitamin B6 0.129 mg folic acid (B9) 41 µg Vitamin C 8.6 mg also rich in minerals such as Calcium 99.1 mg, Iron 1.3 mg, Magnesium 35.1 mg Manganese 0.119 mg, Phosphorus 70.8 mg, Potassium 471 mg, Sodium 70 mg, Zinc 0.85 mg Also rich in essentials amino acids (ug/ml) Threonine 36.77, Valine 22.1, Methionine 2.13, Leucine 20.50, Isoleucine 31.8, Phenylalanine 36.8, Histidine 30.88, Lysine 27.67, Arginine 21.45 [12].

The *Moringa oleifera* leaves are rich in starch, minerals, and iron, vitamin A, B and C. The powder of its leaves can be produced by drying and crushing the leaves which is used as protein and calcium supplement. The edible parts of moringa are, root, flowers, and leaves,

fruits and seeds. From a long time it was used as a medicine to treat skin infections, scurvy, tumors, bronchitis, and anaemia. The leaves of Moringa are equal to 7 times the Vitamin C of Oranges, 4 times the Vitamin A of Carrots, 4 times the Calcium of Milk, 3 times the Potassium of Bananas and 2 times the Protein of Yogurt as shown in figure 2 [8].



Edible parts of moringa tree

Pods

The young pods are called "drumsticks" because of the shape of the pods by Indian communities. It can be cooked in many varieties according to different regions of India. Many people cooked it as a vegetable, while some communities make a mixed vegetable recipe called "Sambar Dal". They are commonly found in Indian and Asian markets in fresh forms as well as canned forms. The Moringa pods are supplied to Europe and Asia by India, Kenya, and Srilanka. In Nigeria, the seeds are prized for their bitter flavor; they are commonly added to sauces or eaten as a fried snack. The edible seed oil may be used in condiments or dressings. Ground, debittered moringa seed is suitable as a fortification ingredient to increase the protein, iron and calcium content of wheat flours [10].

Leaves

The Leaves are very nutritious and many recipes can be made in a variety of ways. The most common way of preparing the moringa leaves dish is the spinach recipe. The young leaves are the source of starch or porridge made with corn meal. The dried leaves of Moringa can be added to sauces to improve its nutritional value.

The leaves are the most nutritious part of the plant, being a significant source of B vitamins, vitamin C, provitamin A as beta-carotene, vitamin K, manganese, and protein [14]. When compared with common foods particularly high in certain nutrients per 100g fresh weight, cooked moringa leaves are considerable sources of these same nutrients. Some of the calcium in moringa leaves is bound as crystals of calcium oxalate [11] though at levels 1/25th to 1/45th of that found in spinach, which is a negligible amount. The leaves are cooked and used like spinach and are commonly dried and crushed into a powder used in soups and sauces.

Seeds

The seeds, sometimes removed from more mature pods and eaten like peas or roasted like nuts, contain high levels of vitamin C and moderate amounts of B vitamins and dietary minerals. The seeds are also part of the edible portion of *Moringa*. The seeds are peeled off from the outer coating and can be eaten as peas when they are fresh and green, the dry seeds cannot be eaten due to the bittering of the outer coating of the seed. The mature seeds consist of 40% of the oil. Moringa oil contains 73% Oleic acid which can be used for cooking and can be sold as "ben oil" [4]. The oil cake of *Moringa* seed is bitter in taste and contains anti-nutritional elements, like haemagglutinins, glucosinolates, alkaloids, and saponin [5].

Roots

The roots are shredded and used as a condiment with sharp flavor qualities deriving from significant content of polyphenols [1]. The roots are not truly edible but the trees which are a few months old can be taken out and used in the diet in place of horse radish. The bark of the root is thoroughly scrapped off because of the presence of alkaloids including the toxic and active moringinine. It is observed that eating a large amount of the drumstick roots or consuming it frequently can lead to nervous problems as it contains pterygospermin and an alkaloid called spirachin, which is a nerve-paralyzing agent.

Flowers

One year of matured *Moringa* tree is able to produce pods. The recipes of flowers of moringa are generally made in two ways one is frying it as it is and the other way is making the flowers mixed with batter and deep fried it. It can be eaten as a special food and is highly nutritious. The flowers are rich in Ca and K. The flowers of *Moringa* are the source of nectar for bees.

Conclusion

The *Moringa* tree is drought resistant and is very inexpensive, therefore it can be grown in almost every region including the areas of malnutrition. The *Moringa oleifera* plant provides better nutrition and can cure and prevent most of the diseases. It has many properties which is beneficial for us and much more people didn't aware about it. Almost each and every part of this tree is edible and can surely eliminate malnutrition. It consists of proteins, vitamins, carbohydrates in more amounts compared to other nutritional products. There are a number of food preparations which can be made from a single tree using its different parts. The poor countries and the regions of malnutrition should promote the plantation of *Moringa oleifera*. *Moringa* is a miracle plant having many benefits and can be grown at large scale as it is the best gift from nature. This review is carried out to focus on nutritional and medicinal properties of *Moringa oleifera* which is beneficial for health and to get further research in possible future applications.

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