



## **Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1.**

Jed W. Fahey, Sc.D.

PEER REVIEWED

Johns Hopkins School of Medicine, Department of Pharmacology and Molecular Sciences,  
Lewis B. and Dorothy Cullman Cancer Chemoprotection Center, 725 N. Wolfe Street, 406  
WBSB, Baltimore, Maryland, USA 21205-2185

**Email:** [jfahey@jhmi.edu](mailto:jfahey@jhmi.edu)

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*Moringa appears to be a nutritional and medicinal cornucopia. The author, a Western-trained nutritional biochemist who has studied some of Moringa's phytochemicals for almost a decade, gives a brief commentary and extensive references, and presents a table introducing some of the tree's most intriguing features. This is the first article in a series, and will be followed by more detailed analysis of some of the strongest claims made regarding this edible plant.*

### **Abstract**

*Moringa oleifera*, or the horseradish tree, is a pan-tropical species that is known by such regional names as benzolive, drumstick tree, kelor, marango, mlonge, mulangay, nébéday, saijhan, and sajna. Over the past two decades, many reports have appeared in mainstream scientific journals describing its nutritional and medicinal properties. Its utility as a non-food product has also been extensively described, but will not be discussed herein, (e.g. lumber, charcoal, fencing, water clarification, lubricating oil). As with many reports of the nutritional or medicinal value of a natural product, there are an alarming number of purveyors of "healthful" food who are now promoting *M. oleifera* as a panacea. While much of this recent enthusiasm indeed appears to be justified, it is critical to separate rigorous scientific evidence from anecdote. Those who charge a premium for products containing *Moringa* spp. must be held to a high standard. Those who promote the cultivation and use of *Moringa* spp. in regions where hope is in short supply must be provided with the best available evidence, so as not to raise false hopes and to encourage the most fruitful use of scarce research

capital. It is the purpose of this series of brief reviews to: (a) critically evaluate the published scientific evidence on *M. oleifera*, (b) highlight claims from the traditional and tribal medicinal lore and from non-peer reviewed sources that would benefit from further, rigorous scientific evaluation, and (c) suggest directions for future clinical research that could be carried out by local investigators in developing regions.

*This is the first of four planned papers on the nutritional, therapeutic, and prophylactic properties of Moringa oleifera. In this introductory paper, the scientific evidence for health effects are summarized in tabular format, and the strength of evidence is discussed in very general terms. A second paper will address a select few uses of Moringa in greater detail than they can be dealt with in the context of this paper. A third paper will probe the phytochemical components of Moringa in more depth. A fourth paper will lay out a number of suggested research projects that can be initiated at a very small scale and with very limited resources, in geographic regions which are suitable for Moringa cultivation and utilization. In advance of this fourth paper in the series, the author solicits suggestions and will gladly acknowledge contributions that are incorporated into the final manuscript. It is the intent and hope of the journal's editors that such a network of small-scale, locally executed investigations might be successfully woven into a greater fabric which will have enhanced scientific power over similar small studies conducted and reported in isolation. Such an approach will have the added benefit that statistically sound planning, peer review, and multi-center coordination brings to a scientific investigation.*

*The following paper is intended to be useful for both scientific and lay audiences. Since various terms used herein are likely not familiar to the lay reader, nor are many of the references readily available to either scientific or lay audiences, we encourage active on-line dialog between readers and both the author and the journal staff. Both will attempt to answer questions and to direct readers to the experts in an open and public manner.*

## **Introduction**

*Moringa oleifera* is the most widely cultivated species of a monogeneric family, the Moringaceae, that is native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. This rapidly-growing tree (also known as the horseradish tree, drumstick tree, benzolive tree, kelor, marango, mlonge, moonga, mulangay, nébéday, saijhan, sajna or Ben oil tree), was utilized by the ancient Romans, Greeks and Egyptians; it is now widely cultivated and has become naturalized in many locations in the tropics. 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 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 (47) 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. It has been used in salads, for fine machine lubrication, and in the manufacture of perfume and hair care products (158). In the West, one of the best known uses for Moringa is the use of powdered seeds

to flocculate contaminants and purify drinking water (11,50,113), but the seeds are also eaten green, roasted, powdered and steeped for tea or used in curries (50). 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 undernourishment is a major concern.

## **Nutrition**

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.

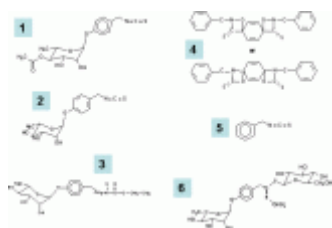
A large number of reports on the nutritional qualities of Moringa now exist in both the scientific and the popular literature. Any readers who are familiar with Moringa will recognize the oft-reproduced characterization made many years ago by the Trees for Life organization, that "ounce-for-ounce, Moringa leaves contain more Vitamin A than carrots, more calcium than milk, more iron than spinach, more Vitamin C than oranges, and more potassium than bananas," and that the protein quality of Moringa leaves rivals that of milk and eggs. These readers will also recognize the oral histories recorded by Lowell Fuglie in Senegal and throughout West Africa, who reports (and has extensively documented on video) countless instances of lifesaving nutritional rescue that are attributed to Moringa (47,48). In fact, the nutritional properties of Moringa are now so well known that there seems to be little doubt of the substantial health benefit to be realized by consumption of Moringa leaf powder in situations where starvation is imminent. Nonetheless, the outcomes of well controlled and well documented clinical studies are still clearly of great value.

In many cultures throughout the tropics, differentiation between food and medicinal uses of plants (e.g. bark, fruit, leaves, nuts, seeds, tubers, roots, flowers), is very difficult since plant uses span both categories and this is deeply ingrained in the traditions and the fabric of the community (85). Thus, Table 1 in this review captures both nutritional and medicinal references as they relate to Moringa, whilst avoiding most of the better known agro-forestry and water purification applications of this plant. The interested reader is also directed to the very comprehensive reviews of the nutritional attributes of Moringa prepared by the NGOs mentioned earlier (in particular, see references 47,123,157).

## **Phytochemistry**

Phytochemicals are, in the strictest sense of the word, chemicals produced by plants. Commonly, though, the word refers to only those chemicals which may have an impact on health, or on flavor, texture, smell, or color of the plants, but are not required by humans as essential nutrients. An examination of the phytochemicals of Moringa species affords the opportunity to examine a range of fairly unique compounds. In particular, this plant family is rich in compounds containing the simple sugar, rhamnose, and it is rich in a fairly unique group of compounds called glucosinolates and isothiocyanates (10,38). For example, specific components of Moringa preparations that have been reported to have hypotensive, anticancer, and antibacterial activity include 4-(4'-O-acetyl-a-L-rhamnopyranosyloxy)benzyl isothiocyanate [1],

4-( $\alpha$ -L-rhamnopyranosyloxy)benzyl isothiocyanate [2], niazimicin [3], pterygospermin [4], benzyl isothiocyanate [5], and 4-( $\alpha$ -L-rhamnopyranosyloxy)benzyl glucosinolate [6]. While these compounds are relatively unique to the Moringa family, it is also rich in a number of vitamins and minerals as well as other more commonly recognized phytochemicals such as the carotenoids (including  $\beta$ -carotene or pro-vitamin A). These attributes are all discussed extensively by Lowell Fuglie (47) and others, and will be the subject of a future review in this series.



(Click to enlarge)

**Figure 1.** Structures of selected phytochemicals from Moringa spp.: 4-(4'-O-acetyl- $\alpha$ -L-rhamnopyranosyloxy)benzyl isothiocyanate [1], 4-( $\alpha$ -L-rhamnopyranosyloxy)benzyl isothiocyanate [2], niazimicin [3], pterygospermin [4], benzyl isothiocyanate [5], and 4-( $\alpha$ -L-rhamnopyranosyloxy)benzyl glucosinolate [6].

## Disease Treatment and Prevention

The benefits for the treatment or prevention of disease or infection that may accrue from either dietary or topical administration of Moringa preparations (e.g. extracts, decoctions, poultices, creams, oils, emollients, salves, powders, porridges) are not quite so well known (116). Although the oral history here is also voluminous, it has been subject to much less intense scientific scrutiny, and it is useful to review the claims that have been made and to assess the quality of evidence available for the more well-documented claims. The readers of this review are encouraged to examine two recent papers that do an excellent job of contrasting the dilemma of balancing evidence from complementary and alternative medicine (e.g. traditional medicine, tribal lore, oral histories and anecdotes) with the burden of proof required in order to make sound scientific judgments on the efficacy of these traditional cures (138,154). Clearly much more research is justified, but just as clearly this will be a very fruitful field of endeavor for both basic and applied researchers over the next decade.

Widespread claims of the medicinal effectiveness of various Moringa tree preparations have encouraged the author and his colleagues at The Johns Hopkins University to further investigate some of these possibilities. A plethora of traditional medicine references attest to its curative power, and scientific validation of these popular uses is developing to support at least some of the claims. Moringa preparations have been cited in the scientific literature as having antibiotic, antitrypanosomal, hypotensive, antispasmodic, antiulcer, anti-inflammatory, hypocholesterolemic, and hypoglycemic activities, as well as having considerable efficacy in water purification by flocculation, sedimentation, antibiosis and even reduction of Schistosoma cercariae titer (see **Table 1**).

Unfortunately, many of these reports of efficacy in human beings are not supported by placebo controlled, randomized clinical trials, nor have they been published in high visibility journals. For example, on the surface a report published almost 25 years ago (141) appears to establish Moringa as a powerful cure for urinary tract infection, but it provides the reader with no source of comparison (no control subjects). Thus, to the extent to which this is antithetical to Western medicine, Moringa has not yet been and will not be embraced by Western-trained medical practitioners for either its medicinal or nutritional properties.

In many cases, published *in-vitro* (cultured cells) and *in-vivo* (animal) trials do provide a degree of mechanistic support for some of the claims that have sprung from the traditional medicine lore. For example, numerous studies now point to the elevation of a variety of detoxication and antioxidant enzymes and biomarkers as a result of treatment with Moringa or with phytochemicals isolated from Moringa (39,40,76,131). I shall briefly introduce antibiosis and cancer prevention as just two examples of areas of Moringa research for which the existing scientific evidence appears to be particularly strong.

**Antibiotic Activity.** This is clearly the area in which the preponderance of evidence—both classical scientific and extensive anecdotal evidence—is overwhelming. The scientific evidence has now been available for over 50 years, although much of it is completely unknown to western scientists. In the late 1940's and early 1950's a team from the University of Bombay (BR Das), Travancore University (PA Kurup), and the Department of Biochemistry at the Indian Institute of Science in Bangalore (PLN Rao), identified a compound they called pterygospermin [4] a compound which they reported readily dissociated into two molecules of benzyl isothiocyanate [5] (23,24,25,26,77,78,79,80,81,108). Benzyl isothiocyanate was already understood at that time to have antimicrobial properties. This group not only identified pterygospermin, but performed extensive and elegant characterization of its mode of antimicrobial action in the mid 1950's. (They identified the tree from which they isolated this substance as "*Moringa pterygosperma*," now regarded as an archaic designation for "*M. oleifera*.") Although others were to show that pterygospermin and extracts of the Moringa plants from which it was isolated were antibacterial against a variety of microbes, the identity of pterygospermin has since been challenged (34) as an artifact of isolation or structural determination.

Subsequent elegant and very thorough work, published in 1964 as a PhD thesis by Bennie Badgett (a student of the well known chemist Martin Ettlinger), identified a number of glycosylated derivatives of benzyl isothiocyanate [5] (e.g. compounds containing the 6-carbon simple sugar, rhamnose) (8). The identity of these compounds was not available in the refereed scientific literature until "re-discovered" 15 years later by Kjaer and co-workers (73). Seminal reports on the antibiotic activity of the primary rhamnosylated compound then followed, from U Eilert and colleagues in Braunschweig, Germany (33,34). They re-isolated and confirmed the identity of 4-( $\alpha$ -L-rhamnopyranosyloxy)benzyl glucosinolate [6] and its cognate isothiocyanate [2] and verified the activity of the latter compound against a wide range of bacteria and fungi.

Extensive field reports and ecological studies (see **Table 1**) forming part of a rich traditional medicine history, claim efficacy of leaf, seed, root, bark, and flowers against a variety of dermal and internal infections. Unfortunately, many of the reports of antibiotic efficacy in humans are not supported by placebo controlled, randomized clinical trials. Again, in keeping with Western medical prejudices, practitioners may not be expected to embrace Moringa for its antibiotic properties. In this case, however, the *in-vitro* (bacterial cultures) and observational studies provide a very plausible mechanistic underpinning for the plethora of efficacy claims that have accumulated over the years (see **Table 1**).

Aware of the reported antibiotic activity of [2], [5], and other isothiocyanates and plants containing them, we undertook to determine whether some of them were also active as antibiotics against *Helicobacter pylori*. This bacterium was not discovered until the mid-1980's, a discovery for which the 2005 Nobel Prize in Medicine was just awarded. *H. pylori* is an omnipresent pathogen of human beings in medically underserved areas of the world, and amongst the poorest of poor populations worldwide. It is a major cause of gastritis, and of gastric and duodenal ulcers, and it is a major risk factor for gastric cancer (having been classified as a carcinogen by the W.H.O. in 1993). Cultures of *H. pylori*, it turned out, were extraordinarily susceptible to [2], and to a number of other

isothiocyanates (37,60). These compounds had antibiotic activity against *H. pylori* at concentrations up to 1000-fold lower than those which had been used in earlier studies against a wide range of bacteria and fungi. The extension of this finding to human *H. pylori* infection is now being pursued in the clinic, and the prototypical isothiocyanate has already demonstrated some efficacy in pilot studies (49,168).

**Cancer Prevention.** Since *Moringa* species have long been recognized by folk medicine practitioners as having value in tumor therapy (61), we examined compounds [1] and [2] for their cancer preventive potential (39). Recently, [1] and the related compound [3] were shown to be potent inhibitors of phorbol ester (TPA)-induced Epstein-Barr virus early antigen activation in lymphoblastoid (Burkitt's lymphoma) cells (57,104). In one of these studies, [3] also inhibited tumor promotion in a mouse two-stage DMBA-TPA tumor model (104). In an even more recent study, Bharali and colleagues have examined skin tumor prevention following ingestion of drumstick (*Moringa* seedpod) extracts (12). In this mouse model, which included appropriate positive and negative controls, a dramatic reduction in skin papillomas was demonstrated.

Thus, traditional practice has long suggested that cancer prevention and therapy may be achievable with native plants. Modern practitioners have used crude extracts and isolated bioactive compounds. The proof required by modern medicine has not been realized because neither the prevention of cancer nor the modification of relevant biomarkers of the protected state has been adequately demonstrated in human subjects. Does this mean that it doesn't work? No. It may well work, but more rigorous study is required in order to achieve a level of proof required for full biomedical endorsement of *Moringa* as, in this case, a cancer preventative plant.

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**TABLE 1. REPORTED NUTRITIONAL, THERAPEUTIC & PROPHYLACTIC USES OF MORINGA**

#### OLEIFERA

Traditional Use Condition/Effect <sup>a</sup>	Plant Part <sup>b</sup>	References <sup>c</sup>
<b>ANT Antimicrobial / Biocidal</b>	<b>LFSPRBGO</b>	8, 13, 19, 24, 27, 31, 34, 64, 68, 100, 104, 114, 115, 126, 140, 151, 160, 161, 162
Bacterial	LFS	25, 26, 55, 63, 77-81, 149
Urinary Tract Infection	L	141
Typhoid	G	47
Infection	LF	47
Syphilis	G	47
Dental Caries/Toothache	RBG	47
Fungal/ Mycoses	O	111
Thrush		88, 111
Viral		

Common cold	FRB	47
Epstein-Barr Virus (EBV)	L	104
Herpes Simplex Virus (HSV-1)	L	84
HIV-AIDS	L	1, 124
Warts	S	47
Parasites		
Dranunculiasis (guinea-worm)		36
Helminths	LFP	47
Schistosomes	S	113
Trypanosomes	LR	95
Other / Not Attributed to a Specific Pathogen		
Skin (Dermal)	O S	15
Hepatic	L	6
Fever	LRGS	47
Earache	G	47
External Sores/Ulcers	LFRB	15
Bronchitis	L	47
Throat Infection	F	47
Water treatment (general)	S	11, 50, 75, 86, 169
<b>AST Asthma</b>	<b>RG</b>	47
<b>CAN Cancer Therapy / Protection</b>	<b>LFPBS</b>	12, 17, 28, 39, 45, 59, 61, 64, 104, 115
Anti-tumor	LFSB	45, 48, 57, 61, 87
Prostate	L	47, 48
Radioprotective	L	132
Skin	P	12
<b>CIR Circulatory/Endocrine Disorders</b>	<b>LFSPR</b>	56, 93
Anti-anemic	L	47, 125
Anti-hypertensive	LP	40, 41, 42, 43, 44, 53, 83, 137
Cardiotonic	R	47
Diabetes/hypoglycemia	LP	6, 45, 71, 87, 101, 167
Diuretic	LFRG	6, 14, 62
Hypocholestemia	L	52, 94
Thyroid	L	153
Tonic	F	47
Hepatorenal	LR	93, 120
<b>DET Detoxification</b>	<b>BO</b>	76, 135, 166
Antipyretic		148
Purgative	O	47

Snakebite	B	47
Scorpion-bite	B	47
<b>DIG Digestive Disorders</b>	<b>LSRBG</b>	53
For TRTMNT of:		
Colitis	LB	47
Diarrhea	LR	47, 62, 64
Digestif	B	47
Dysentery	LG	47
Flatulence	R	47
Ulcer / Gastritis	LS	3, 115, 136
<b>INF Inflammation</b>	<b>LFSPRG</b>	14, 28, 35, 45, 62, 64, 68, 110, 131, 160, 161
Rheumatism	LFSPRG	28
Joint Pain	P	47
Edema	R	47
Arthritis	S	47
<b>IMM Immunity</b>	<b>SO</b>	69
Immune-stimulant	S	69
Lupus	O	28
<b>NER Nervous Disorders</b>	<b>LFRBGO</b>	58, 59, 62, 96
Anti-spasmodic	SR	14, 53
Epilepsy	RB	47
Hysteria	FRBO	47
Headache	LRBG	47
<b>NUT Nuritional</b>	<b>LSBO</b>	6, 7, 18, 22, 28, 30, 31, 32, 46, 47, 48, 51, 65, 66, 67, 70, 92, 102, 112, 116, 133, 163
Antinutritional factors	B	88, 89, 90, 110, 127, 128, 139, 156, 164, 165
Antioxidant	LO	110, 147
Carotenoids	L	29, 105, 152
Energy	LSO	85
Goitrogen	S	2
Iron deficiency	LS	16
Oil quality	O	5, 98, 110, 158, 159
Protein	LS	47
Vitamin/Mineral deficiency	LS	7, 9, 54, 56, 85, 119
<b>REP Reproductive Health</b>	<b>LFPRBGO</b>	44, 53, 64, 121, 122
Abortifacient	FRBG	106, 107, 155
Aphrodisiac	RB	47
Birth Control	B	45, 53, 142-146



Lactation Enhancer	L	47
Prostate function	O	47

<b>SKI Skin Disorders</b>	<b>LRS</b>	160, 161
Antiseptic	L	47
Astringent	R	47
Pyoderma	S	15
Rubefacient	RG	47
Vesicant	R	47

<b>GEN General Disorders/Conditions</b>	<b>LFSPRBO</b>	4, 6, 8, 20, 21, 45, 48, 64, 66, 67, 68, 73, 74, 82, 91, 92, 99, 102, 103, 109, 116, 117, 118, 123, 125, 128, 129, 130, 134, 150, 163
Bladder	OS	47
Catarrh	LF	47
Gout	RO	47
Hepatomegaly	R	47
Lactation	L	47
Low.Back/Kidney Pain	R	47
Scurvy	LSRBO	47
Splenomegaly	R	47
"Tonic"	LFPSO	47

**a** It is very difficult in some cases to separate the effects of severe nutritional deficiencies (e.g. Vitamin C) from sequelae (e.g. scurvy) which transcend categorization by organ systems or classification into single disease states.

**b** Plant parts are designated by their first letters (in bold):

- L**eaves
- F**lowers
- S**eeds
- P**ods (drumsticks)
- R**oots
- B**ark
- G**um
- O**il (from seeds)

**c** Many of the original citations have been collected by Lowell J. Fuglie, [and can be found in his excellent treatise entitled *The Miracle Tree*, (47)] and by Manuel Palada (116), Julia Morton (102), and *Trees For Life* (157). Most other compendiums in recent publications or on commercial websites appear to be highly derivative of these seminal works.

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*(3-letter code in yellow at end of reference indicates major classification in Table 1)*

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Subject: *Moringa oleifera*: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophyl

Author: [jfahey](#), Date: Wednesday, May 31 2006 @ 04:56 AM EDT

posted with permission

To Jed W. Fahey Sc.D.:

Hello. My name is Meghan Wilson. I am a Licensed Practical Nurse, and a Certified Professional Midwife with an Associate of Science Degree in Midwifery from the National College of Midwifery.

I have begun initial research for a project which I will present to the National College of Midwifery in order to earn my bachelor's degree in midwifery. Vicki Penwell, MSM, is my advisor. I plan to study the benefits of Moringa leaf powder in pregnancy and birth.

I read in the abstract of "Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1" that you are interested in networking with statistically sound, small-scale, locally executed investigations.

I have read in the ECHO technical note "Moringa Leaf Powder", by Beth Doer and Lindsay Cameron, and in "The Miracle Tree", by Lowell J. Fuglie, that Moringa leaf powder is extremely beneficial for malnourished children, pregnant and lactating women. I have not yet found any research that indicates the specific benefits of Moringa leaf powder when taken by pregnant women.

I am a full-time volunteer at Mercy in Action Maternity Center, in Manila, Philippines. We are a not-for-profit Christian ministry. Our target people for outreach are pregnant women from a squatter area called "Welfaresville"; one square kilometer in which 100,000 people live in poverty. Our 24-hour maternity center is one block away from Welfaresville, and 80% of our clients live there. Our clinic sees between 20 and 50 pregnant women every weekday for prenatal check-ups, and 40-100 births each month. We see the results of malnutrition in pregnancy every day; malnutrition complicates pregnancy and birth like nothing else can. We spend much of our time during prenatal visits discussing nutrition, but many of the women are so poor that they cannot always afford to buy food, and frequently leafy green vegetables are not prioritized.

Moringa is an easy-to-grow, tasty source of nutrients! It grows naturally in the Philippines, where it is called "Malunggay". It is already used in a soup that is traditionally given to women after they deliver their baby. We are encouraging women to eat it when they are still pregnant as a source of protein, iron and many necessary vitamins. We are planning to begin growing moringa in container gardens and community gardens in Welfaresville to provide the leaf powder for the study, and afterwards to provide for our clients.

I want to benefit the women who are coming to us for care, and I want to benefit all organizations which are encouraging Moringa leaf powder in pregnancy by providing research that shows the actual benefits of leaf powder in pregnancy. After completing the research I would like to share the findings with development workers around the world, especially those working in areas of Maternal Health.

This is the first scientific study that I have been a part of, and I would like to make it scientifically legitimate. I would be very grateful for any communication, or help you may be able to give. If you are aware of research that already meets the goals of my proposed project, please let me know.

As for literature on Moringa, any literature about nutritional uses of moringa leaf powder, especially nutritional uses in pregnancy, would be very helpful.

(posted with permission from Meghan Wilson)

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Subject: Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophyl

Author: [mprice](#), Date: Wednesday, May 31 2006 @ 08:35 AM EDT

Meghan, I'm really pleased that you plan to do scientific studies in the Philippines to determine possible benefits of moringa leaves for pregnant women. I'll look forward to your results.

I got the initial information on nutritional values of moringa leaves from a nurse in Haiti who gave me a photocopied document from the Philippines called "Learn to Eat Malunggay." We shared this in one of our earliest newsletters, around 1982.

We have a Philippino document that I received at the same time that has something like 40 recipes for moringa. I would be pleased to email you a copy if you like. Write me at [echo@echonet.org](mailto:echo@echonet.org).

Martin Price, Executive Director, ECHO

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Subject: Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophyl

Author: [livefoodgems](#), Date: Tuesday, June 27 2006 @ 12:26 AM EDT

I live in the Makati city, Philippines. I'd like to get in touch with Ms Meghan Wilson regarding the moringa research. I am a raw food chef and I have incorporated a lot of fresh moringa in my recipes and beverages. I'd like to share her some of the of the positive effects moringa has done to a lot of my clients.

I can be contacted thru my email address: [sweetgems65@yahoo.com](mailto:sweetgems65@yahoo.com).

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Subject: Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophyl

Author: [moringa](#), Date: Saturday, October 28 2006 @ 11:23 AM EDT

Hello,

World's number one moringa cultivator and exporter of mornga products from India is interested, please get in touch.

Regards,

Ms. Meenu Sunder Raj

[www.moringa.net](http://www.moringa.net)

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Subject: Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophyl

Author: [marg16](#), Date: Saturday, September 15 2007 @ 11:55 AM EDT

hi..ive done research also about the moringa..and i found out thats really an amazing plant,an exceptionally nutritious vegetable tree with a variety of potential uses..and right now..we hav a

distributor company here in the philippines of moringa leaves and roots in the form of capsules..and with bio-i technology they also added in it.makes it one of the best food supplement ive seen nd used..any interested can email me at geng\_4@yahoo.com.thanks..more power to trees for life.this will be a great help informing our people to plant more trees.God bless!!

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Subject: Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1.

Author: [drmuthu007](#), Date: Monday, October 30 2006 @ 12:51 AM EST

To Jed W. Fahey Sc.D.:

Hello. My name is muthukumar. I am a veterinary master degree student in INDIAN VETERINARY RESEARCH INSTITUTE.I have begun initial research for a project which I will present to the IVRI in order to earn my master degree in animal reproduction. I plan to study the benefits of Moringa leaf powder in animal reproduction especially in bovine reproduction.

I read in the abstract of "Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1" that you are interested in networking with statistically sound, small-scale, locally executed investigations.

I want to benefit the poor farmers of India and I want to benefit all organizations which are encouraging Moringa leaf powder by providing research that shows the actual benefits of leaf powder. After completing the research I would like to share the findings with those working in areas of animal reproduction.

I would be very grateful for any communication, or help you may be able to give. If you are aware of research that already meets the goals of my proposed project, please let me know.

As for literature on Moringa, any literature about uses of moringa leaf powder in animal reproduction, especially effect on estrus cycle, uterine contraction and conception would be very helpful.

My email address is [drmuthu007@yahoo.com](mailto:drmuthu007@yahoo.com)

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Subject: Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1.

Author: [shirley\\_japay2](#), Date: Friday, June 29 2007 @ 08:49 PM EDT

Greetings,

I am Shirley Mae Japay from Francisco Q. Duque Medical Foundation Special Science High School at Pangasinan in the Philippines and currently making my research thesis about Moringa Oleifera Leaves as Facial Cleanser. I am grateful that I have opened your forum. It made me know further about Moringa Oleifera and its properties. Please to anyone who could get in touch with me and help me with my reserach, i would be very grateful. Thanks to this forum I have learned that Moringa Oleifera have its own anti-bacterial properties. My e-mail add is [shirley\\_japay2@yahoo.com.ph](mailto:shirley_japay2@yahoo.com.ph).



J. W. Fahey, "Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties: Part 1," *Trees for Life Journal*, Vol. 1, No. 5, 2005, pp. 1-15. <http://www.tfljournal.org/article.php/20051201124931586>. has been cited by the following article: TITLE: Effect of Pure Culture Fermentation on Biochemical Composition of Moringa oleifera Lam Leaves Powders. ABSTRACT: This study was carried out to determine the effect of the age of the leaves and fermentation on in vitro protein digestibility and biochemical properties of leaves powder of Moringa oleifera. A 6 × 2 factorial design with two ages of the leaves (one and seven-month-old leaves), six times of fermentation and two fermentation temperatures was used for this purpose.