



Left: Fruits of the *Jatropha* plant. Photo: www.Jatropha.org . Middle: *Moringa* leaves, and right: *Moringa* fruits. Photo: www.Moringanews.org

Jatropha and Moringa: Two tropical multipurpose trees with potentials

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Jatropha and *Moringa* are tropical tree species with multifarious beneficial uses. They are considered to have potentials of contributing to the socioeconomic development of Sub-Saharan Africa through renewable energy production, income generation and food security, soil and water conservation, eco-sanitation and reduction of environmental degradation. Some of the properties of these two species are highlighted in this article.

The world today has fossil fuel as a major source of energy. It is, however, being increasingly evident that this form of energy is exhaustible and other sources of energy are being sought. Fossil fuel is also a major contributor to the challenges of climate change the world is facing today.

A lot of effort is now being placed in looking for sustainable alternative sources of energy. Huge investments are being made today in the fermentation of plant material to produce biofuels. In South America and certain parts of the Caribbean, ethanol is now increasingly being used as an alternative to fossil-fuel. More and more attention is being paid to alternative sources of energy other than non-renewable petroleum or coal. Many plant species are known to contain extractable oils used for medicinal purposes, foods and as dyes, but also as fuel. Many such plants are found in the tropics of Africa and Asia. Besides being energy sources, many plants contain valuable nutritious substances that can be used against

malnutrition, which still is an important hurdle in the efforts of many developing countries, particularly in Sub-Saharan Africa, to achieve socioeconomic development.

Two, locally well-known, species which might have the potential to reduce the use of fossil-based fuels and provide nutrition are ***Jatropha*** and ***Moringa*** respectively (Parsons, 2005; Foidl et al., 2001).

Jatropha curcas is a multi-purpose tree belonging to the family of *Euphorbiaceae*, and a native of Africa, North America and the Caribbean where it is of significant economic importance. There are toxic and non-toxic varieties of the plant. Some of the properties of *Jatropha* are:

- *Jatropha* grows in most of the tropics, and survives and even produces on marginal land with poor and stony soils;

- Jatropha “live fences” can be important in erosion control and shelter for crops;
- It is drought resistant requiring a minimum of 250 mm rainfall per year but does better on 900 - 1200 mm;
- It can easily be propagated from seeds or cuttings;
- Jatropha gives seed yields averaging 6 - 8 tons per hectare. With an average oil content of 37 % Jatropha yields 2200 - 3000 litres oil per hectare which can be extracted and used directly as fuel. Trans-esterification to biodiesel is however more common. Typical oil yields of rapeseed are approximately 1000 kg per hectare (equivalent to approximately 1100 litres); and
- The press cake of seeds of Jatropha can be used as organic fertilizer or soil improver.

Seed production starts about 12 months after propagation; reaches maximum productivity level after 4 - 5 years, and continues to produce for 40 - 50 years. The bark of the Jatropha plant can be used to produce dark blue dye and wax.

The listed properties indicate that this multi-purpose tree can have positive environmental and socioeconomic benefits in developing as well as industrialised countries. Jatropha apparently holds a potential in the fight against poverty and environmental degradation, but its full potential remains to be validated.

The Jatropha system creates a positive reciprocity between raw material / energy production and environment / food production; e.g. the more energy Jatropha hedges produce the more food crops are protected from animals and erosion.



Jatropha fruits in West Africa (Photo by R.K. Henning)

Also additional income is created, mainly for women. It also has great potential in the trade in renewable energy between the rich north and the poor south.

A lot of work has been done on Jatropha in South America, by the University of Hohenheim, Germany and by the Centre for Jatropha Promotion, a worldwide network which is at all aspects of the plant.

<http://www.Jatrophaworld.org/9.html>

Moringa oleifera is another useful tropical plant. Though apparently native only to restricted areas in the southern foothills of the Himalayas, *M. oleifera* is cultivated in all the countries of the tropics. The relative ease with which it propagates through both sexual and asexual means and its low demand for soil nutrients and water after being planted makes its production and management easy. *M. oleifera* is cultivated for its leaves, fruits, and roots for a variety of food and medicinal purposes.

The young fruits (sometimes called "drumsticks") can be cooked in a number of different ways, while the leaves are extensively used as a vegetable. The table below compares the nutritive value of Moringa leaves with that of other nutritious food items. *M. oleifera* is also of interest because of its production of compounds with antibiotic activity such as the glucosinolate 4 alpha-L-rhamnosyloxy benzyl isothiocyanate.

Moringa leaves compared to common foods Values per 100gm. edible portion		
Nutrient	Moringa Leaves	Other Foods
Vitamin A	6780 mcg	Carrots: 1890 mcg
Vitamin C	220 mg	Oranges: 30 mg
Calcium	440 mg	Cow's milk: 120 mg
Potassium	259 mg	Bananas: 88 mg
Protein	6.7 gm	Cow's milk: 3.2 gm

from *Nutritive Value of Indian Foods*,
by C. Gopalan, et al. 1971

Other desirable qualities of Moringa include:

- Moringa has an average seed oil content of around 40%. Unlike Jatropha, this oil is nutritious cooking oil and like Jatropha it can also be used as fuel and for lubrication of delicate machines (Foidl et al., 2001).
- The press cake after oil extraction can serve as organic fertilizer.
- Moringa is widely used in water treatment in developing countries (Folkard et al., 1990). Crushed Moringa seed kernels work as natural flocculants / coagulants, binding to the solids in water and causing them to sink to the bottom. Since bacteria in water are generally attached to solid particles, treatment with Moringa powder can give clear potable water. The flocculating effect of the Moringa seed

extract or powder has been found to be equal to that of aluminium sulphate in water treatment plants. In developing countries, therefore, Moringa seed coagulants are viable alternatives to chemical coagulants for purifying drinking water (Nkhata, 2001). Unlike aluminium sulphate the Moringa seed residues, after water treatment, can be used as organic fertilizer and soil amendment

Like Jatropha Moringa tolerates a wide range of soil and rainfall conditions. Minimum annual rainfall requirements are estimated at 250 mm with maximum at over 3000 mm. The presence of a long taproot makes it resistant to periods of drought. It can perform well on most degraded soils and can therefore be useful in combating land degradation.



A. de Saint-Sauveur

Moringa Oleifera showing leaves and pods (Photo: A. de Saint-Sauveur)

More on Moringa can be found here:

<http://www.le.ac.uk/engineering/staff/Sutherland/Moringa/Moringa.htm>

The above suggests that Jatropha and Moringa can play significant roles in **breaking the unholy alliance of food insecurity, poverty and environmental degradation in developing countries**. There is strong evidence that countries in sub-Saharan Africa are becoming more and more aware of the importance of these species to the extent of including them in their Poverty Reduction Strategy Papers (PRSPs). In the context of Norwegian development cooperation, there is room to exploit the potential these two plant species offer in the battle against poverty and food insecurity. Even though a wide body of information on both species promises well, there is still a need for further verification and validation as part of the advocacy of their large scale exploitation.

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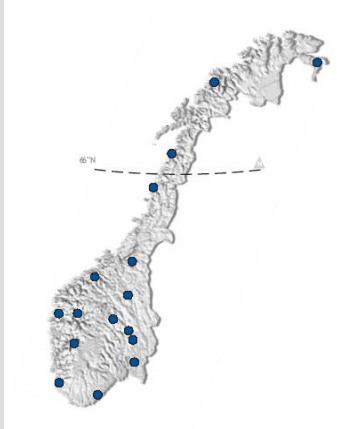
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