



Agro-forestry Species Highlights

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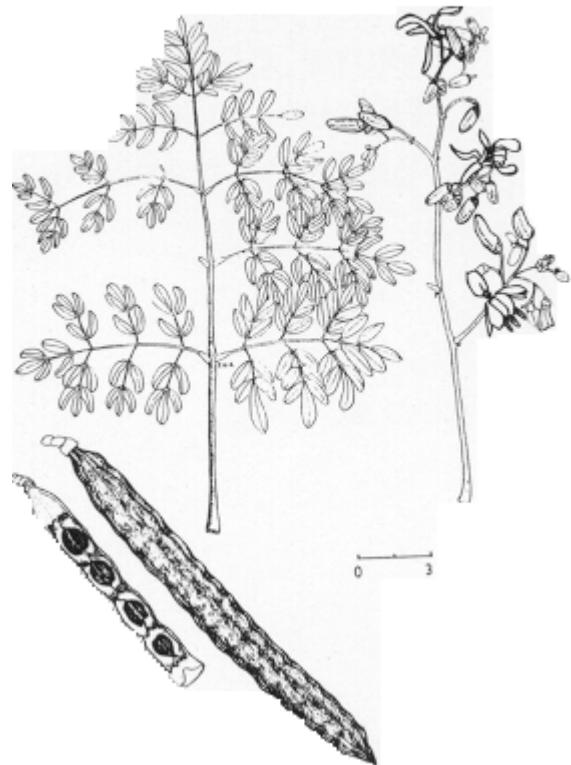
Moringa oleifera: A Perfect Tree for Home Gardens

Moringa oleifera, commonly called the 'drumstick tree', is well known for its multi-purpose attributes, wide adaptability, and ease of establishment. Its leaves, pods and flowers are packed with nutrients important to both humans and animals.

Botany.

Drumstick is a small, fast-growing, drought deciduous tree or shrub that reaches 12 m in height at maturity. It has a wide-open, typically umbrella-shaped crown and usually, a single stem. Its wood is soft and its bark is light. It tends to be deeply rooted. (F/FRED, 1992) Its leaves are imparipinnate--rachis 3 to 6 cm long with 2 to 6 pairs of pinnules. Each pinnule has 3 to 5 obovate leaflets that are 1 to 2 cm long (von Maydell, 1986). The terminal leaflet is often slightly larger.

Its leaflets are quite pale when young, but become richer in color with maturity. Cream-colored flowers emerge in sweet-smelling panicles during periods of drought--or stress--when the tree loses its leaves. The pods are triangular in cross-section--30 to 50 cm long--and legume-like in appearance. The oily seeds are black and winged.



Ecology.

Drumstick readily colonizes stream-banks and savanna areas where the soil is well-drained and the water table remains fairly high year-round.

It is usually cultivated in home gardens and courtyards, where it is most useful. It produces lots of palatable green foliage. Leaf production is increased with frequent additions of kitchen and waste water.

Moringa oleifera is adapted to a wide range of soil types but it does best in a well-drained loam to clay loam. It does not withstand prolonged water-logging. It is observed to prefer a neutral to slightly acidic soil reaction, but it has recently been introduced with success to Pacific atolls where soil pH is commonly greater than 8.5. It does best where temperature ranges from 26 to 40°C and annual rainfall totals at least 500 mm. It grows well from sea level to 1000 m in elevation.

Moringa is quite drought tolerant, but it yields much less foliage where it is continuously under water- stress. Where annual rainfall is below 300 mm, the tree requires a relatively high water table to be productive.

Distribution.

Moringa oleifera has its origin in Arabia and India. Today the tree is a common to landscapes all over the tropics of the Old World--from south Asia to West Africa (von Maydell, 1986). It is most visible in parts of East and South Africa. It is now also finding its way into gardens on many Pacific islands--from Kiribati to the Northern Marianas.

Uses.

Moringa oleifera is one of the most useful trees for semi-arid and drought-prone areas. It is quite often found next to kitchens and in courtyard gardens where its succulent leaves are harvested daily for soups, sauces, or salads. These palatable leaves are high in protein, vitamin A and vitamin C. Where diets lack in these essential nutrients--like on Pacific atolls--the Drumstick tree makes a major contribution to human health.

Moringa is not a nitrogen fixing tree, but its fruit, flowers and leaves all contain 5 to 10 % protein-on average. All of these parts are eaten widely as vegetables, providing excellent food for both humans and animals. The pods are often cooked and eaten like green beans. The root tastes similar to horse radish and is a popular food in East Africa. *Moringa* flowers also produce a good honey.

The wood is light, but provides a fairly good fuel for cooking. It has a density of 0.5 to 0.7 and yields approximately 4,600 kcal/kg (F/FR.F-D, 1992). The bark contains a gum that is used as a seasoning and a treatment for some stomach ailments. Various parts of the *Moringa* plant are also used in medicines as diuretics and treatments for bladder ailments.

The seed is often used to purify dirty or cloudy drinking water. It is pounded into small fragments, wrapped in some sort of cloth, and then placed into water jars or containers.

This pounded seed acts as flocculent, taking impurities out of the water solution. In the Nile Valley, the name of the tree is 'Shagara al Rauwaq' which means 'tree for purifying' (von Maydell, 1986).

Planted as a hedge in courtyards, *Moringa oleifera* provides wind protection, shade and support for climbing garden plants. One can easily understand the popularity of this versatile and adaptable tree in many locations as a household/garden component.

Moringa seed contains about 35% oil. Sweet and non-sticking, this oil is often extracted for cooking and in rare cases, even lubrication purposes. It does not turn rancid, is excellent in salads, can be used for soap making, and burns without smoke (von Maydell, 1986).

In India, economic analysis has illustrated that cultivation of *Moringa oleifera*--or 'Sahjan'---can be very profitable for farmers with access to urban markets (Sherkar, 1993). The leaves, pods, flowers, and wood are all in high demand, and even a few scattered trees can yield enough marketable produce to make frequent trips to town worthwhile.

Silviculture.

Moringa oleifera is easily established by cutting or by seed. Seed can be sown either directly or in containers. No seed treatment is required. The rapidly germinating seedlings can reach 5 m in one year if sheltered from drying winds and provided with enough water.

Plants raised from 1 m cuttings bear pods from the second year of growth onwards, with maximum production at 4 to 5 years. In a favorable environment an individual tree can yield 50 to 70 kg of pods in one year (Sherkar, 1993).

Accompanying/ Inter-row crops: The drumstick is an ideal tree for agro-forestry uses as the branches can be easily trimmed to regulate shade effects. Its open crown allows plenty of sunlight to reach under-story crops-- often garden vegetables that benefit from some shading.

Frequent pruning, lopping, coppicing or pollarding will increase and maintain leaf production. Drumstick will sprout back repeatedly and vigorously when lopped or pollarded. It is best to keep trees at a height that facilitates leaf harvesting. The leaves are attractive to all livestock however, so harvesting practices should keep the sprouting area out of reach of local browsers.

Limitations.

Though quite tolerant to drought, the tree is deciduous, and it loses most of its leaves in periods of mended water-stress.

The wood of *Moringa* is relatively soft. Because of this, it is not used in heavy construction. The tree is also susceptible to breakage in high winds.

The pods of some varieties taste quite bitter and may be poisonous if eaten in large quantities.

Moringa is relatively short-lived reaching only 20 years on average (von Maydell, 1986). Because it is so easy to establish, however, this limitation does not discourage cultivation of this very useful and adaptable tree.

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Moringa oleifera

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"*Drumstick Tree*" and variants thereof redirect here. This name is also used for the *Golden Shower Tree* (*Cassia fistulosa* L.).

Moringa oleifera

Scientific classification

Kingdom: [Plantae](#)
(unranked): [Angiosperms](#)
(unranked): [Eudicots](#)
(unranked): [Rosids](#)
Order: [Brassicales](#)
Family: [Moringaceae](#)
Genus: [Moringa](#)
Species: *M. oleifera*

Binomial name

Moringa oleifera

Moringa oleifera, commonly referred to simply as **Moringa** (Tamil **murungai**, ಮುರುಂಗೈ), (Kannada **Nuggekai**) (**Mulakkaya** in [Telugu](#)), (Marathi **Shevaga**) is the most widely cultivated variety of the genus *Moringa*. It is of the family Moringaceae. It is an exceptionally nutritious [vegetable tree](#) with a variety of potential uses. The tree itself is rather slender with drooping [branches](#) that grows to approximately 10 m in height; however, it normally is cut back annually to one meter or less, and allowed to regrow, so that [pods](#) and [leaves](#) remain within arm's reach.



The Moringa tree grows mainly in [semi-arid tropical](#) and [subtropical](#) areas, corresponding in the United States to USDA hardiness zones 9 and 10. While it grows best in dry [sandy soil](#), it tolerates poor soil, including coastal areas. It is a fast-growing, [drought](#)-resistant tree that is [native](#) to the southern foothills of the [Himalayas](#), and possibly [Africa](#) and the [Middle East](#)^[1]. Today it is widely cultivated in [Africa](#), Central and [South America](#), [Sri Lanka](#), [India](#), [Mexico](#), [Malaysia](#) and the [Philippines](#). Considered one of the world's most useful trees, as almost every part of the Moringa tree can be used for [food](#), or has some other beneficial property. In the tropics it is used as [forage](#) for [livestock](#). And in many countries, Moringa is used as a [micronutrient](#) powder to treat indigenous diseases.

A traditional food plant in Africa, this little-known vegetable has potential to improve nutrition, boost food security, foster rural development and support sustainable landcare.^[2]

The [immature](#) green pods, called “drumsticks” are probably the most valued and widely used part of the tree. They are commonly consumed in India, and are generally prepared in a similar fashion to [green beans](#) and have a slight [asparagus taste](#). The seeds are sometimes removed from more mature pods and eaten like [peas](#) or roasted like [nuts](#). The [flowers](#) are edible when cooked, and are said to taste like [mushrooms](#). The [roots](#) are shredded and used as a [condiment](#) in the same way as [horseradish](#), however it contains the [alkaloid spirochin](#), a potentially fatal [nerve](#) paralyzing agent, so such practices should be strongly discouraged. ^{[[citation needed](#)]}



Leaf in [Kolkata](#), [West Bengal](#), [India](#).

The leaves are highly [nutritious](#), being a significant source of [beta-carotene](#), [Vitamin C](#), [protein](#), [iron](#) and [potassium](#). The leaves are cooked and used like [spinach](#). In addition to being used fresh as a substitute for spinach, its leaves are commonly dried and crushed into a [powder](#), and used in [soups](#) and [sauces](#). *Murungakai* as it is locally known in [Tamil Nadu](#) and [Kerala](#) is used in [Siddha medicine](#). Its leaves are full of medicinal properties. The tree is a good source for calcium and phosphorus. In Siddha medicine, the drumstick seeds are used as a sexual [virility](#) drug for treating erectile dysfunction in men and also in women for prolonging sexual activity.



Trunk in [Kolkata](#), [West Bengal](#), [India](#)

The Moringa seeds yield 38–40% [edible oil](#) (called [ben oil](#), from the high concentration of [behenic acid](#) contained in the oil). The [refined oil](#) is clear, odorless, and resists [rancidity](#) at least as well as any other botanical oil. The seed cake remaining after oil extraction may be used as a [fertilizer](#) or as a [flocculent](#) to [purify](#) water.

The [bark](#), [sap](#), roots, leaves, seeds, oil and flowers are used in [traditional medicine](#) in several countries. In [Jamaica](#), the sap is used for a blue [dye](#).

The flowers are also cooked and relished as a delicacy in West Bengal and Bangladesh, especially during early spring. There it is called *sojne ful* and is usually cooked with green peas and [potato](#).

Malnutrition

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. (Jed W. Fahey, 2005)

A large number of reports on the nutritional qualities of Moringa now exist in both the scientific and the popular literature. 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. The oral histories recorded by Lowell Fuglie in Senegal and throughout West Africa, who reports countless instances of lifesaving nutritional rescue that are attributed to Moringa (Fuglie, L.J., 1999, 2000). 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. (Jed W. Fahey, 2005) 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 (Lockett et al., 2000). ”

[edit] Cultivation

In the Philippines, the plant is propagated by planting limb [cuttings](#) 1–2 m long, from June to August, preferably. The plant starts bearing pods 6–8 months after planting but regular bearing commenced after the second year. The tree bears for several years. It does not tolerate [freezes](#) or [frost](#). It can also be propagated by [seed](#). As with all plants, optimum cultivation depends on producing the right environment for the plant to thrive. Moringa is a sun and heat loving plant. As a seedling, however, you must monitor the environment in the beginning until the tree is established. Seeds can be germinated year round.

[edit] Soil

Moringa needs well draining [soil](#). Increase the drainage of your soil by adding [perlite](#) or other porous substance.

[edit] Planting seeds

Plant an inch from the surface of the soil, cover and tamp gently.

Rajangam *et al* write:


[India](#) is the largest producer of moringa with an annual production of 1.1 to 1.3 million tonnes of tender fruits from an area of 380 km². Among the states, [Andhra Pradesh](#) leads in both area and production (156.65 km²) followed by [Karnataka](#) (102.8 km²) and [Tamil Nadu](#) (74.08 km²). In other states, it occupies an area of 46.13 km². Tamil Nadu is the pioneering state insomuch as it has varied genotypes from diversified geographical areas, as well as introductions from Sri Lanka.

– [\[3\]](#)

Moringa is common in India, where its triangular, ribbed pods with winged seeds are used as a vegetable crop. It is particularly suitable for dry regions. The drumstick can be grown using rainwater without expensive irrigation techniques. The yield is good even if the water supply is not. The tree can be even grown on land covered with 10-90 cm of mud.

Moringa is grown in home gardens and as living fences in [Thailand](#), where it is commonly sold in local markets. ^[4] In the [Philippines](#), moringa is commonly grown for its leaves, which are used in soup. ^[5] The leaves (called *dahon ng malunggay* in [Tagalog](#) or *dahon sa kamunggay* in [Cebuano](#)) are commonly sold in local markets. Moringa is also actively cultivated by the [AVRDC](#) in [Taiwan](#). The [AVRDC](#) is "the principal international center for vegetable research and development in the world. Its mission is to reduce poverty and malnutrition in developing countries through improved production and consumption of vegetables."

[\[edit\]](#) Culinary uses

 Seeds and fruit of the *M. oleifera*, ready for cooking



The [fruit](#) of the tree is quite popular as a [vegetable](#) in [Asia](#) and [Africa](#). The fruit is a long, thin pod, resembling a [drum stick](#). The fruit itself is called *drumstick* in [India](#) and elsewhere. Moringa leaves are also eaten as a leaf vegetable, particularly in the [Philippines](#) and [Africa](#).

[\[edit\]](#) India

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The moringa pod is known as *drumstick* or *saragwa* or *saragwe* in India. In [South India](#), it is used to prepare a variety of [sambar](#) and is also [fried](#). It is also preserved by [canning](#) and exported worldwide. In other parts of [India](#), especially [West Bengal](#) and also in a neighboring country like [Bangladesh](#) it is enjoyed very much. It can be made into varieties of *curry* by mixing with coconut, poppy seeds and mustard. It can just be boiled, until the drumsticks are semi-soft and consumed directly without any extra processing or cooking. It is used in [curries](#), [sambar](#)s, [kormas](#), and [dals](#), although it is also used to add flavor to cutlets, etc.

Tender drumstick leaves, finely chopped, make an excellent garnish for any vegetable dishes, dals, sambars, salads, etc. One can use the same in place of or with coriander, as these leaves have high medicinal value. If the pulp has to be scraped out after cooking the sticks, then keep the pieces as long as 4-5 inches long. Also do not scrape the skin before boiling. This will help to hold and scrape them more easily and with less mess. For drumstick sambar follow recipe for traditional sambar, adding boiled drumstick fingers, along with onions in the oil, while stir frying.

Scraped drumstick pulp can be made into drumstick [bhurtha](#), more or less like the [baingan](#) bhurtha after the pulp has been obtained. It is a wonderfully unusual and tasty dish. The recipe is identical to that of baingan bhurtha.

Drumstick dal, is also a very tasty version of the traditional '[toor dal](#)'. Add some of the pulp to the boiled dal, and hand beat it along with the dal before seasoning. This will give an unusual, novel flavor to this dal. In another variation you may add pieces of boiled drumstick including the water in which it was boiled, to the traditional [toor dal](#) while it is simmering. The pieces are delightful to chew on with the dal & rice. In addition to being known as Drumstick Dal, the South Indian version which is a spiced lentil soup is more popular by the name - sambar or sambhar. Sambar is usually cooked with toor dal, drumsticks and other locally grown vegetables. The spices used typically in this stew are turmeric, chili powder and cumin among others. It is eaten with rice just like the Drumstick dal.

[\[edit\]](#) Philippines

In the Philippines, the leaves are widely eaten. Bunches of leaves are available in many markets, priced below many other leaf vegetables. The leaves are most often added to a broth to make a simple, and highly nutritious soup. The leaves are also sometimes used as a characteristic ingredient in [tinola](#)—a traditional chicken dish, composed of chicken in a broth, moringa leaves, and either green [papaya](#) or another secondary vegetable.

The leaves are now used in making "polvoron" candy, as [bio-fuel](#) and [moringa oil](#).

On [September 14](#), 2007, Senator [Loren Legarda](#) campaigned for the popularization of moringa. She asked the government to make moringa among its priority crops for propagation. The Bureau of Plant Industry, in its report, stated that, weight per weight, moringa leaves have the calcium equivalent of 4 glasses of milk, the vitamin C content of 7 oranges, potassium of 3 bananas, 3 times the iron of spinach, 4 times the amount of vitamin A in carrots, and 2 times the protein in milk. Moringa also helps to purify water, a cheaper alternative to mechanical filtration.^{[6][7]}



leaves with flowers in [Kolkata](#), [West Bengal](#), [India](#).

[\[edit\]](#) Other uses :

The tree's bark, roots, fruit, flowers, leaves, seeds and gum are also used medicinally. Uses include as an antiseptic and in treating rheumatism, venomous bites and other conditions.

[\[edit\]](#) Names

Other names for the **Moringa** in English include:

- *Drumstick tree*, from the appearance of the long, slender, triangular seed pods.
- *Horseradish tree*, from the taste of the leaves, which can serve as a rough substitute for [horseradish](#).
- *Ben oil tree*, from the oil derived from the seeds

The Chinese name of the Moringa (辣木), pronounced "la mu" in [Putonghua](#) and "lat mok" in [Cantonese](#), means "spicy (hot) wood", and is reminiscent of the English name "horseradish tree".

In some Indian languages, the name is phonetically somewhat similar to "moringa", while in others it is quite different:

- In Sinhalese it is called Murunga
- In Thai language it is called "ma rum มะรุม".
- In [Assamese](#) it is called *Sojina*.
- In [Punjabi](#) it is called *Surajana*.
- In [The Philippines](#) it is called *Malunggay*.
- In [Tamil](#) The tree is called *Murungai Maram* (முருங்கை மரம்) and the fruit is called *Murungai-kaai* (முருங்கை காய்).
- In [Hindi](#) it is called *sahjan*.
- In [Marathi](#) it is called *Shevga*.
- In [Kannada](#) it is known as *Nuggekayee*.
- In [Tulu](#) it is known as *Noorggae*.
- In [Telugu](#) it is called *Mulakkaya*.
- In [Konkani](#) it is called *Mushinga Saang*.
- In [Gujarati](#) it is called *Saragvo*.
- In [Oriya](#) it is called *Sajana* or *Sujuna*.
- In [Bengali](#) it is called *Sojne danta*.
- In [Kerala](#) state it is known as Muringa Tree and the fruit called Muringakka in [Malayalam](#).
- In [Nepali](#) it is known as *Sajiwan* or *Swejan*.
- a In [Guyana](#) it is called *Sijan*

The [Tagalog](#) name, in the Philippines - *Malunggay* - is also phonetically similar to "moringa". In [Ilocano](#), another Filipino language, it is called *Marungay*. It is called "Kamunggay" in Bisaya.

In [Haiti](#), the moringa is called the *benzolive* (or *benzolivier*).

In Nicaragua the plant is referred to as Marango.

In [Indonesian](#), the moringa is called *kelor* (*kalor* in [Malay](#)). In [Javanese](#), it is called *limaran*.

In [Mooré \(Burkina Faso\)](#), it is called "Arzan Tiiga" which means "tree of paradise".

In [Dioula \(Côte D'Ivoire\)](#), it is called "Arjanayiiri".

In Mauritius, it's : "Brede Mouroum", popular among the poor...

The [MMPND entry for Moringa](#) gives names in many other languages.

[edit] Popular beliefs

There are several popular beliefs associated with the tree and the fruit in southern India without any medical proof.

- The fruit is said to increase sexual libido in men. This belief is so common in the state of [Tamil Nadu](#) that there have been passive references to this in its legislative assembly.
- The tree is said to host ghosts during the night. This combined with the fact that the tree attracts a host of insects make it unattractive for people to grow it in their backyards.

[edit] Gallery



trunk at [Narendrapur](#) near [Kolkata](#), [West Bengal](#), [India](#).



flowering at canopy at [Narendrapur](#) near [Kolkata](#), [West Bengal](#), [India](#).



flowers in [Kolkata](#), [West Bengal](#), [India](#).



flowers in [Kolkata](#), [West Bengal](#), [India](#).



flowering branch in [Kolkata](#), [West Bengal](#), [India](#).



leaves at [Jayanti](#) in [Buxa Tiger Reserve](#) in [Jalpaiguri](#) district of [West Bengal](#), [India](#).



flowers at [Jayanti](#) in [Buxa Tiger Reserve](#) in [Jalpaiguri](#) district of [West Bengal](#), [India](#).



flowers at [Jayanti](#) in [Buxa Tiger Reserve](#) in [Jalpaiguri](#) district of [West Bengal](#), [India](#).

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7. [^ AHN, Philippine Lawmaker Urges Agriculture Department To Propagate Highly Potent Malunggay Vegetable](#)

[[edit](#)] External links



Yields and Economics

While I have not located specific yield figures for Moringa, I feel, from personal observations, that its biomass and pod production should approach that of Prosopis growing in the same habitat. Hence, I would suggest a target yield of **about 10 MT pods per hectare**.

Horseradish-tree is grown locally in India, Sri Lanka and elsewhere, and is consumed as a local product, either ripe or unripe. No commercial data are available.

Energy

According to Verma et al. (1976), "saijan" is a fast growing tree being planted in India on a large scale as a potential source of wood for the paper industry. It seems doubtful that the wood and seed oil could both be viewed as fountains of energy. According to Burkill (1966), "The seeds yield a clear inodorous oil to the extent of 22 to 38.5 percent. It burns with a clear light and without smoke. It is an excellent salad oil, and gives a good soap... It can be used for oiling machinery, and indeed has a reputation for this purpose as watch oil, but is now superseded by sperm oil."

Sharing rather similar habitat requirements with the jojoba under certain circumstances, it might be investigated as a substitute for sperm whale oil like jojoba. Growing readily from cuttings, the ben oil could be readily produced where jojoba grows. Coming into bearing within two years, it could easily be compared to jojoba in head-on trials. I recommend such.



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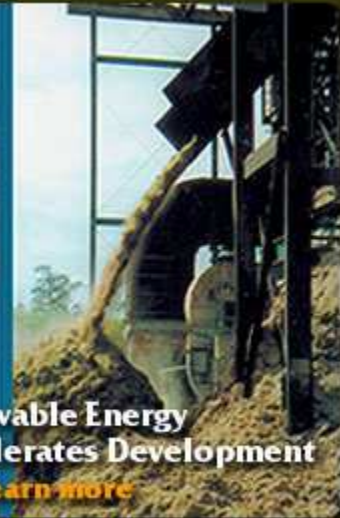
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