The Tree of Life, the Never Die Tree, The Magic Tree, The Tree of Paradise, The Miracle Tree, Mothers’ Best Friend. These are some of the laudatory appellations showered on the *Moringa plant*, *M. oleifera* and *M. stenopetala* in particular, to signify the plant’s utility as a functional food item, medicinal tree and natural water purifier. Since 2013 or so, the “Miracle Leaf” frenzy that hit the social media and other outlets by storm has catapulted *Moringa* even into the stores of Addis Ababa, especially Mercato. We hear a 0.5 kg- plastic bag of *Moringa*, with clear nutritional labels, sells for 80 Birr. In the USA, *Moringa* is sold in stores that cater to immigrants from India, Sri Lanka, China and the Philippines. Are the attributes that are ascribed to *Moringa* justified? There is some evidence that is put out in the scientific literature to lend support to many, if not all, of the nutritional, medicinal and other claims for the plant. Of course, the level of evidence is open to further scrutiny. The current article attempts to provide a summary of the highlights of *Moringa*, against general background information. A special emphasis is laid on its status in Ethiopia. Some key references have been given at the end.
Moringa has been used by the Romans, Greeks, Egyptians, Indians and other communities since as far back as the year 150 A.D. Even earlier than that period, ancient kings and queens included the leaves and fruits of the plant in their diets. Maurian warriors of olden times are said to have been fed Moringa to relieve them of stress and pain, and to energize them as well, during warfare. In 1817, a petition was tabled in the Jamaican House of Assembly applauding the food value of Moringa. It was also argued that Moringa oil was as good as the best Florence oil as a light source in giving clear illumination without emitting smoke. The plant is known by 210 different names in over 80 countries. Moringa oleifera is known by the common names: Drumstick Tree; Horse-radish Tree; Kelor Tree; Oil of Ben Tree. In the Nile valley, it is known by the name Shagara Rauwaq, which literally means “tree for purifying.” In Africa, the Hausa call it zogallagandi, while the Igbo and the Yoruba call it okwe-beke and ewe igbale, respectively. The Indians claim M. oleifera is used for 300 types of ailments. There are 13 known Moringa species in the monogeneric (monotypic) Moringaceae plant family. The best known and most studied plant in the genus is Moringa oleifera. A native of the western and sub- Himalayan tracts, India, Pakistan, Asia Minor, Africa and Arabia, Moringa oleifera is now distributed in the Philippines, Cambodia, Central America and the Caribbean Islands. It is important to note that of the 13 species, six are known in Ethiopia: M. longituba, M. oleifera, M. peregrine, M. rivae, M. ruspoliana and M. stenopetala. The most widely spread and used species in Ethiopia appears to be M. stenopetala. This species has been accorded various local names (perhaps some of the names apply to M. oleifera, as well):

Aleko, Aluko, Halaco (Gamo), Kalanke (Hamer), Shelaqta, Shelagda, Shelchada (Konso), Telahu (Tsemay), Shiferaw (Amarigna), Wuame, Mawe (Somali) and Wadessa. M. oleifera is an introduced species in Ethiopia, while the rest are indigenous. In Ethiopian traditional medicine, M. stenopetala is
used for asthma, diabetes, hypertension, malaria and stomach problems. For these remedies, tea that is prepared by boiling the leaves, or the liquid in which chopped leaves are dipped, is taken. For example, for severe malaria, communities around Arba Minch make a decoction from the leaves and roots, and drink the liquid in the morning before breakfast.

*M. stenopetala* is a branched tree that grows to 6-10 m high, with leaves that are 3.3-6.5 cm long, creamy-grayish seeds measuring 6-9 cm long, and sweet-scented flowers with petals up to 10 mm long. In comparison, *M. oleifera* can grow to 8 m high, with leaves that are 1-2 cm long, dark-brown or black seeds up to 5.5 cm long, and strongly scented flowers whose petals measure greater than 10 mm long. It is evident that *M. stenopetala* has larger leaves and bigger seeds. Nutritionally, both species are rich in carbohydrates, fats, proteins and minerals. These nutrients occur in about the same percentages in the leaves of both species. In fact, these levels of nutrients (carbohydrates, fats, proteins, mineral and fiber) are comparable to the levels that are found in *Brasicca carinata* (Ethiopian kale, aka *ye’habesha gomen*). The leaves are boiled and eaten like cabbage. For this reason, *M. stenopetala* is also known as “Cabbage Tree.” It is also known as African moringa. It has a wide range of adaptation, ranging from arid to humid climates. It is a fast growing and drought-resistant plant. A perennial plant, *M. stenopetala* can survive up to 100 years without reduction in productivity. The most common pests are caterpillars, which can destroy leaves from *Moringa* trees in an entire village just in one week. The nutritional composition has been extensively studied and reported. It is rich in proteins and has a fair amount of essential amino acids. It is widely used as food by 12 ethnic communities in southern Ethiopia. It is the main component of the daily diet of the Konso, Gamo and Gofa people in southern Ethiopia. *Moringa* is a popular ingredient of “kurkufa,” a special and favorite recipe of the Konso people.

*Moringa oleifera*

This species is often confused with the most commonly used species in Ethiopia, viz., *Moringa stenopetala*. Although the two species are closely related taxonomically and chemically, they are different species, and hence their properties and applications are not always the same. Just
like *M. stenopetala*, *M. oleifera* is used as food and helps to curb malnutrition and hunger around the world. The leaves and young pods are used as vegetables. They are added to soups and salads to help digestion and to enhance appetite. Infusion of the root bark is traditionally used for venereal diseases and treatment of fevers. The seed oil is applied to the skin externally to treat infections. In Africa, the tree is planted on grave sites to ward off hyenas. The branches are used to make potions for charm against witches. The seeds are used in Africa to induce abortion, and they are also used to purify water. In India, it is used for a long list of complaints: epilepsy, hysteria, to stimulate the heart and blood vessels, for various diseases of the liver, spleen, articular pains, scurvy, catarrh, flatulence, etc. Chemically, the leaves are rich in amino acids. The flowers and fruits also contain amino acids. The root-bark yields the amino acid derivatives moringinine and spirocholine, as well as benzylamine and glucotropaeline. The seeds contain a large amount of fixed oil, commercially known as **Beni** or **Moringa Oil**, which is rich in various types of fatty acids. The roasted seeds contain acetonitrile derivatives.

Most of the pharmacological studies conducted on *M. oleifera* were in animal or *in vitro* models. These studies have demonstrated antibacterial, anti-tubercular, cytotoxic, cardiac stimulant and vasopressor activities of the plant. The juice from the leaves and stem-bark was shown to have antibacterial and anti-tubercular effects. The root bark extract has demonstrated antiviral, anti-inflammatory and analgesic properties. The ethanol extract of the whole plant exhibited cytotoxic property in human epidermoid carcinoma in tissue culture and *in vivo* activity against P 388 leukemia cells in mice. The water extract has shown anti-fertility effect in rats. The aqueous extract reduced the turbidity of dirty water by 80-90.5% and also lowered bacterial count significantly within 1-2 hrs post-treatment, with the bacteria being concentrated in the coagulated sediment. A constituent of *M. oleifera*, moringinine is an adrenalin-like substance and a cardiac stimulant that raises blood pressure.

**Moringa stenopetala**

This species is the one commonly found in Ethiopia. Legend has it that it derived the name Shiferaw from a person (his name), who happened to
observe that cattle grew very well when they were foraging on *Moringa*. *M. stenopetala* shares some of the properties of *M. oelifera*. Nomadic people in the Omo Valley use the roots to clarify muddy water. The water purifying property has been shown not only to clarify muddy and turbid water, but also to decrease the suspended bacterial load. As mentioned earlier, nutritional studies have shown they have similar profiles of nutrients in fairly comparable percentages. Preliminary studies by Ethiopian scientists have demonstrated that extracts of the seeds possessed antimicrobial activity against *Salmonella typhi*, *Vibrio cholerae* and *Escherichia coli*. The roots have also shown activity against *Staphylococcus aureus*, *Salmonella typhimurium*, *E. coli* and *Pseudomonas aeruginosa*. The fatty acid constituents, a derivative of palmitic acid and oleic acid have been implicated in the antimicrobial effects. The leaf extract has exhibited activity against *Trypanosoma brucei* in guinea pigs and mouse models (trypanosomiasis = Gendi in Amh). The essential oils of the seeds are potent trypanocidal agents, with the activity attributable to the main constituent of the oil, benzyl isothiocyanate. In guinea pigs, *M. stenopetala* has shown hypotensive and saluretic (diuretic) effects. The crude water extract of the leaves caused a significant drop in systolic blood pressure (SBP), diastolic BP and mean arterial BP in normotensive (otherwise normal BP) in this model. A vasodilatation effect was observed when the guinea pigs were given *Moringa* after vasoconstriction was induced. In diabetes-induced mice, *Moringa* leaf extract has shown antihyperglyemic and antilipidemic properties. However, the active ingredients responsible for these effects are not known. *M. stenopetala* has been used for visceral leishmaniasis (kala-azar), caused by a *Leishmania* parasite (leishmaniasis = Qunchr or Shahgn in Amh). Intraperitoneal administration of a methanol extract of the leaves has indeed demonstrated antileishmanial activity in mice.

**The Hypebole**

*M. stenopetala* has been dubbed “super dish.” This designation may carry a notion that *Moringa* is an ultimate source of all required nutrients. While very nutritional, it does not contain all required nutrients for a healthy diet. However, it provides useful nutrients to people in the
rural community, especially in times of food shortage. Even in normal times, it is an important source for nutrients, when people do not have other choices, anyway. *M. stenopetala* has also been called a “magic herb,” which may imply a cure for all ailments. This is far from true. While anecdotal evidence (even in rigorous science) provides useful clues, it doesn’t necessarily constitute a definitive proof for verbal/written claims, until unbiased and well-designed larger studies are conducted. It is important, however, to mention that there is a school of thought in the natural products scientific community that if local people in various countries use an herb for a certain ailment and claim that it works, chances are that there might be some merit to the claim. This claim is then firmed up when it is supported by preliminary studies in various models. Some of the pitfalls of data derived from in *vitro* animal models are extrapolating results to humans. For example a plant material (an extract or pure compound thereof) may show activity in *vitro*, but this activity may be rendered inactive by enzymes when tested *in vivo*. Conversely, a material that is inactive *in vitro* may be transformed enzymatically to an active product *in vivo*. Then, there is also this phenomenon of multiple constituents in a plant, activating or deactivating each other to active, inactive or even toxic products.

**Conclusions**

*Moringa* is an interesting and useful plant. Among the six *Moringa* species found in Ethiopia, it appears that *M. stenopetala* is the most widely used species. It is mainly used as a food source, water purifying product and as a natural medicinal remedy. It has been demonstrated that it is rich in carbohydrates, proteins, fats, minerals and fiber. Studies have also shown that the plant is a reasonably good natural purifier of muddy and contaminated water. Local communities use it for diabetes, hypertension, asthma, leishmaniasis, malaria and unspecified stomach problems. Preliminary studies, especially those that were conducted in Ethiopia, appear to support the traditional uses of *M. stenopetala* for diabetes, hypertension and leishmaniasis. Dosing and regulating the marketing/use of *M. stenopetala* appear to be yet-unaddressed hazy areas. As has been recently brought up at a workshop held in Ethiopia in 2014, maximizing the benefits of *Moringa* should be a central issue to all stakeholders.
Confirming other medical claims through rigorous scientific studies needs to be a priority for all active researchers in the field.

Key References


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