

# Moringa: The herbal gold to combat malnutrition

## Abstract

This document is aimed at describing the potential benefits of the *Moringa* tree as a nutrient. *Moringa* tree can be utilized in treating the malnutrition in a local and cost-effective manner. Malnutrition causes a great deal of human suffering and is associated with more than half of all deaths of children worldwide. Malnutrition severely affects the socio-economic development of a nation because a work force that is stunted both mentally and physically may have a reduced work capacity. Thus nutrition plays an important role in the reproduction of poverty from one generation to the next. Not only is the *Moringa oleifera* tree extraordinary in that all parts of the tree are edible, but the most amazing aspect of the tree is its exceptionally high nutritional value. The leaves of the *Moringa* tree are an excellent source of vitamin A, vitamin B, vitamin C and other minerals. The leaves are also an outstanding source of calcium, protein, potassium and iron. The content of amino acids such as methionine and cystine is also high. Carbohydrates, fats and phosphorus content are low making this one of the finest plant foods to be found. Present review focuses on the potential benefits of *Moringa oleifera* in treatment of malnutrition.

### Key words:

Deaths of children, high nutritional value, malnutrition, plant foods

## Introduction

There are several herbs of nature which help in restoring the balance of body and maintaining good health. But a single *moringa* tree can provide leaf for nutrition, oil for cooking and healthy skin, seed cake for water purification and wood to build shelter and keep you warm. *Moringa oleifera* is the most widely cultivated pan-tropical species of a monogeneric family, the Moringaceae, which is native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. *Moringa oleifera* is known by such regional names as benzolive, drumstick tree, kelor, marango, mlonge, mulangay, nébéday, saijhan, and sajna [Figure 1].

The history of *Moringa* dates back to 150 B.C. Historical proofs reveal that ancient kings and queens used *Moringa* leaves and fruit in their diet to maintain mental alertness and healthy skin. Ancient Maurian warriors of India were fed with *Moringa* Leaf Extract in the warfront. The Elixir drink was believed to add them extra energy and relieve

them of the stress and pain incurred during war. These brave soldiers were the ones who defeated “Alexander” the Great.”<sup>[1,9,10]</sup> There are 13 varieties of *Moringa*, *Moringa Oleifera* is the most well known. Every part of this tree is edible, from the leaves, trunks, stems, all the way down to its root. The flowers can be eaten or used to make tea and provide good amounts of both calcium and potassium. The young pods can be cooked and reportedly have a taste reminiscent of asparagus. The green peas and surrounding white material can be removed from larger pods and cooked in various ways.

## Growing/ecology

*Moringa* tolerates a wide range of environmental conditions.<sup>[4]</sup> It will tolerate extremely high temperatures in the shade and can survive a light frost. The drought-tolerant tree grows well in areas that receive annual rainfall amounts ranging

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between 250 and 1500 mm. It prefers a well-drained sandy loam or loam soil, but tolerates clay. *Moringa* is planted either by direct seeding, transplanting, or using hard stem cuttings.

### Harvesting

Leaves can be harvested after plants grow 1.5 to 2.0 m, which usually takes 3 to 6 months. They are harvested by snapping leaf stems from branches or by cutting the entire branches 20 to 40 cm above the ground. Older leaves need to be stripped from their tough and wiry stems. These leaves are more suited to making dried leaf powder, since stems can be removed during the sifting process. For fresh vegetables the leaves must be harvested early in the morning and sold the same day. Flowers and pods are produced during the second year of growth. The pods are harvested when young, tender and green. The pulp and immature seeds of older pods remain edible until shortly before the ripening process begins.<sup>[4]</sup>

### Contribution to rural and social development

Virtually every part of the tree is beneficial in some way and both rural and urban people depend on it for their livelihood. Depending on the purpose and quantity, *Moringa* is grown in nurseries, as a community project, or on a small scale at the family level. It can function as windbreaks, for land erosion control, live fences, as an ornamental, or intercropped to provide semi-shade to species requiring less direct sunlight. One theme surrounding the cultivation and use of *Moringa* is the risk that the species may alter the land and its living systems. However, according to a recent study, a crucial transition must take place whereby destructive farming practices must be replaced by new and improved cultivation methods which raise *Moringa* without destroying natural systems on which agriculture ultimately depends. In fact, the effective development and management of *Moringa* can indeed contribute to sustainable growth and poverty reduction in developing countries. But for this to take place, a balance must be found between the short-term needs of the people for their social and economic development and the protection of the natural resource base.<sup>[11]</sup>

### *Moringa* as a nutrient source

In developing tropical countries, *Moringa* trees have been used to combat malnutrition, especially among infants and nursing mothers.<sup>[12,13]</sup> Three non-governmental organizations in particular - Trees for Life, Church World Service and Educational Concerns for Hunger Organization - advocate *Moringa* as "natural nutrition for the tropics." The immature pods are the most valued and widely used of all the tree parts. The pods are extremely nutritious, containing all the essential amino acids along with many vitamins and other nutrients. The immature pod can be

eaten raw or prepared like green peas or green beans, while the mature pods are usually fried and possess a peanut-like flavor. The pods also yield 38 to 40% of non-drying, edible oil known as Ben Oil. This oil is clear, sweet and odorless, and never becomes rancid. Overall, its nutritional value most closely resembles olive oil. The thickened root is used as a substitute for horseradish although this is now discouraged as it contains alkaloids, especially moriginine, and a bactericide, spirochin, both of which can prove fatal following ingestion. The leaves are eaten as greens, in salads, in vegetable curries, as pickles and for seasoning. They can be pounded up and used for scrubbing utensils and for cleaning walls. Leaves and young branches are relished by livestock. The Bark can be used for tanning and also yields a coarse fiber. The flowers, which must be cooked, are eaten either mixed with other foods or fried in batter and have been shown to be rich in potassium and calcium [Tables 1-4].<sup>[14-18]</sup>

### *Moringa* as a source of vitamins and minerals

Not only is the *Moringa oleifera* tree extraordinary in that all parts of the tree are edible, but the most amazing aspect of the tree is its exceptionally high nutritional value. The leaves of the *Moringa* tree are an excellent source of vitamin

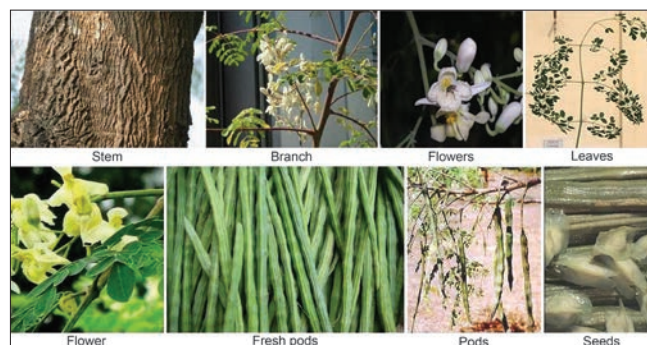


Figure 1: Various parts of *Moringa Oleifera*<sup>[1-8]</sup>

Table 1: *Moringa* nutrition content<sup>[15]</sup>

Nutrition analysis	Pods (per 100 g)	Fresh leaves (per 100 g)	Dried leaf (per 100 g)
Moisture %	86.9	75	7.5
Calories	26	92	205
Protein (g)	2.5	6.7	27.1
Fat (g)	0.1	1.7	2.30
Carbohydrates (g)	3.7	13.4	38.2
Fiber (g)	4.8	0.9	19.2
Minerals (g)	2	2.3	-
Calcium (mg)	30	440	2003
Magnesium (mg)	24	24	368.0
Phosphorous (mg)	110	70	204.0
Potassium (mg)	24	24	1324
Copper (mg)	3.1	1.1	0.6
Iron (mg)	5.3	0.7	28.2
Oxalic Acid (mg)	10	101	0.0
Sulfur(mg)	137	137	870

A (four times the amount in carrots), the raw leaves are rich in vitamin C (seven times the amount in oranges), and they are also a good source of vitamin B and other minerals. Vitamins and Minerals are required for everything from building our physical bodies to blood coagulation and energy

**Table 2: Vitamin and mineral content of *Moringa***<sup>[16,17]</sup>

Vitamin content (per 100 g)	Fresh leaves	Dried leaves
Carotene (Vit. A) mg	6.78	18.9
Thiamin (B1) mg	0.06	2.64
Riboflavin (B2) mg	0.05	20.5
Niacin (B3) mg	0.8	8.2
Vitamin C mg	220	17.3
Calcium mg	440	2,003
Calories cal	92	205
Carbohydrates g	12.5	38.2
Copper mg	0.07	0.57
Fat g	1.70	2.3
Fiber g	0.90	19.2
Iron mg	0.85	28.2
Magnesium mg	42	368
Phosphorus mg	70	204
Potassium mg	259	1,324
Protein g	6.70	27.1
Zinc mg	0.16	3.29

**Table 3: *Moringa* protein content**<sup>[15]</sup>

Amino acid content (per 100 g)	Pods	Fresh leaves	Dried leaf powder
Arginine (mg)	360	406.6	1325
Histidine (mg)	110	149.8	613
Lysine (mg)	150	342.4	1325
Tryptophan (mg)	80	107	425
Phenylalanine (mg)	40	310.3	1388
Methionine (mg)	140	117.7	350
Theroinine (mg)	390	117.7	1188
Leucine (mg)	650	492.2	1950
Isoleucine (mg)	440	299.6	825
Valine (mg)	540	374.5	1063

**Table 4: Percentage of the recommended daily allowance of various nutrients**

Nutrition component	% RDA	
	Parent	Child
Protein	21	42
Calcium	84	125
Magnesium	54	61
Potassium	22	41
Iron	94	71
Vitamin A	143	272
Vitamin C	9	22

Supplied to a nursing mother and a 1 to 3 year old child by *Moringa* leaf powder (6 tablespoons per day for a nursing mother; 1 tablespoon three times per day for a 1 to 3 year old child)<sup>[17]</sup>, RDA: Recommended daily allowance

production. As a source of nutrients and vitamins, *Moringa* leaves rank among the best of perennial tropical vegetables.

***Moringa* as a source of protein**

*Moringa* trees are known to overcome protein deficiency in developing countries as the leaves and other parts of the tree contain high amount of crude proteins and amino acids compared with soy bean. *Moringa* is an excellent non-animal source of protein for vegans and vegetarians. *Moringa* leaves contain all of the essential amino acids, which are the building blocks of proteins. It is very rare for a vegetable to contain all of these amino acids And *Moringa* contains these amino acids in a good proportion, so that they are very useful to our bodies. *Moringa* leaves could be a great boon to people who do not get protein from meat. *Moringa* even contains arginine and histidine two amino acids especially important for infants. Arginine and histidine, are especially important for infants who are unable to make enough protein for their growth requirements. Experts tell us that 30% of children in sub-Saharan Africa are protein deficient. *Moringa* could be an extremely valuable food source.<sup>[1,9,19-24]</sup>

***Moringa* as a source of essential fatty acids**

The other nutrients required for optimal cellular health are the essential Fatty Acids. As strange as it may sound, there are good fats that actively help create good health. These are the now-famous omeg-3 and omega-6 fatty acids.

**Nutritional application of *Moringa***

A large number of reports on the nutritional qualities of *Moringa* now exist in both the scientific and the popular literature. *Moringa* has been in use since centuries for nutritional as well medicinal purposes. *Moringa* Leaves are full of essential disease-preventing nutrients. *Moringa* is a natural, whole-food source for vitamins, minerals, protein, antioxidants, and other important compounds that your body relies on to stay healthy.<sup>[3,25-28]</sup> Micronutrient deficiencies are now recognized as an important contributor to the global burden of disease. *Moringa* is an alternative to imported food supplies to treat malnutrition in poor countries. *Moringa* trees have been used to combat malnutrition, especially among infants and nursing mothers. Three non-governmental organizations in particular–Trees for Life, Church World Service and Educational Concerns for Hunger Organization–have advocated *Moringa* as “natural nutrition for the tropics.” Leaves can be eaten fresh, cooked, or stored as dried powder for many months without refrigeration, and reportedly without loss of nutritional value. *Moringa* is especially promising as a food source in the tropics because the tree is in full leaf at the end of the dry season when other foods are typically scarce. Leaves were also used for food fortification.<sup>[1,1-21,29,30]</sup>

In 1997-98, Alternative Action for African Development and Church World Service tested the ability of *Moringa*

leaf powder to prevent or cure malnutrition in pregnant or breast-feeding women and their children in southwestern Senegal. Malnutrition was a major problem in this area, with more than 600 malnourished infants treated every year. During the test, doctors, nurses, and midwives were trained in preparing and using *Moringa* leaf powder for treating malnutrition. Village women were also trained in the preparation and use of *Moringa* leaf powder in foods. Result had indicated that children maintained or increased their weight and improved overall health, pregnant women recovered from anemia and had babies with higher birth weights and breast-feeding women increased their production of milk.<sup>[1, 11]</sup> Pollution, pesticides and numerous other particles bombard us every day. These are just some of the free radicals which we now know are so destructive. The only protection against free-radical damage comes in the form of Antioxidants.

### Treating malnutrition with *Moringa*

Ideally, good nutrition should be assured by a varied diet rich in meat, root, grain, fruit and vegetable foods. In reality, for a majority of the world's population such variety in food is unaffordable or seasonally unavailable. Within the arid countries of the African Sahel, for example, the dry seasons are marked by a heavy dependence on the staples of rice, millet and sorghum; during these months, fruits and greens can be found only in a few irrigated garden plots. And in virtually every year there is a lean period when grain stores have been exhausted one to three months prior to the new harvest. Elsewhere in the tropics, meals are generally built around one staple food rich in carbohydrates but very poor nutritionally, such as a *pap* or *fufu* made from yam, maize or manioc. *Malnutrition* is frequently characterized by this kind of restricted diet wherein a child consumes the same weaning *pap* every day. In this context, *Moringa* is a very simple and readily available solution to the problem of malnutrition. The edible leaves of the *Moringa oleifera* tree are already an occasional food source throughout West Africa and other regions of the tropics and sub-tropics.

Micronutrient deficiencies are now recognized as an important contributor to the global burden of disease. Iodine deficiency in pregnancy has long been linked to intra-uterine brain damage and possible fetal wastage. Currently, although more than two billion people live in areas that used to be iodine-deficient, it is estimated that iodine deficiency is the cause of only 0.2% of the global burden of disease. Iron deficiency also affects about two billion people. Recent estimates find that iron deficiency anemia is responsible for one fifth of early neonatal mortality and one tenth of maternal mortality. Iron deficiency also reduces cognitive development and work performance. Iron deficiency is the cause of about 800,000 deaths and 2.4% of the global burden of disease.<sup>[31,32]</sup>

Vitamin A deficiency (VAD) harms the eyes and increases

childhood and maternal mortality. Globally, 21% of children have VAD and suffer increased rates of death from diarrhea, measles, and malaria. The importance of zinc deficiency is being increasingly recognized. Trials have shown that zinc supplementation results in improved growth in children, lower rates of diarrhea, malaria, and pneumonia, and reduced child mortality. In total about 800,000 child deaths per year are attributable to zinc deficiency. Zinc deficiency is the cause of 1.9% of global burden of disease. According to WHO, 19% of the 10.8 million child deaths globally a year are attributable to iodine, iron, vitamin A, and zinc deficiencies. Recent estimates indicate that fortification or supplementation with iron, vitamin A, and zinc are among the most cost-effective interventions available, even in areas that are poor or have high HIV infection rates.

However, mild or moderate malnutrition before this terminal stage is reached is a completely different matter: the physiological abnormalities are much less severe and successful recovery can be had through a fully balanced diet containing all 40 essential nutrients in the correct proportions. *Moringa*, added on a daily basis to a child's food, has thoroughly demonstrated its ability to bring about rapid recoveries from moderate malnutrition. But while successfully treating malnutrition is good, preventing it is much better. Malnutrition is brought on by a multitude of causes: lack of education, poverty, famine, parasites and impure drinking water are some of them. A program which focuses on correcting micronutrient deficiencies alone will not fully eradicate malnutrition until these other causes are addressed. However, as the *Moringa* project in south-western Senegal has demonstrated, this approach can show very impressive results in reducing the incidence of malnutrition.<sup>[33]</sup> *Moringa* is used successfully in combating malnourishment in children and for its capacity to boost the immune system, it can be used to complement modern medicines in chronically ill people including those suffering from AIDS and HIV related illnesses. It is also used in traditional medicine for the treatment of various illnesses including recovery from liver damage. It is currently being examined as a bio-enhancer of drugs and nutrients because of its production of compounds with antibiotic activity.<sup>[11,32]</sup>

These qualities have made the *Moringa oleifera* tree a candidate in the fight against malnutrition. A group of health workers from the Church World Service have been utilizing this highly nutritious and fast growing tree as a means to cure and prevent malnutrition in infants, pregnant and lactating women as an alternative to the classic and expensive condiments usually used such as whole milk powder, sugar, vegetable oil, and sometimes peanut butter. It takes around ten days to see an improvement in malnourished infants when *Moringa* leaves are used whereas it takes months for recovery with conventional methods. According to Dr. Lowell



Fuglie, the West Africa representative of the Church World Service who used the *Moringa* tree as a base for a nutrition program, “for a child aged 1-3, a 100 g serving of fresh cooked leaves would provide all his daily requirements of calcium, about 75% of his iron and half his protein needs, as well as important amounts of potassium, B vitamins, copper and all the essential amino acids. As little as 20 g of leaves would provide a child with all the vitamins A and C he needs”.<sup>[19,20]</sup>

According to Senegal’s National Center for Nutritional Alimentation, vitamin A supplementation can reduce the incidence of childhood illness and mortality due to measles by 50%, due to diarrhea by 40% and due to malaria by 30%.<sup>[34]</sup> On average, vitamin A supplementation programs have been effective in reducing overall childhood mortality by 34%.<sup>[35]</sup> To combat VAD, UNICEF is working in collaboration with national health authorities in many countries through a program to give every under-five child one massive dose of vitamin A, in tablet form, twice annually. At the same time iron supplements are being distributed to pregnant and lactating women against anemia. Given the impressive impact on child mortality rates these vitamin A programs have had, they would appear to be a good idea. However, an opposing argument claims that this approach, focusing on specific micro-nutrient deficiencies and relying as it does on imported products and subsidies, is short-sighted and ultimately unsustainable.<sup>[36]</sup>

### **The advantages of using *Moringa* in malnutrition prevention programs**

It is a drought-resistant and fast growing tree which is present in nearly all tropical and sub-tropical countries. Its edible leaves are already an occasional food source in West Africa regions and appear at the end of the dry season: a time when other greens are in short supply. As a source of good nutrition, its leaves are considered the best of tropical legumes with its high quantities of vitamin A and significant quantities of vitamin C, calcium, iron, protein, potassium, magnesium, selenium, zinc and a good balance of all the essential amino acids. Also, the leaves can be easily dried into powder form for use as a nutritional supplement for sauces or as an addition to infant weaning foods. *Moringa* leaves can be produced intensively in a family-size small garden. The seeds can be spaced as closely as 10 cm apart. When the plants reach a height of a meter, they can be cut down to a height of 30 cm. The leaves can be stripped from the stems and used to prepared sauces or dried for long-term storage as a nutritious food additive, and the stems fed to livestock. The stumps survive the harvest and will re-sprout, allowing another harvest in as little as 50 days. Using this technique, a *Moringa* garden can continually produce green matter for several years with very little labor required.<sup>[19,20]</sup>

### **Pregnant/breast-feeding women and *Moringa***

For pregnant and breast-feeding women, *Moringa* leaves and pods can do much to preserve the mother’s health and

pass on strength to the fetus or nursing child. Breastfeeding mothers in India and the Philippines have traditionally been urged by their elders to add boiled young leaves of *Moringa* to their diet. Although the exact mechanism for this is not yet fully understood, generations of breastfeeding mothers have sworn by its lactation-inducing effects. One 100 g portion of leaves could provide a woman with over one-third of her daily need of calcium and give her important quantities of iron, protein, copper, sulfur and B-vitamins. *Moringa* is especially useful for children and women who are anemic due to their menstrual cycles.<sup>[16,17]</sup>

### **Antioxidants in *Moringa***

A combination of antioxidants is more effective than a single antioxidant on an equal weight basis due to antioxidant cascade mechanism. *Moringa* has approximately 46 antioxidants and is one of the most powerful sources of natural anti-oxidants. Daily intake of *Moringa Oleifera* will provide the antioxidant which in turn keeps the body healthy by preventing the adverse effect caused due to fat deposition. Anti-oxidants supply the free atoms needed by the human body and mitigate the effect of free radicals. This antioxidant property helps in preventing the formation of malignancy. *Moringa* leaves are rich in Flavonoids, a class of anti-oxidants. *Moringa* has essential micronutrients with antioxidant activity or directly linked to this process: selenium and zinc. The major anti-oxidants present are Quercetin, Kaempferol, Beta-Sitosterol, Caffeoylquinic acid and Zeatin. Antioxidant plays a major role in controlling the symptoms of aging process and improves the cardiovascular health. Additionally, Vitamin C and Vitamin E, present in *Moringa*, also function as anti-oxidants. Researches confirm that the anti-oxidants deliver the desired result, if only taken with the combination of other essential vitamin and minerals, which makes health enthusiast to seek after *Moringa*.<sup>[11,19,20,37]</sup>

### ***Moringa* and diabetes**

*Moringa Oleifera* is a nutrient plant that can help to maintain normal blood sugar levels. *Moringa Oleifera* holds so much promise for those who suffer from diabetes. This is primarily because of its many amazing, natural benefits. *Moringa Oleifera* has been shown to boost the immune system, which usually becomes compromised in those who suffer from type 1 and 2 diabetes. *Moringa Oleifera* has also been shown to possess many key anti-inflammatory benefits; diabetes often causes circulatory problems which can be managed through anti-inflammatory supplements. There are no negative side effects associated with *Moringa Oleifera* use, meaning that it is a safe, natural way for people to manage their blood sugar and care for their diabetes symptoms. It is just one more option for the many people who have to cope with this serious condition.<sup>[38]</sup> Unexpected benefits of *Moringa* include an apparent cure for tapeworms and help in controlling diabetes and high blood pressure.<sup>[39]</sup> *Moringa Oleifera* as a rich source of ascorbic acid helps in insulin

secretion. It is interesting to note that certain nutrients like vitamins B1, B2, B12, pantothenic acid, vitamin C, protein and potassium along with small frequent meals containing some carbohydrate can actually stimulate production of insulin within the body. Please consult to your doctor first before you begin to consume it.<sup>[40,41]</sup>

### **Other health benefits of *Moringa***

#### **Relieves arthritis, rheumatism and gout**

The oil extracted from *Moringa* seeds and flowers, called *Moringa* oil or ben oil, has anti-inflammatory compounds<sup>[42,43]</sup> that help relieve the pain and swelling caused by arthritis, rheumatism and gout. Just apply the oil over the affected joint, massage lightly, and leave on for 30 minutes. Making a decoction from *Moringa* seeds will also have a similar effect. You can also roast the seeds, pound them and apply the pulverized powder over the affected area. Pounded *Moringa* roots can also be used as a poultice for pain and swelling.

#### **Relaxes the muscles and cures diarrhea**

The roots and leaves of *Moringa* have been found to contain antispasmodic compounds that help relax the muscles.<sup>[42-45]</sup> Besides helping soothe tired and painful muscles, this action also helps control the intestinal spasms characteristic of diarrhea. Studies have shown that *Moringa* root extract contains alkaloids, flavonoids and tannins that have anti-dysenteric and anti-diarrheal properties.

#### **Helps with lower back pain**

When mixed with milk, the juice from the root of the *Moringa* tree has been used traditionally to help ease lower back pain or lumbago. Studies have shown that certain extracts of the *Moringa* root contains analgesics called moringine and moringinine that may play a role in its efficacy against lumbago.<sup>[42,43]</sup>

#### **Protects the liver**

The flowers and roots of the *Moringa* plant contain a compound called quercetin that is known to protect the liver. Decoctions from dried *Moringa* flowers and pounded root have been traditionally used to help with liver disease.<sup>[42,43]</sup>

#### **Wards off heart disease**

Juice or tea made from *Moringa* leaves has been found to help lower high blood pressure. This has been discovered to be due to the action of compounds called glycosides that are found in the *Moringa* leaf. The seeds of *Moringa* are also rich in these compounds. The crude extract of *Moringa* leaves has also been found to significantly lower cholesterol levels due to the action of beta-sitosterol. The fruit of the *Moringa* is the most powerful when it comes to protecting the heart it has been found to lower blood cholesterol as well as reduce fat in the liver, heart and aorta.<sup>[42,43]</sup>

#### **As an antibiotic**

The roots and flowers of the *Moringa* have a compound

called pterygospermin, a powerful antimicrobial that kills bacteria and fungi. The leaves and roots of *Moringa* are also rich in a compound called benzyl isothiocyanate that have strong antifungal and antibacterial properties. The bark of *Moringa* has also been found to have antibacterial and antifungal effects. You can make a strong antibiotic wash to clean wounds from fresh *Moringa* leaves. To make a strong dressing, pound fresh leaves and mix with coconut oil, then spread over the wound.<sup>[42,43,46,47]</sup>

#### **Relieves sore throat**

Because of the *Moringa*'s excellent antibiotic properties, it is also used to kill bacteria that cause sore throat. A decoction of roots is usually used as a gargle to provide sore throat relief.<sup>[29,30]</sup>

#### **Eases asthma and hiccups**

When mixed with milk, juice from the root of the *Moringa* plant can help ease asthma and hiccups.<sup>[29,30]</sup>

#### **Wards off cancer**

Studies have shown that several compounds extracted from *Moringa*, namely isothiocyanates, a benzyl carbamate, niazimicin, and beta-sitosterol have anti-tumor properties against lung, breast, skin, esophagus, and pancreatic cancer. These compounds are found in high concentrations in the leaves and seeds of the plant.<sup>[29,30]</sup>

## **Conclusion**

The *Moringa Oleifera* plant is the most inexpensive and credible alternative to providing good nutrition. *Moringa oleifera* is the most nutrient-rich plant yet discovered. Not only is the *Moringa oleifera* tree extraordinary in that all parts of the tree are edible, but the most amazing aspect of the tree is its exceptionally high nutritional value. *Moringa* provides a rich and rare combination of nutrients, amino acids, antioxidants, anti-aging and -inflammatory properties used for nutrition and healing. The leaves of the *Moringa* tree are an excellent source of vitamin A (four times the amount in carrots), the raw leaves are rich in vitamin C (seven times the amount in oranges), and they are also a good source of vitamin B and other minerals. The leaves are also an outstanding source of calcium (four times the amount in milk), protein (twice the amount in milk), and potassium (three time the amount in bananas). The content of iron is very good as well and the leaves have purportedly been used for treating anemia in the Philippines. The content of amino acids such as methionine and cystine is also high. Carbohydrates, fats and phosphorous content are low making this one of the finest plant foods to be found.

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