Moringa Oleifera

Moringa, the plant is being used around the world by many cultures for a variety of ailments. It is time now to explore and explain in more detail some of the known and lesser known facts about its medicinal properties, active compounds, and their effects on humans and animals. Let me start with a short introduction on medicinal plants and their importance in human health.

Herbal (plants) medicine is the most ancient form of healthcare known to humankind. Plants as medicines are mentioned in historic documents dating back many thousands of years. Since prehistoric times and continuing to our modern days, people from all over the world have grown or collected plants for the prevention and treatment of diseases. Moringa Oleifera is one of the best examples. People have long known that botanical medicine provided a complete, safe system of healing and prevention of diseases.

The Main Nutritive Groups and Valuable Dietary Compounds in Moringa

1. Protein constituents or amino acids (the building blocks of protein). There are 20 amino acids necessary, and found in human proteins, of which 9 are essential. All 9 are found in Moringa
2. Carbohydrates (several of the ·ggood·h type, including fibers; about 3-13% in leaves).
3. Minerals as microelements such as calcium, magnesium, potassium, phosphorus, sulfur.
4. Minerals as necessary microelements: iron, zinc, copper, manganese.
5. Fats, as vegetable oils: fatty acids, beneficial omega-6 oils and liposoluble vitamins.
6. Vitamins, many of which with antioxidant properties: vitamin C, E, F, K, provitamin A(beta-carotene), complex of vitamins B, B1, B2, B3, choline, others.
7. Chlorophyll, the green pigment of plants (includes magnesium in its molecule).
8. Other plant pigments, some with antioxidant properties: lutein, carotenoids.
9. Plant hormones with anti-aging properties in humans: cytokinins such as zeatin.
10. Plant specific (phytochemicals) antioxidants: quercetin, kaempferol and others.
11. Plant specific sterols: beta-sitosterol.

Amino Acids in Moringa

Plants are an important source of proteins, but most plants actually supply the units making up the proteins – the amino acids. As you know, proteins together with lipids and carbohydrates are the three basic groups of biochemical substances of which plant and animal organisms are made. Again, amino acids are the building blocks or monomers of the proteins (which are long chains of amino acids linked together).

How Much Protein Do We Need?

Nutrition experts recommend that proteins (or amino acids) should account for 10-15% of the calories in a balanced diet, although requirements for protein are affected by age, health, weight, and other factors. Generally, a normal adult requires approximately 0.36 grams of protein per pound of body weight, or 0.8 grams per kg weight. That makes a total of 50-80 grams daily. Athletes have higher amino acid (protein) requirements, and babies need much more protein per body weight than do adults.

Proteins are digested by the gastro-intestinal system and then cut into smaller, simpler units (amino acids) that can be absorbed through the walls of the intestines and used by the body. After absorption, the liver and various tissues will make their own, specifically needed proteins. Thousands and thousands of complicated proteins make up the structure of cell walls, and the soluble particles in blood or less soluble structures of bone and skin. Proteins interact with each other and specifically recognize each other in order to perform all our physiological functions. Life can be seen as a complicated and beautiful ·gdance of proteins·h! since proteins and other nitrogen-containing substances are continuously degraded and rebuilt, they must be replaced by a continuous supply of amino acids from the diet.

There are 20 amino acids present in the human body·fs structures. (Actually, in nature there are more amino acids). Of those, 9 are known to be ESSENTIAL; they have to be supplied by the diet since the human body cannot synthesize them, as it does with the other 11 amino acids. Few foods, like Moringa, are known to contain all essential amino acid, hence, the importance of a complex, rich diet. The 9 essential amino acids are: histidine, isoleucine, leucine, lycine, methonine, phenylalanine, threonine, tryptophan and valine. Histidine is considered essential for children and babies, not for adult. Strict vegetarians should ensure that their diet contains sufficient amounts of all these amino acids.

Moringa is one of the very few plants that contain all the essential amino acids, although two of them, lysine and tryptophan, are poorly represented in most plants. Moringa's essential amino acids presence and digestibility scores are more than adequate when measured against the standards of World Health Organization (WHO), Food and Agriculture Organization (FAO) and United Nations Organization (UNO) for small children, the most at-risk population group when it comes to protein in food..

Essentials Amino Acids Composition in Proteins of Moringa (leaves) and Soy (protein isolate)

Essential Amino Acid	**Soy Protein** Mg/g protein	**FAO/WHO 2-5 year old child Reference Pattern** Mg/g protein	**Moringa Oleifera Extracted Leaves** Mg/g protein
Histidine	26	19	**31**
Isoleucine	49	28	**51**
Leucine	82	66	**98**
Lysine	63	58	**66**
Methionine + Cystine	26	25	**21**
Phenylalanine + Tyrosine	90	63	**105**
Threonine	38	34	**50**
Tryptophan	13	11	**21**
Valine	50	35	**63**

Introducing The Essential Amino Acids of Moringa and Briefly Explain Their Importance for Human Health.

Histidine - Moringa leaves contain histidine, a semi-essential amino acid - adult generally produce adequate amounts but children usually may not. It is believed that histidine may increase the body’s resistance to environmental toxins and allergens (factors that trigger allergies in susceptible persons). Since histidine found abundantly in hemoglobin - the respiratory pigment protein needed for oxygen transportation to every cell – histidine aids in the prevention of anemia.

Histidine is also a mild vasodilator and helps increase blood circulation. According to some research, people with rheumatoid arthritis have low levels of histidine; therefore it has been used in the treatment of rheumatoid arthritis. A deficiency of histidine can also cause poor of hearing. Since histidine is found in numerous proteins, its presence is needed for normal general physiology.

Isoleucine - Moringa contains isoleucine in large amounts. Its main role in the body is related to its incorporation into many proteins and enzymes. This is one of the essential amino acids needed for hemoglobin formation, as is histidine. Therefore, its presence is useful for the prevention or treatment of anemia. Isoleucine plays a role in optimal growth during childhood;babies and children need much more isoleucine per body weight than adults! It also maintains normal blood sugar and energy levels and therefore it is particularly important for diabetics. Isoleucine is metabolized in muscle tissue and can

enhance energy levels and increase endurance. Athletes and everyone exercising regularly need extra isoleucine.

Leucine - This is another essential amino acid related to isoleucine and valine, all vital for normal growth in children. Moringa contains large amounts of leucine as well. These three amino acids work together to protect muscles, build muscles, and enhance energy levels and stamina. They also promote bone, skin and muscle tissue healing and therefore are recommended for those recovering from injuries, stress or surgery.Leucine may help to lower elevated blood sugar levels, which is important for diabetics. For normal growth, small children and babies need much more leucine per body weight than adults. Leucine also aids in increasing growth hormone production.

Lysine - Lysine is required for normal growth and development in children, who need vast amounts of this amino acids. Although plant sources are usually poor in lysine.Moringa leaves are quite rich in this essential amino acid. Lysine helps calcium absorption and bone development, and maintains proper protein balance. Lysine also aids in the production of antibodies[protective proteins of the immune system], hormones and enzymes, in skin maintenance and formation, and tissue repair .Since it helps to build muscle protein, lysine is necessary for those recovering from stress, injuries and surgery. In people with “bad” serum fats and high cholesterol, lysine lowers high serum triglyceride levels.

Another useful quality of lysine is its capacity to inhibit the multiplication of viruses, especially herpes viruses.

Methionine and Cystine - These are important sulfur-containing amino acids. Cystine is the stable form of the sulfur-containing amino acid cysteine. The body readily converts one into the other as needed, therefore the two forms can be considered as a single amino acid in metabolism. Sulfur-containing amino acids are involved in detoxification of the organism; they help to neutralize and eliminate harmful toxins and protect the body against radiation damage caused by UV rays and x-rays .They are free radical destroyers, and work best when taken with selenium and vitamin E (see "Antioxidants in Moringa"). Cystine helps to protect the river and brain from damage due to toxics such as alcohol , drugs, and environmental pollutants.

Methionine and cystine are main constituents of the proteins of fingernails, skin and hair; they promote proper elasticity and texture of the skin and hair. Ladies, real beauty comes from the inside, and sulfurcontaining amino acids must surely be ingredients of any diet that fights skin aging!

Cystine may have anti-inflammatory properties that can be helpful in the treatment of osteoarthritis and rheumatoid arthritis. Cystine and metheonine are recommended to be supplemented in the treatment of some forms of cancer. These two amino acids also promote wound healing; therefore they are helpful after surgery and burns. They are known to bind iron, aiding in iron absorption. For those interested in losing weight, it is worth mentioning that cystine also promotes the burning of fat and the building of muscle.

Phenylalanine and Tyrosine - These two essential amino acids, well represented in Moringa leaves, are particularly important for the health of the central nervous system. Once in the body, phenylalanine can be converted into tyrosine, which in turn is used to synthesize two key brain transmitters that promote alertness: dopamine and norepinephrine. These two amino acids – phenylalanine and tyrosine – can therefore elevate mood, decrease pain, help with memory and even suppress appetite.

Phenylalanine and tyrosine should be supplemented in the treatment of depression, arthritis, obesity and Parkinson’s disease. Phenylalanine is effective for controlling pain, especially the chronic pain in osteoarthritis and rheumatoids arthritis, according to some studies. Similar to other amino acids, these two are incorporated in a variety of proteins throughout the body.

Threonine - Threonine is also very well represented in Moringa, although its content is usually low in many grains and other plant protein sources. This amino acid is important for the formation of collagen and elastin, two main proteins of the skin. It also helps to protect the liver and has a lipotropic function (against fatty liver). Threonine is present in high concentrations in the heart, central nervous system and skeletal muscle. It maintains their health and normal functions. It also enhances the immune system by aiding in the production of antibodies, and promotes thymus (a gland vital for the function of the immune

system) growth and related activity. Other vital nutrients are also better absorbed when threonine is presen in the food. Some use threonine supplements in certain cases of depression. Infants need much more (8 times) threonine per body weight than adults.

Tryptophan- An essential amino acid, tryptophan is required for the production of niacin (vitamin B3) and serotonin (the neurotransmitter involved in relaxation and sleep) among others. Therefore, tryptophan helps to control depression and insomnia, stabilizes emotional moods, and it also eases perception of pain, and might combat inflammation. It also aids to control hyperactivity in children and alleviates stress. Although tryptophan is the rarest of all amino acids to be found in protein's composition, it plays an important role in reducing stress-related mood disorders, and helps relaxation and good sleep! We all need some extra tryptophan sometimes! Supplements of tryptophan are not approved in the USA, so, when needed, we have to get it from food. Moringa is an excellent plant source of tryptophan, and its concentration in the leaves exceeds the concentration in soy beans. Since some migraine sufferers have abnormally low levels of tryptophan, it is believed that tryptophan can also ease the pains as sociated with certain types of migraines.

Valine - unlike tryptophan, valine has a stimulant effect. It is needed for muscle metabolism and structure, general tissue repair and the maintenance of a high concentrations in muscles, similar to related amino acids, isoleucine and leucine. These three branched-chain amino acids can be used as an energy source by muscle tissue, thus preserving the use of glucose and supplying stamina. Studies have shown that these amino acids are useful in restoring muscle mass in people with liver disease, or after physical stress, injuries and surgery. Moringa leaves are at least as rich (if not more) as soy beans (and soy protein concentrate) in valine.

Moringa is one of the very few plant sources that contain all 9 essential amino acids.

Moringa's essential amino acids presence and digestibility are as good as soy (one of the best protein sources). Soy is often a highly processed product while Moringa is presented in its natural state.

Moringa's essential amino acids presence and digestibility are better than those required by the standards of WHO, FAO and UNO. Moringa, even in small portions, provides adequate amounts of protein nutrients for everyone, including healthy or medically compromised individuals, children, senior adults, lactose intolerant individuals, vegetarians and people with soy allergies.

Moringa is not genetically modified or altered by humans.

Moringa is considered to have the highest protein ratio of any plant so far identified!

Comparison of Various Calcium-rich Food Source	
Food (100g)	**Calcium (mg)**
Skimmed milk	120
Yogurt, low fat	180
Spinach	130
Cheese	480
Beans	60
Iceberg lettuce	90
Salmon	180
Nuts, seeds	70
Green peas	35
Moringa leaves	**440**

Moringa has a substancial content of vital macro and microelements such as calcium, iron and sulfur, all absolutely necessary for good health.

Humans do not produce minerals, therefore they all must be provided from food.

Moringa leaves contain calcium in quantities similar to cheese, and far higher than most plants.

Moringa leaves are very rich in iron in comparison with spinach and other plants.

Moringa also contains important microelements such as manganese and selenium.

Sources of Vitamin B1	
Food (100g)	**Vitamin B1 (mg)**
Asparagus (boiled)	0.12
Romaine Lettuce	0.11
Tuna (boiled)	0.32
Green peas	0.20
Broccoli (raw)	0.03
Black beans (boiled)	0.20
Carrots (raw)	0.06
Corn (boiled)	0.18
Orange	0.11
Red meat (cooked)	0.15
Soy beans (cooked)	0.12
Moringa leaves	**0.21**
Moringa leaf powder	**2.60**

Beta-Carotene Content and Corresponding Vitamin A Equivalents in Various Foods		
Food	**Beta-Carotene** mg/100g	**Vitamin A** mg/100g
Coriander leaves	7,000-8000	1,166-1300
Cabbage	1,300	218
Spinach	3,600	600
Carrot	1,300-2,600	215-430
Mango (ripe)	3000	500
Orange	200	35
Pumpkin	650-700	100-120
Moringa leaves	7,000-8,000	1,166-1,300

Vitamins are absolutely essential for growth and maintenance of a healthy life.

Most vitamins are not produced by our bodies, therefore they must be supplied by the diet.

Moringa is rich in many vitamins, particularly in vitamin C, provitamin A (beta-carotene) Vitamins B1 and E. these abundant vitamins in Moringa exceed those commonly found in most other plants.

Many of the vitamins in Moringa have powerful antioxidant and anti-aging properties.

These are some of the uses of Moringa Oleifera:
- Moringa Oleifera for Diabetes Relief
- Moringa Oleifera for Healthy Skin
- Moringa Oleifera for Nutrition
- Moringa Oleifera to improve sensory perception
- Moringa Oleifera to sleep better
- Moringa Oleifera for decreased depression and anxiety

Gram for gram, Moringa leaves contain four times the vitamin A available in carrots. Seven times the vitamin C in oranges. Four times the Calcium available in milk. Twice the protein in milk and three times the Potassium in bananas.