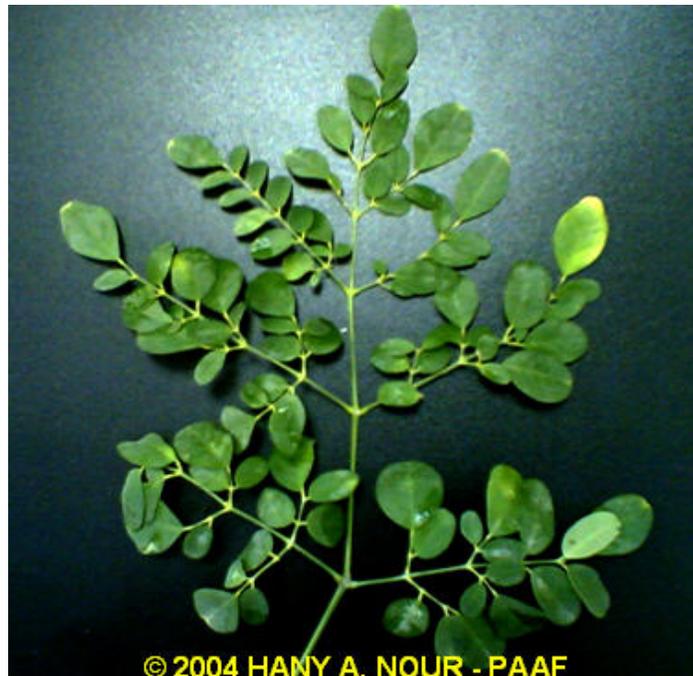
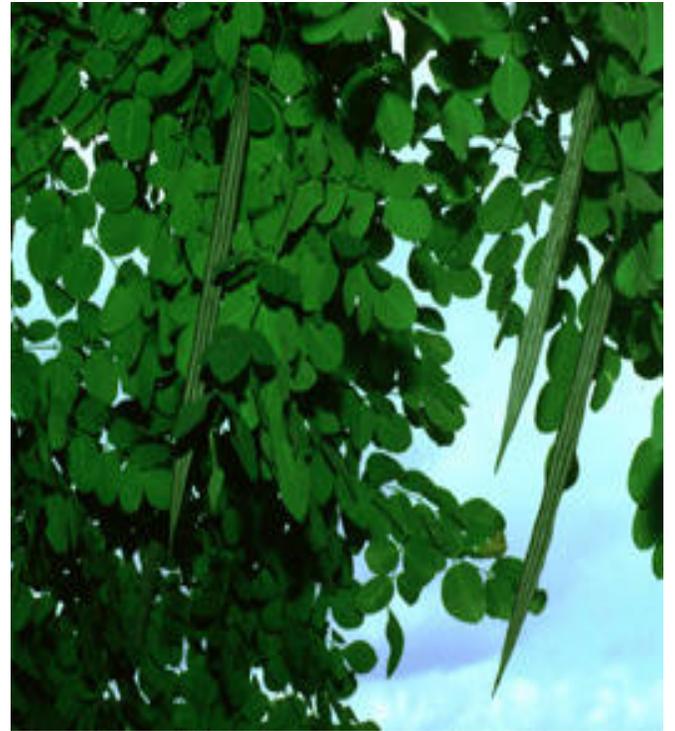
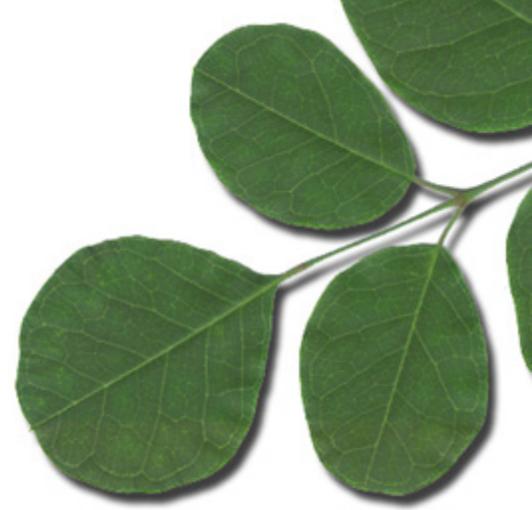


Moringa oleifera

الشجرة المعجزة The Miracle Tree

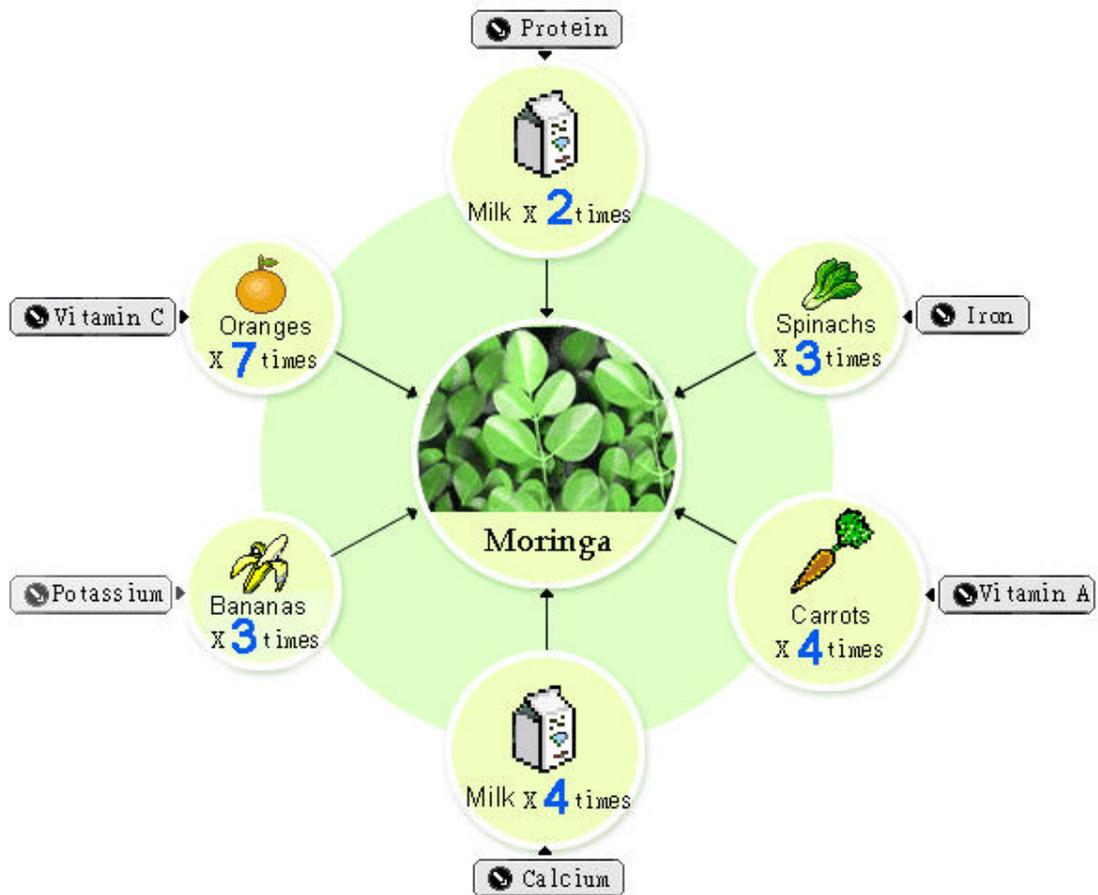


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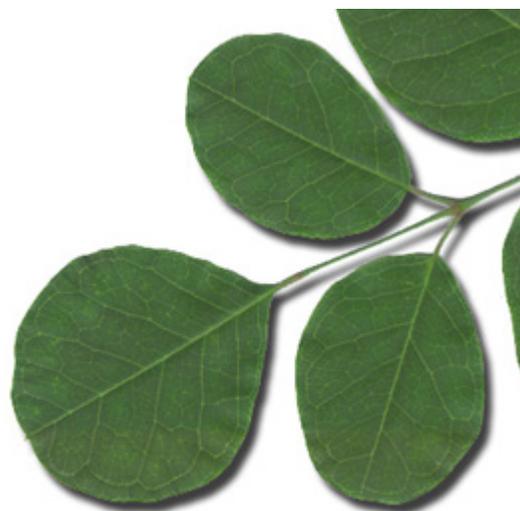


Moringa oleifera

الشجرة المعجزة The Miracle Tree



MORINGA OLEIFERA



<i>Moringaceae</i>	العائلة
<i>Moringa oleifera</i>	الاسم العلمي
Drum sticks	الاسم الإنجليزي
شجرة البان - شجرة اليسار - شجرة الحياة - أسماء لشجرة المورينجا من صنف (<i>Moringa Peregrina</i>)	الإسم العربي
أشجار سريعة النمو يصل ارتفاعها الى أكثر من عشرة ، تتكاثر بالبذرة .	طبيعة النبات
الجزور ، الثمار، الأوراق، الأزهار ، الساق.	الجزء المستعمل
الربيع ، الصيف وفق عوامل البيئة الزراعية العامة.	الأزهار
الصيف، الخريف، تبعاً للمناخ المحلي	النضج
المورينجا تنمو في الاراضي القاحلة والحارة حيث تتحمل الجفاف وتمتاز بسرعة النمو.	البيئة
قارتي آسيا وأفريقيا	موطن العائلة

:

<http://www.geocities.com/moringakw>



شجرة المورينجا تنمو فى الاراضى القاحلة والحارة حيث تتحمل الجفاف وتمتاز بسرعة النمو ، وهي تعتبر من أسرع الأشجار فى النمو حيث يصل إرتفاعها الى أكثر من مترين فى أقل من شهرين وأكثر من ثلاثة أمتار فى أقل من عشرة أشهر من زراعة البذور وقد يصل ارتفاعها الى ما بين ٩ و ١٢ مترا خلال ثلاث سنوات .

تحتوى عائلة المورينجا على ١٤ صنف من أصناف المورينجا المختلفة ، ولها عدة أسماء حول العالم ، فيما يطلق عليها في فى بعض المواقع الغربية اسم شجرة الحياه أو الشجرة المعجزة لأنها تحمل جوانب انسانية عديدة للفقراء لما يمكن أن تمثله من مصدر غذائي كامل لهم ولاسيما أنها تنمو برياً وتنتشر فى بلاد عديدة من قارتى آسيا وأفريقيا.

أن أوراق شجرة البان تحتوى على ٣٠ مللي جراما من الكالسيوم وهو ما يوازى محتوى أربعة أمثال الحليب ومن البوتاسيوم ما يوازى ثلاثة أضعاف محتواه فى الموز. وقال ان هذه الاوراق تحتوى على فيتامين (ج) ما يوازى محتواه فى سبعة مرات من عصير البرتقال وفيتامين (أ) ما يوازى أربعة أضعاف محتواه فى الجزر ومن الحديد ما يوازى ثلاثة أضعاف محتواه فى السبانخ ومن البروتين ما يعادل مرتين فى الحليب أو ما يعادل بيضة.

يطلق على شجرة المورينجا من صنف (Moringa Peregrina) شجرة البان وقد تغنى بها الشعراء ونالت إهتمام العديد من الباحثين .

البان شجرة لها فوائد عديدة قيمتها الغذائية مازال العلماء يعملون على اكتشافها، وشجرة البان يطلق عليها بالعربية اسم اليسر أو الحبة الغالية أو شجرة الفقراء.

و أن زيت هذه الشجرة يفوق فى قيمته الغذائية زيت الزيتون . ان هذه الشجرة تساعد على علاج أنيميا الدم وأمراض القلب والمخ والاعصاب والسرطان والسكر الى جانب مفعوله فى الوقاية من الاصابة بفقدان البصر الناتج من نقص فيتامين (أ) فيما أجمع عدد من الاطباء على القيمة الفعالة للشجرة فى علاج أمراض التهاب المثانة والبروستاتا والسيلان والزهرى والحمى الصفراء و الروماتيزم، ويجري العمل حاليا على التوسع بزراعتها فى الكويت و عدة مناطق أخرى من العالم.

- و قد قمت بتوثيق زراعة أشجار المورينجا من صنف (*Moringa oleifera*) سنة ١٩٩٥ وذلك فى مشاتل الهيئة العامة لشئون الزراعة والثروة السمكية ، ويجرى العمل الآن لإكثار أشجار المورينجا ودراسة تحملها ومدى ملاءمتها للزراعة كشجرة حرجية للزراعة فى مختلف أنواع الأراضي وكذلك دراسة فوائدها الطبية والإقتصادية .



Moringa oleifera



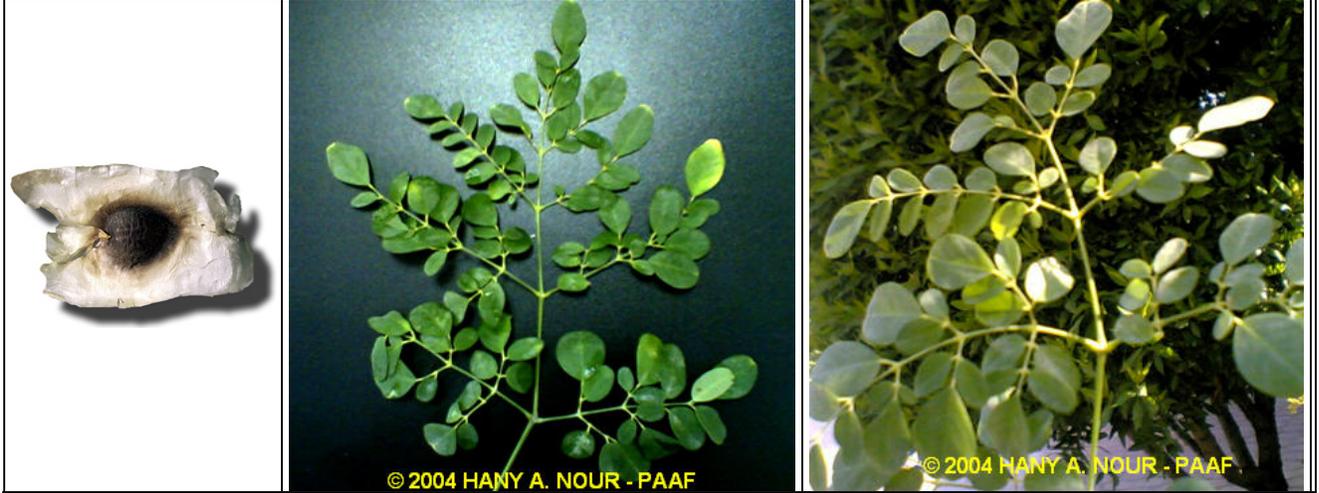
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DRUM)

. (STICK

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وتتعدد إستعمالاتها فى كافة المجالات الهامة ومنها :-

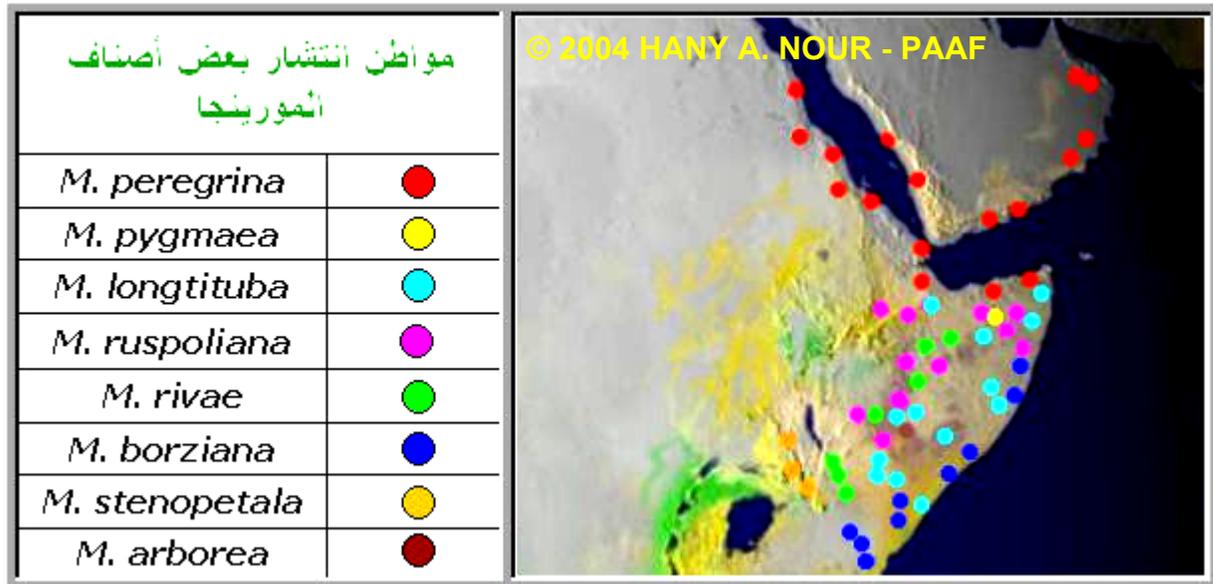
- الغذاء .
- صناعة الأدوية الطبية .
- استخراج الزيوت ذات الجودة العالية .
- صناعة الأخشاب .
- صناعة الأوراق .
- زراعة الغابات .
- تنقية الماء من البكتيريا والفيروسات.

Moringaceae

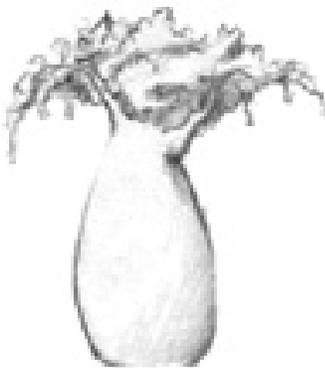


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. (*M. Peregrina*)

الموطن	الاسم العلمي	الشكل العام
	Bottle trees	الأشجار الممتلئة
	<i>M. drouhardii</i>	
	<i>M. hildebrandtii</i>	
	<i>M. ovalifolia</i>	
	<i>M. stenopetala</i>	
	Slender trees	الأشجار الرفيعة
	<i>M. concanensis</i>	
	<i>M. oleifera</i>	
	<i>M. peregrina</i>	
Trees, shrubs, and herbs of NE Africa		
	<i>M. arborea</i>	
	<i>M. borziana</i>	
	<i>M. longituba</i>	
	<i>M. pygmaea</i>	
	<i>M. rivae</i>	
	<i>M. ruspoliana</i>	

إستخدام البان فى الطب القديم .

- يقول ابن سينا فى البان: "ان حبه اكبر من الحمص، مائل إلى البياض وانه منق خصوصاً لبه، ويفتح مع الخل والماء السدد فى الاحشاء، وينفع بالخل الجرب".

- يقول داود الانطاكي فى البان: "انه شجر مشهور كثير الوجود، له زهر ناعم الملمس، مفروش، يخلف قرونا داخلها حب يميل إلى البياض كالفستق، ينكسر عن حب عطري إلى صفرة ومرارة، يدخل فى الغوالي والاطياب، واهل مصر تشرب من زهر هذه الشجرة زاعمين التبريد به، وجميع اجزاء هذا النبات تمنع الاورام والنوازل، وتطيب العرق، وتشد البدن، وتدمل الجراح، ودهنه ينفع من الجرب، والحكة والكلف والنمش وينقي الاحشاء بالغاً مع الماء والعسل والخل، ويذهب الطحال مطلقاً، وكذا حبه طلاء، وبالبول يقلع البثور ويدمل ويصلح البواسير، وإذا قطر فى الاحليل ادر البول سريعاً". ويضيف الانطاكي: "ان دهن البان قوي الفعل فى اصلاح النزلات وكل بارد كالفالج، ويقوي المعدة والكبد، وان فتق بالعنبر طيب الجسد وهيج الانعاض، ويحلل الاورام، وينفع من النسيان سعوطاً، والشقيقة دهناً، وقيل انه يضر الكلى ويصلحه اليانسون، كما ان حب البان يدخل فى عمل بعض الوصفات المستخدمة فى علاج البهاق الأسود".

- اما ابن هاشم فيقول فى كتابه "فاكهة السبيل" فى البان: "انه يفيد فى علاج العقم عند النساء، وذلك بان تتحمل المرأة بدهنه مع المصطكى والزعفران. كما يفيد ايضاً فى علاج استرخاء الذكر وذلك بان يدهن الذكر بدهان البان".

- يقول المظفر عن البان "انه شجر ينمو ويطول كالاثل، وإذا ارادوا استخراج الدهن رد على الصلابة حتى ينزل قشره ثم يطحن ويعصر. وهو كثير الدهن الذي يستعمل فى العطور والطيوب المرتفعة، اما ثقله الذي يبقى بعد استخراج دهنه فينفع من الكلف والنمش والبرش الذي فى الوجه من الجرب والحكة، واجوده الحب الكبير العطر وهو يزيل الثآليل من الوجه وينفع الاورام الصلبة إذا جعل فى المرهم، كما يزيل صلابة الكبد والطحال إذا شرب من حبة بخل أحمر".

أما الاستعمالات الحديثة لنبات البان فهي: يستعمل على نطاق واسع فى استخراج زيت البان الذي يستعمل كمثبت للعطور، كما يدخل فى صناعة مواد التجميل وزيتوت تصفيف الشعر. كما يستعمل فى اعراض غذائية وفى الاضاعة، اما الكسب المتخلف من البذور بعد عصرها فيستخدم كسماد جيد، كما ان اوراق النبات

الغضة وازهاره وثماره تستخدم كغذاء ودواء للإنسان، وعصيرية الاوراق قاتل للبكتيريا، تؤكل الاوراق لعلاج الاسقربوط والتهاب القناة التنفسية المصحوب بأفرازات عصير.

وعصير الاوراق ايضاً مقيء في حدود خمسة جرامات، كما يعطى للاطفال مع الملح لعلاج انتفاخ المعدة بالغازات، قشور النبات تستخدم ضد لدغ العقرب.

قشر الجذور يستخدم كمدر للبول كما يستخدم مسحوق القشور كسعوط في حالة وجع الرأس.

وان عجينة الجذور الطازجة مخلوطة بالملح تستخدم لعلاج الالتهابات والاورام والمفاصل المصابة بالروماتيزم والاجزاء المصابة بالشلل.

يقال ان مغلي الازهار مع اللبن منشطة وعصارة الازهار باللبن مدرة للبول مانعة لتكوين الحصى وقاتلة للديدان وهاضمة، اما البذور فهي منشطة.

م/ هاني أحمد نور الدين

MORINGA OLEIFERA

NUTRITIONAL VALUE OF LEAVES AND PODS

From the report on "Analysis of Leaf Powder for Nutritional Composition, July 17, 1998 by Campden and Chorleywood Food Research Association in conjunction with the Department of Engineering at the University of Leicester and Church World Service, affiliate of the National Council of Churches

Analysis of Moringa pods, fresh (raw) leaves and dried leaf powder have shown them to contain the following per 100 grams of edible portion.

	Pods	Leaves	Leaf Powder
Moisture (%)	86.9	75.0	7.5
Calories	26.0	92.0	205.0
Protein (g)	2.5	6.7	27.1
Fat (g)	0.1	1.7	2.3
Carbohydrate (g)	3.7	13.4	38.2
Fiber (g)	4.8	0.9	19.2
Minerals (g)	2.0	2.3	-
Ca (mg)	30.0	440.0	2,003.0
Mg (mg)	24.0	24.0	368.0
P (mg)	110.0	70.0	204.0
K (mg)	259.0	259.0	1,324.0
Cu (mg)	3.1	1.1	0.6
Fe (mg)	5.3	7	28.2
S (mg)	137.0	137.0	870.0
Oxalic acid (mg)	10.0	101.0	0.0
Vitamin A - B carotene (mg)	0.1	6.8	16.3
Vitamin B -choline (mg)	423.0	423.0	-
Vitamin B1 -thiamin (mg)	0.05	0.21	2.6
Vitamin B2 -riboflavin (mg)	0.07	0.05	20.5
Vitamin B3 -nicotinic acid (mg)	0.2	0.8	8.2

Vitamin C -ascorbic acid (mg)	120	220.0	17.3
Vitamin E -tocopherol acetate (mg)	-	-	113.0
Arginine (g/16g N)	3.6	6.0	0.0
Histidine (g/16g N)	1.1	2.1	0.0
Lysine (g/16g N)	1.5	4.3	0.0
Tryptophan (g/16g N)	0.8	1.9	0.0
Phenylalanine (g/16g N)	4.3	6.4	0.0
Methionine (g/16g N)	1.4	2.0	0.0
Threonine (g/16g N)	3.9	4.9	0.0
Leucine (g/16g N)	6.5	9.3	0.0
Isoleucine (g/16g N)	4.4	6.3	0.0
Valine (g/16g N)	5.4	7.1	0.0

Many of the above vitamins, minerals and amino acids are very important for a healthy diet. An individual needs sufficient levels of certain vitamins, minerals, proteins and other nutrients for his physical development and well-being. A deficiency of any one of these nutrients can lead to health problems. Some of the problems caused by deficient diets are well known: scurvy, caused by lack of vitamin C; night blindness, caused by lack of vitamin A; kwashiorkor, caused by lack of protein; anemia, caused by lack of iron. Many other health problems are caused by lack of vitamins or minerals which are less known, but still essential to a person's bodily functions.

Actual need for different vitamins, etc., will vary depending on an individual's metabolism, age, sex, occupation and where he/she is living. Recommendations for daily allowances (RDA) also vary according to whom is doing the study. WHO/FAO recommend the following daily allowances for a child aged 1-3 and a woman during lactation:7

VITAMINS

(RDA, in milligrams):		Child	Woman
A	Beta-carotene	1.5	5.7
B1	Thiamin	0.5	1.6
B2	Riboflavin	0.8	1.8
B3	Niacin	9	20
C	Ascorbic acid	20	95
PROTEIN (grams):		16	65

MINERALS

(RDA, in milligrams)			
Ca	Calcium	400	1,200
Cu	Copper	0.8	2
Fe	Iron	10	15
K	Potassium	800	3,000
Mg	Magnesium	150	340
P	Phosphorus	800	1,200

The following lists the composition of Moringa pods, fresh leaves and leaf powder and what this represents in terms of recommended daily intake for children aged 1-3 and women during lactation. The listing of pod and fresh leaf content is for each 100 grams of edible portion. However, the CWS/AGADA project recommended use of dried leaf powder as a nutritional additive to sauces and infant formulas, whereby one or more spoonfuls of powder would be stirred into the sauce or formula before serving. One rounded soup spoon (tablespoon) contains about 8 grams of powder (100 grams of powder is a bit less than one and a half cups American measure). As such, the listings of leaf powder content are per heaped soup spoon.⁸

As an example, 100 grams of the edible part of pods will contain 2.5 grams of protein. 100 grams of fresh leaves will contain 6.7 grams of protein and one heaped soup spoon of leaf powder will contain 2.2 grams. It is recommended that during the months a woman is pregnant or breast-feeding she should be consuming 65 grams of protein daily. So, a meal of 100 grams Moringa pod will satisfy 3.8% of her protein needs and a meal of 100 grams fresh Moringa leaves

will satisfy 10.3% of her protein needs for that day. Each rounded soup spoon of leaf powder added to her diet will satisfy 3.3% of her protein needs.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)	PROTEIN (g)	2.5	6.7	2.2
	RDA							
Child aged 1-3:	16	15.60%	41.9%	13.60%				
Lactating woman:	65	3.80%	10.30%	3.30%				

Proteins are essential constituents of all body tissues and help the body produce new tissue, so are extremely important during growth and pregnancy and when recovering from wounds. Deficiency can cause growth retardation, muscle wasting, kwashiorkor and edema (abnormal swelling; collection of fluids in the body). Synthesis of protein by the body requires intake of vitamin A. Fresh Moringa leaves contain more than twice the amount of protein found in spinach (2.8g/100g).

	PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
CARBOHYDRATES (g)	3.7	13.4	3.1

Carbohydrates are compounds which provide heat and energy for all forms of body activity. Deficiency can cause the body to divert proteins and body fat to produce needed energy. This can lead to depletion of body tissue.

	PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
FIBER (g)	4.8	0.9	1.5

An important part of any diet, fiber aids in digestion. Recommendations are that an average adult should consume 18-32 grams of fiber daily.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
CALCIUM Ca (mg):		30	440	160.2
	RDA			
Child aged 1-3	400	7.5%	110%	40%
Lactating woman:	1200	2.5%	36.7%	13.4%

Calcium builds healthy bones and teeth and assists in blood-clotting. Calcium intake is very important during the childhood growing years. Deficiencies can cause rickets, bone pain and muscle weakness. Women frequently suffer from calcium deficiencies during pregnancy and breast-feeding periods. Fresh Moringa leaves contain almost four times the amount of calcium found in cow's milk (120mg/100g) and more than double the amount found in spinach (170mg/100g).

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
MAGNESIUM Mg (mg)		24	24	29.4
	<u>RDA</u>			
Child aged 1-3:	150	16.0%	16.0%	20.6%
Lactating woman:	340	7.1%	7.1%	8.7%

Magnesium helps the body maintain and repair cells, and provides energy. Deficiencies can result in weakness, tiredness, vertigo, convulsions, nervousness, cramps and heart palpitations.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
PHOSPHORUS		110	70	16.3
	<u>RDA</u>			
Child aged 1-3:	800	13.8%	8.7%	2.0%
Lactating woman:	1200	9.2%	5.8%	1.4%

Phosphorus provides energy and helps build the structure of bones and teeth. Deficiency can lead to loss of appetite, weakness, bone pain and mental confusion. However, phosphorus is present in many foods so deficiencies are rare.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
POTASSIUM K (mg)		259	259	106
	<u>RDA</u>			
Child aged 1-3	800	32.4%	32.4%	13.2%
Lactating woman:	3000	8.6%	8.6%	3.5%

Potassium helps the body maintain normal water balance in cells, transmit nerve impulses, keep acids and alkalis in balance, and stimulate normal movement of the intestinal tract. Deficiencies can cause vomiting, acute muscle weakness, loss of appetite and coma.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
COPPER Cu (mg)		3.1	1.1	0.04
	<u>RDA</u>			
Child aged 1-3	0.8	388%	138%	5.7%
Lactating woman:	2	155%	55%	2.3%

Copper is a co-factor in many enzymes, including those which provide hair and skin color, help skin to heal, provide protection from infections, and form healthy blood and bones. Copper, along with iron, is necessary to promote recovery from anemia among malnourished children. Deficiencies in babies can cause depigmentation of skin and hair, slow growth and diarrhea. In adults it can result in anemia, irritability, brittle bones, loss of hair color and loss of sense of taste.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
IRON Fe (mg)		5.3	7.0	2.3
	<u>RDA</u>			
Child aged 1-3	10	53.0%	70.0%	22.6%
Lactating woman:	15	35.3%	46.7%	

Iron is a vital component of red blood cells which carry oxygen. Iron assists the muscles to keep reservoirs of oxygen and makes the body more resistant to infections. Iron deficiency can cause anemia, tiredness, headaches, insomnia and palpitations. In children, deficiency can cause slow growth and impaired mental performance. Fresh Moringa leaves contain over three times the amount of iron found in spinach (2.1mg/100g).

	PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
SULFUR S (mg)	137	137	

Sulfur is a constituent of all proteins and an essential element for all life. In the body, the sulfur content is mostly found in the skin, joints, nails and hair. The more sulfur content in the hair, the curlier it will be (sheep hair is about 5% sulfur). Although involved in many metabolic processes, there is generally not a recommended dietary requirement for sulfur because the body can extract it from the amino acids cysteine and methionine.

	PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
OXALIC ACID (mg)	10	101	1.60 % *

An acid also found in strawberries, rhubarb and spinach, oxalic acid can combine with calcium and iron in the body to form insoluble compounds which the body cannot absorb. However, only large amounts of oxalic acid consumption are liable to cause calcium and iron deficiencies.

(*Oxalic acid content in leaf powder is listed as a percentage).

	PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
VITAMIN A -Beta carotene (mg)	0.11	6.8	1.3
	<u>RDA</u>		
Child aged 1-3	1.5	7.3%	453%
Lactating woman:	5.7	1.9%	119%
			22.9%

Vitamin A in the form of retinol is found mainly in meat, eggs and dairy products. Beta carotene is the precursor to vitamin A which can be found in many plants,

particularly those with yellow, red or dark green coloring. However, since absorption of B-carotene by the intestines is not very efficient, it is estimated that six milligrams of B-carotene are needed to give the dietary equivalent of one milligram retinol.

Vitamin A is important for developing good eyesight, healthy skin and hair, strong immunity and resistance to infection, strong bones, good growth and helps prevent anemia. Deficiency can cause intestinal and respiratory infection, poor hair quality, eyeball pain, poor eyesight, night blindness and xerophthalmia (a dry, thickened, lusterless eye condition) which can damage the cornea and lead to blindness. It is estimated that this causes 500,000 new cases of blindness a year in children in south-east Asia. Children who lack vitamin A are more likely to get respiratory, intestinal and other infections and are more prone to die from them.

Vitamin A is not destroyed by most methods of cooking. Some losses can occur at high temperatures, such as when leaves are fried in oil. Sunlight will also destroy vitamin A, so significant losses can occur if leaves are exposed to sunlight during the drying process. Carotene may cause some yellowing of the skin if taken in excess, but it is not harmful.

The vitamin A content of fresh Moringa leaves cited above is a very conservative estimate. Other researchers have found fresh leaves to contain as much as 9mg vitamin A per 100g.⁹ Nonetheless, even the conservative figure means that fresh Moringa leaves contain almost three times the Beta-carotene content of spinach (3.5mg/100g).

	PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
VITAMIN B -Choline (mg)	423	423	-

Choline helps with metabolism and fat-stabilization. Deficiency can cause nerve degeneration, senility, high blood pressure, reduced resistance to infections, strokes and thrombosis (presence or formation of blood clots).

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
VITAMIN B₁ -Thiamin (mg)		0.05	0.21	-
	<u>RDA</u>			
Child aged 1-3	0.5	10.0%	42.0%	-
Lactating woman:	1.6	3.1%	13.1%	-

Vitamin B₁ helps the body convert glucose into energy in nerves and muscles. It helps in improving mental ability and heart functions, digestion, and warding off rheumatism. Deficiency can cause easy fatigue, muscle weakness, loss of appetite, nausea, constipation, impaired memory and ability to concentrate, beriberi. Deficiency is a risk during periods of pregnancy and breast-feeding.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
VITAMIN B₂ -Riboflavin (mg)		0.07	0.05	-
	<u>RDA</u>			
Child aged 1-3	0.8	8.8%	6.3%	-
Lactating woman:	1.8	3.9%	2.8%	-

Vitamin B₂ helps the body convert proteins, fats and sugars into energy, and also helps the body repair and maintain tissues. Deficiency can cause bloodshot or tired eyes, inflammation and ulcers on the tongue and lips, hair loss, vertigo, slow-learning and insomnia.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
VITAMIN B₃-Niacin (mg)		0.2	0.8	-
	<u>RDA</u>			
Child aged 1-3	9	2.2%	8.9%	-
Lactating woman:	20	1.0%	4.0%	-

Niacin (nicotinic acid) is needed to help the body release energy from metabolism of carbohydrates, fats and proteins. Deficiency can cause dimness of vision and eye muscle fatigue.

		PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
VITAMIN C -Ascorbic acid (mg)		120	220	1.4
	<u>RDA</u>			
Child aged 1-3	20	600%	1100%	6.9%
Lactating woman:	95	126%	231%	1.5%

Vitamin C is necessary for healthy development of bones, teeth, blood and sex organs. Deficiency can cause bleeding and inflammation of the gums, loosening of the teeth, weakness, lassitude and scurvy. Much of the vitamin C content will be lost when leaves are boiled in open pots or when the cooking water is discarded. Excess intake of vitamin C is not harmful.

	PODS (100g)	LEAVES (100g)	LEAF POWDER (8g)
VITAMIN E (mg)	-	-	9.0

Vitamin E influences oxidation in body tissues, protects vitamin A and amino acids, and promotes the ability of white blood cells to resist infectious diseases. Some studies have indicated that vitamin E will help prevent cancer and Alzheimer's disease, as well as improve blood flow in people affected by arterial hardening, clotting or inflammation (atherosclerosis, thrombosis and thrombophlebetis). Deficiencies in children can result in irritability, water retention and hemolytic anemia. In adults, deficiencies can cause lethargy, apathy, lack of concentration, muscle weakness, irritability and decreased sexual interest. Recommendations for daily intake vary. For infants, formulas should contain at least 0.3mg per 100ml. For adults, recommendations range from 3 to 30mg per day, although extended intake of up to 3,200mg per day have not caused any negative effects. Other significant sources for vitamin E are soybean oil (87mg/100g), maize oil (66mg/100g), and roasted groundnuts (12mg/100g).

	PODS (100g)	LEAVES (100g)	LEAF POWDER*
<u>AMINO ACIDS</u>			
Arginine (g/16g N)	3.6	6.0	1.33 %
Histidine (g/16g N)	1.1	2.1	0.61
Lysine (g/16g N)	1.5	4.3	1.32
Tryptophan (g/16g N)	0.8	1.9	0.43
Phenylalanine (g/16g N)	4.3	6.4	1.39
Methionine (g/16g N)	1.4	2.0	0.35
Threonine (g/16g N)	3.9	4.9	1.19
Leucine (g/16g N)	6.5	9.3	1.95
Isoleucine (g/16g N)	4.4	6.3	0.83
Valine (g/16g N)	5.4	7.1	1.06

Amino acids make the specific proteins required by the body's specialized tissues. With the lack of any one amino acid, production of the needed proteins cannot occur. Although the body is able to make most of the amino acids it needs, several are not made in sufficient quantities and must be obtained from the person's diet. These are called essential amino acids. The above amino acids represent every one of the essential amino acids. Arginine and histidine are especially important for infants who are unable to synthesize sufficient protein for their growth requirements.

(* Leaf powder amino acid content is listed in terms of percentage).

Moringa Seed Kernel makes up about 75% of the seed. Per 100g the kernel contains 4.08 water, 38.4g crude protein, 34.7% fatty oil, 16.4g N free extract, 3.5g fiber and 3.2g ash. The cake left after oil extraction contains, 58.9% crude protein, 0.4% CaO, 1.1% P₂O₅ and 0.8% K₂O.