

Technical Bulletin #24:

Moringa – An Excellent Source of Nutrition

Moringa is a common tree in Cambodia

The Moringa tree (*Moringa Oleifera*) grows in people’s yards and elsewhere throughout Cambodia. It is often called the drumstick tree because of the seed pods that it produces. The fresh leaves of the Moringa are used in some of the most popular Cambodian recipes such as Samlor Korko.

What many Cambodians may not know is that Moringa is a very important source of key nutrients that everyone needs to consume for healthy eating. The principal edible parts of the tree are fresh leaves, dried leaves that have been made into a powder, and the young seed pods.



High nutritional value of Moringa

Fresh Moringa leaves provide significant quantities of the key nutrients required for a healthy diet. These quantities are several times greater than the nutrients found in common foods, when leaves are compared gram-for-gram with different fruits and vegetables.

Since the dried Moringa leaf powder is concentrated, it contains even more of these essential nutrients with the exception of Vitamin C.

Fresh leaves	Dried leaf powder
4 times the Vitamin A in carrots	10 times the Vitamin A in carrots
7 times the Vitamin C in oranges	1/2 the Vitamin C in oranges
2 times the Iron in mustard greens	88 times the Iron in mustard greens
3 times the Potassium in bananas	15 times the Potassium in bananas
4 times the Calcium in pak choi	17 times the Calcium in pak choi
2 times the Protein in morning glory	9 times the Protein in morning glory

Moringa fights malnutrition

Pregnant women, lactating mothers and young children are all vulnerable to malnutrition. In Cambodia, 28% of children under the age of 5 years are underweight for their age, a key indicator of malnutrition. Among Cambodian women of childbearing age (15-49 years), 44% suffer from anemia caused by iron deficiency.

Daily consumption of Moringa in the form of fresh leaves or dried leaf powder can contribute significantly to meeting the needs of these vulnerable populations for the nutrients that will reduce the risks of malnutrition.

For pregnant women and lactating mothers, consuming fresh Moringa leaves, dried leaf powder, or pods can strengthen a mother’s health and reduce anemia. Pregnant women who include Moringa in their diets

tend to have babies with higher birth weights. Traditionally, a tea made by boiling Moringa flowers is used by lactating mothers to stimulate the flow of breast milk. A 100g portion of fresh leaves gives a woman three times her daily requirements for Vitamins A and C, about half her daily requirement for calcium, and important quantities of iron and protein.

Young children that consume dried leaf powder on a regular basis increase their weight and overall health. Adding one large spoonful (8g) of dried Moringa leaf powder to *bobor* or other complementary foods three times each day will ensure that a child is getting a nutrition-rich diet. The following table identifies how dried Moringa leaf powder contributes to the Recommended Daily Allowance (RDA) of young children and women for key nutrients.

	% Recommended Daily Allowance	
	Nursing Mothers	Child, 1-3 years
	(6 large spoonfuls/ day)	(1 large spoonful, 3 times/day)
Vitamin A	143	272
Vitamin C	9	22
Iron	94	71
Calcium	84	125
Protein	21	42
Potassium	22	41
Magnesium	54	61

Source: Moringa – an ECHO Technical Note (www.echonet.org)

Making dried Moringa leaf powder

Making dried leaf powder from Moringa leaves can easily be done at home.

- Moringa leaves can be harvested at any time once a tree is established.
- The leaves should be stripped off the stems, rinsed in clean water to remove dirt and germs, and spread in a thin layer on a flat surface such as a cloth on the floor, a flat basket, or a tray made with wire mesh (to improve air movement).
- The leaves should always be dried in an area that is protected from light. Drying Moringa leaves in a bright or sunny place will destroy Vitamin A and other nutrients.
- The leaves should be covered by a thin cloth or mosquito netting to help keep them clean while drying.
- It will take 2-4 days to dry the leaves depending on the humidity levels. Mix the leaves frequently while they are drying. When they become brittle and crush easily, they are dry.
- Once dried, pound the brittle leaves with a mortar and pestle. Then rub the dried leaves through a wire screen or mesh to produce a fine powder.





- The leaf powder can be safely stored for several months in a tightly-sealed container that is kept in a place protected from heat, humidity, and light. If mold or mildew appears, the powder should be thrown away and a fresh batch of powder made.

The ratio of fresh leaves to dried leaf powder is about 8 to 1. That is, it takes about 8 kg of fresh leaves to produce 1 kg of dried leaf powder.

Cooking with Moringa

In addition to Samlor Korke, fresh Moringa leaves can be added to many soups, curries, stir-fries, omelets, and salads that Cambodians like to eat – any dish that includes the use of various herbs. Also, young Moringa leaves and shoots can be cooked separately in the same way as pumpkin leaves and morning glory. Dried leaf powder can be added to any of these dishes as well as various sauces.

- Although some nutrients will be lost in the cooking process, studies have found that boiled fresh Moringa leaves or leaf powder provide the body with higher levels of iron and other nutrients.
- It is best to add fresh Moringa leaves to soups and other dishes at the end of the cooking process to minimize the loss of nutrients.
- The nutrient content is higher in mature leaves although most people prefer to cook with and eat young leaves and shoots.
- Cooking Moringa leaves and shoots with oil helps to retain and enhance the Vitamin A content.
- If boiling Moringa leaves in water, do not throw away the cooking water. Nutrients will leach into the water during cooking, so use this nutrient-rich liquid in soups and sauces.
- Dried Moringa leaf powder can easily be added to soups, sauces and other dishes without significantly changing the taste of foods. The dried leaf powder can be readily available all year long, even during the periods when there are no leaves on the trees.

Immature Moringa seed pods can be eaten raw or cooked like green beans. They contain high levels of dietary fiber, as well as other vitamins and nutrients.

Cultivating Moringa

Moringa trees are extremely fast-growing plants – they grow as much as 4m per year and reach a mature height of 6m-15m. The trees have a long taproot so they are drought-tolerant and prosper in areas with annual rainfall of 250mm-1500mm. Although Moringa prefer well-drained sandy or loam soils, they will tolerate a clay soil if it is not water-logged. They also tolerate a wide range of pH (5-9) and respond well to mulch, water, and fertilizer.

Moringa can be grown from seedlings, or seeded directly in the ground. The seeds have no dormancy period, so they can be planted as soon as they are mature. Seeds can be kept for up to one year although the germination rate may drop to 60-70%. Within 3 years, a young tree will produce 400-600 seed pods annually, each with 10 or more seeds. A



mature tree will produce up to 1,600 pods per year.

For seedling production, poly bags 18cm x 12cm in diameter should be filled with a mixture of 3 parts soil to 1 part sand. Soak the seeds overnight, crack and remove the shells and plant only the kernels. Germination will occur within 5 to 12 days, and seedlings can be transplanted when they are 60-90cm high.

If drip irrigation or another water source is available, seeds can be planted directly in the ground at any time of year. When direct seeding or transplanting, complete the following steps: dig planting pits; mix compost with fresh topsoil to fill the pits; and, the day before planting seeds or seedlings, water the filled pits.

Trees can also be established from hard wood cuttings (not green wood). Cuttings that are 45cm to 1.5m long and 10cm thick can be planted directly in light, sandy soil. Plant one-third of the cutting length in the ground. Do not over-water or the roots may rot. The cuttings can also be planted in nursery sacks and transplanted after 2-3 months.

The spacing of Moringa trees depends on how they will be grown. If trees grow to their full mature height, they should be spaced 3m x 3m to ensure sufficient sunlight and airflow. This spacing would apply to a few trees planted in the house yard. Some people grow small plantations of Moringa to harvest the leaves for sale in local markets. In these cases, the trees are often planted on a smaller grid, for example, 1.5m x 1.5m. In some places, trees are planted in a line less than 1m apart to create living fence posts. Because Moringa has a deep taproot, trees planted in gardens do not compete with other plants for surface nutrients and the light shade they provide can be beneficial for some vegetables.

As Moringa seedlings grow, a program of consistent pruning in the first 3 months will encourage bushy trees that produce many pods.

- When seedlings reach a height of 60cm, pinch the terminal growing tip 10cm from the top.
- Secondary branches will appear within 1 week. When they are 20cm long, cut them back to 10cm. To do this, use a sharp knife and make a slanting cut.
- Tertiary branches will appear and should be pinched in the same way.

Trees grown to harvest leaves are regularly pruned to maintain the trees at heights of 1-1.5m. In areas where there is commercial production of dried leaf powder, plants that reach a height of 1.2m are cut back to a height of 20cm. This minimizes the growth of woody stem material and optimizes the leaf production. In Senegal where this is being done, there are 6-9 harvests of leaves each year.

Moringa trees do not need much watering. They will generally grow well without adding very much fertilizer beyond the compost that is mixed in the planting pits. Moringa is resistant to most pests. However, cattle, pigs and goats like to eat Moringa seedlings, pods, and leaves, so it is important to protect the seedlings by installing a fence until trees are more mature.

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