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Summary: The Moringa Oleifara tree (the horseradish or drumstick tree) has been called the “miracle tree of hope.” It is a tree that is native to Bangladesh but its extraordinary nutritional value includes three times the potassium of bananas, two times the protein of milk, seven times the Vitamin C of oranges, and four times the calcium of milk. In Bangladesh where nearly half of the children under the age of six suffer from some sort of malnutrition, the consumption of the Moringa tree could have a miraculous effect on lowering the levels of malnutrition. This paper proposes a project to distribute moringa seeds and seedlings to needy individuals and women’s groups to promote nutritional self-sufficiency. Part of the program would include creating part-time livelihood opportunities for a number of women to engage in either group or one-on-one nutritional counseling with similarly situated village women.

Brief biography of the author: Anastasia Telesetsky is a California lawyer at Briscoe, Ivester & Bazel LLP with a strong interest in grassroot development work. She became aware of the challenges of food security as a Bosch Fellow working at the German Foreign Ministry in 2003-2004. At the Ministry, she assisted German diplomats in the drafting of the “Voluntary Guidelines for the Right to Food.” In addition to large-scale diplomatic solutions, she is an active proponent of small-scale village level projects. She has worked with several international environmental non-profits. In the Philippines as part of a Fulbright scholarship, she worked on behalf of the Environmental Legal Assistance Center to collaborate successfully with the City of Puerto Princessa to implement local air quality regulations. In Papua New Guinea, she assisted a local attorney to promote legislative ideas to protect his indigenous homeland from mineral and timber overexploitation and successfully assisted a village-based women’s group to apply for community development grants. She is currently on the board of three development non-profits and is familiar with American non-profit law. This year, she has presented two papers at international conferences on how protecting cultural heritage can further poverty reduction strategies. She hopes that her volunteer and research work will ultimately give others hope.

## **PROMOTING MORINGA TREE USE AMONG LOW INCOME COMMUNITIES THROUGH WOMEN RUN COMMUNITY-BASED SMALL-SCALE GARDENS**

The Chinese sage Confucius is reputed to have said, “Study the past, if you will define the future.” The past may very well provide a partial solution to two of Bangladesh’s current challenges- chronic malnourishment of pregnant women and children and ongoing deforestation. This paper proposes reviving the indigenous use of the moringa tree in Bangladesh to combat micronutrient deficiency in the lowest-income communities through the promotion of woman to woman nutritional counseling. An added benefit of promoting the use of the moringa tree will be additional cultivation of the tree and possible reforestation of deforested areas.

### **I. PROBLEM-MALNUTRITION AND DEFORESTRATION**

Scope of Malnutrition Problem:In Bangladesh, the eighth most populated country in the world, nearly half of the children under the age of six suffer from some form of malnutrition including micronutrient malnutrition.<sup>1</sup> This malnutrition is exacerbated by natural disasters, insecurity of land tenure, lack of infrastructure (including health and transport), and differential treatment of genders and cultures. Micronutrient malnutrition has lasting impacts on the social fabric of Bangladesh leading to threats to child survival and growth, poor women’s health, disruptions to brain development, decreases in adult productivity, barriers to educational achievement, and poor resistance to illness and diseases.

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<sup>1</sup> Local Estimation of Poverty and Malnutrition in Bangladesh, 2004, The Bangladesh Bureau of Statistics, United Nations World Food Programme, <http://www.povertymap.net/publications/doc/SAE%20-%20Final%20Report%20-%20May%202004.pdf> ; See also Helen Keller International Newsletter, Homestead Food Production Bulletin, November 2004, [http://www.hki.org/research/pdf\\_zip\\_docs/HFP\\_BD\\_Bulletin\\_2.pdf](http://www.hki.org/research/pdf_zip_docs/HFP_BD_Bulletin_2.pdf)

A lack of vitamin A has been connected to night blindness in children and increased risks in maternal mortality. A vitamin C deficiency can lead to an increase in pregnancy complication such as preeclampsia resulting in increased infant and mother mortality rates. A lack of iron results in anemia and affects both fundamental cognitive development and the physical work capacity of individuals. A lack of iodine has been connected to mental and physical retardation due to a lack of fetal brain development. A lack of folic acid can result in spina bifida and anencephaly.

There has been a call for an increase in fortifying basic foods such as cereal and rice and food flavorings such as sugar and salt. However, fortification by itself does not provide an easy fix. Frequently, local food industries, unless compelled by regulations, are reluctant to fortify foods because of the additional infrastructure and expense. To the extent that it is possible, it is easier to reach the lowest-income individuals of Bangladesh through home gardening of foods that are readily available for planting and livestock raising programs of foods.

Scope of Deforestation Problem: In Bangladesh, increased deforestation resulting from insecure land tenure, illegal tropical wood logging, and fuel source collection has increased the risk of a large number of individuals to seasonal flooding. In a vicious cycle, individuals who are displaced by flooding will travel to other parts of Bangladesh and remove trees in order to build villages. Conflicts between nature and man are becoming ever more common including clashes between endangered elephants and villagers.<sup>2</sup>

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<sup>2</sup> Elephants and Villagers Battle in Jungles of Bangladesh,  
<http://www.planetark.com/dailynewsstory.cfm/newsid/37959/newsDate/5-Sep-2006/story.htm>

## **II. PROMOTING MORINGA TREE USE AMONG LOW INCOME COMMUNITIES THROUGH WOMEN RUN COMMUNITY-BASED SMALL-SCALE GARDENS AND WOMAN TO WOMAN NUTRITION COUNSELING**

Moringa Trees: In the past few years, the cultivatable Moringa Oleifara tree has received a great deal of critical attention. It has been called the “miracle tree of hope” because of the promise that it may combat malnutrition in areas of chronic malnutrition. Significantly for Bangladesh, the Moringa tree is a native species. It has not only nutritional values but also medicinal and water purification values.

The multi-purpose tree can be eaten in a variety of ways. In Ethiopia, the leaves are used as a vegetable. The leaves can also be dried and ground up into powder and added to soups and stews. The young green pods of the tree can be eaten whole. The older pods can be treated like seeds and either boiled or roasted. When the pods mature, the seeds can be removed and pressed to extract an oil that has been compared to olive oil.

Researchers claim that the raw leaves of the tree have four times the Vitamin A of a serving of carrots and seven times the amount of Vitamin C as in oranges. The leaves also contain four times the amount of calcium as a serving of milk, twice the amount of protein as a serving of milk, and three times the amount of potassium as a banana. Iron, vitamin B, and minerals are also found in different parts of the tree. There are some nutritional claims that feeding Moringa leaves can result in an improvement in nutrition within ten days of feeding the leaves.<sup>3</sup>

In Africa, a group of workers from Church World Service have been using parts of the tree to nourish pregnant women, lactating women, and children in lieu of more expensive and

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<sup>3</sup> “Moringa Tree: Nature’s Pharmacy” Aisha El-Awady,  
<http://www.islamonline.net/english/science/2003/02/article06.shtml>

difficult to obtain products like whole milk powder, sugar, and vegetable oil. One hundred grams of leaves provides for a one to three year old all of the daily calcium, 75% of the necessary iron, 50% of his or her protein, and all of the daily needed vitamin A and C. For a lactating woman, six spoonfuls of Moringa tea powder provide all of a woman's daily iron and calcium.<sup>4</sup>

Moringa is easily grown in family gardens with the seedlings planted 10 cm apart. The seedlings grow well in most soils without additional fertilizer but compost can be used for optimum growth. When the seedlings are one meter, they can be cut down to about 30 cm. The leaves can be removed from the stems and either eaten raw or dried. The stumps will survive the harvest and will produce again within fifty days.<sup>5</sup> In fact, a well-rooted moringa tree is extremely tolerant to drought and will need little watering after it has been established.

The trees grow quite fast and in 9 months can grow in optimum conditions up to 4 meters (13 feet). If trees are to be used as a food source, the community will need to cut back the branches to ensure a fresh supply of leaves. Mature pods containing ripe seeds should be collected and stored in a cool, dry area for future plantings.

Additionally, parts of the tree can be marketed. It may be possible in some parts of Bangladesh for low-income families to market moringa as a vegetable for mid-income families. Eventually moringa from Bangladesh could be marketed as a vitamin and mineral supplement to Western health food stores and a possible source of livelihood for some impoverished communities. Moringa is being commercially produced by an Indian company as an ayurvedic medicine. (See <http://www.moringa.net/export.htm>)

Moringa trees are unlikely to be cut for timber for use in the timber industry because the trees are considered low quality. However moringa trees are a desirable food source for cattle,

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<sup>4</sup> <http://www.churchworldservice.org/moringa/TMTnutrition.html>

<sup>5</sup> The Advantage of Using Moringa in Malnutrition Prevention Programs, Lowell J. Fuglie in the Moringa Tree: A Local Solution to Malnutrition, [www.moringanews.org/documents/Nutrition.pdf](http://www.moringanews.org/documents/Nutrition.pdf)

sheep, pigs and goats and must be protected from livestock by hedges or fences. Pest control for moringa is an additional challenge.

**Women's Communities in Bangladesh:** Over the past few decades, women have begun to form community groups in low-income regions in hopes of improving the quality of their life. A number of both formal and informal women's communities focus on nutrition and infant health such as the Bangladesh Integrated Nutrition Program founded in 1996<sup>6</sup>. Working in community groups, women have discovered that there is power in numbers.

**Proposed Program:** Moringa is native to Bangladesh. It is uncertain how much village knowledge there is about the use of moringa in Bangladesh as a micronutrient supplement among the lowest income communities. There are no publications on the Internet of moringa cultivation work being actively promoted in Bangladesh.

The proposed program will first try to identify a Bangladeshi local source of cultivatable moringa trees to purchase in either seed or seedling form. If a local source is not available, the project may request a donated supply of Moringa seed from ECHO (Educational Concerns for Hunger Organization, a Florida based non-profit with a seed bank available for agricultural development work.) or seeds can be purchased from a number of locations in India.

Working in cooperation with a medical NGO or medical officers from the Bangladeshi government, the program will identify at least five urban or rural communities that are at extremely high risk for chronic malnutrition among women and children. The medical clinics in the high risk communities or medical officers who serve the high risk communities will be provided with a supply of dried moringa for immediate consumption by malnourished mothers

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<sup>6</sup> <http://nutrition.tufts.edu/research/ifnc/highlights/bangladesh.html>

and infants and seeds to be distributed either to individuals or to women's community groups. Where there are existing women's organizations engaged in improving the quality of life of their villages, these communities will be encouraged to plant moringa trees in a community gardening area where farming land is available or in pots in a communally shared area where land is not available (i.e. urban centers.). High risk individuals will not be required to participate through a woman's organization in order to receive moringa powder, seedlings, or training. The goal of the program will be to provide women and their infant children for three years with sufficient moringa either via powder or leaves produced from their household or community garden.

A number of young women from high risk communities will be trained in the cultivation of moringa trees and the preparation of moringa for consumption (in both fresh and dried form). These women will be paid a small sum for identifying other communities in need and assisting them with structuring a culturally appropriate community-based nutrition program that includes the use of moringa. It is hoped that these women will be able to also support valuable peer education and combat nutrition beliefs that are doing more harm than good to the community. For example, village fieldworkers could work with young pregnant women to combat the cultural belief that consuming less food than usual during pregnancy is necessary to avoid a difficult delivery.<sup>7</sup>

**Challenges:** The primary challenge for this program is working to change long-standing individual cultural practices of what is considered nutritious food. Moringa is not a new food in Bangladesh, but an overlooked food that is only beginning to take root again in household gardens. The challenge of changing eating habits may be overcome in part by fieldworkers being well-versed in the historical uses of the plant and in its practical culinary uses. There is already

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<sup>7</sup> *Id.*

significant research on the use of moringa in food and a commercial producer of moringa in India has generated a number of potentially culturally appropriate recipes such as a moringa curry with onions, a moringa korma, and a moringa chutney.

<http://www.moringa.net/recipe.htm>

A secondary challenge for this program is overcoming any assumptions that moringa is a wonder drug. Moringa's positive effects require individuals to consume on a regular basis over several weeks certain quantities of moringa. It may be possible to overcome this program challenge by requesting village fieldworkers to follow up on a semi-regular basis with the women that they have counseled in order to support them with the personal discipline aspects of changing diet. There may also be other culturally viable solutions to these challenges that are best discovered in the field. For example, a particular charismatic member of a village may be able to influence group behavior based on his or her individual behavior.

**Indirect Effects of Proposed Program:** The proposed moringa program to distribute trees to women's groups in high risk communities should contribute to Bangladesh nearing its goals of meeting the Millennium Goal of halving hunger. Achieving improvements in nutritional status of families contributes tangibly to poverty reduction by breaking the linkages in existing intergenerational poverty. A child born into poverty is not fated to remain in poverty.

Addressing the micro-nutritional needs of low income families can lead to better opportunities for educating children, a reduction in the disparity between genders, and improved long-term health.

Additionally, the planting of moringa trees will contribute to combating some of the general deforestation of Bangladesh villages by providing new green spaces in the form of

community gardens. While the planting of moringa trees cannot serve as a substitute for the disappearance of other tropical varieties of trees-it may help to set the stage for other community conservation efforts.

**Project Budget:** If the committee is interested in funding such a project, the author of this paper will form a non-profit to receive the prize money. All of the prize money will be spent on the program goals to combat malnourishment and deforestation through distribution of moringa seeds and seedlings. The \$25,000 prize money should be enough to fund a modest and hopefully sustainable program to combat malnutrition in Bangladesh. Similar programs have been performed in Haiti for \$18,000.<sup>8</sup> The prize money would be spent on purchasing seeds, hiring a Bangladeshi coordinator to identify target communities, and hiring village women from target communities and paying them a living wage to provide woman to woman nutrition counseling and moringa food preparation advice. If the project is successful and additional funding is necessary beyond the prize money, it will likely be possible to obtain additional funding from Western based NGOs such as the International Tree Foundation or Trees for Life to expand the program.

**Conclusion:** This project if executed properly using local supplier and local social capital networks has the potential to make a sizable difference in sustainably reversing the chronic malnutrition that has plagued Bangladesh for decades. This program intends to target at least five needy communities in Bangladesh of more than a 1000 persons and through a livelihood

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<sup>8</sup> <http://www.pcusa.org/hunger/downloads/2005intgrants.pdf> See Colladere Cooperative/Peasant Movement of Papay "Production and Transformation of Moringa."

program build the capacity for the needy not just to help themselves but also help neighboring communities in need.

### **Bibliographical Resources:**

Doerr, Beth (2005), Moringa Leaf Powder available at [www.echonet.org](http://www.echonet.org)

Fahey, Jed, (2005) Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1., Trees of Life Journal available at <http://www.tfljournal.org/article.php>

Fuglie LJ (1999) The Miracle Tree: *Moringa oleifera*: Natural Nutrition for the Tropics. Church World Service, Dakar. (See generally <http://www.churchworldservice.org/moringa/index.html>)

Moringa Recipes, Educational Concerns for Hunger Organization staff available at [www.echonet.org](http://www.echonet.org) (providing Southeastern recipes such as a Mung Bean stew,

Palada, M.C. and L.C. Chang (March 2003) “Suggested Cultural Practices for Moringa”, Asian Vegetable Research and Development Center Publication 03-545, available at <http://www.avrdc.org/LC/indigenous/moringa.pdf> (Describing in detail how to plant seeds and/or hard stem cuttings)

Suresh Chandra Babu, “Rural Nutrition Interventions with indigenous plant foods- a case of vitamin A deficiency in Malawi” Biotechnol Agron. Soc. Environ. 2000, 4(3), pp. 169-179. available at <http://www.bib.fsagx.ac.be/library/base/text/v4n3/169.pdf>

UNESCO Best Practices on Indigenous Knowledge, Improving nutrition with Moringa ‘miracle’ trees in Senegal available at <http://www.unesco.org/most/bpik10-2.htm>

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

**MORINGA OLEIFERA  
NUTRITIONAL VALUE OF LEAVES AND PODS**

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	92	205
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	440	2,003
Mg (mg)	24	24	368
P (mg)	110	70	204
K (mg)	259	259	1,324
Cu (mg)	3.1	1.1	0.57
Fe (mg)	5.3	7	28.2
S (mg)	137	137	870
Oxalic acid (mg)	10	101	1.6%
Vitamin A B carotene (mg)	0.11	6.8	16.3
Vitamin B choline (mg)	423	423	-
Vitamin B1 thiamin (mg)	0.05	0.21	2.64
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	17.3
Vitamin E tocopherol acetate (mg)	-	-	113
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%