



## A new record *Moringa oleifera* Lam. (Moringaceae) in the Flora of Libya

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### Abstract

*Moringa oleifera* Lam. Belongs to the family Moringaceae is recorded for the first time as introduced species in the flora of Libya, this record is add a new family as well. Few trees of *M. oleifera* were seen in two places, the first one at the petroleum clinic garden in Tripoli city, and the second one at Ghat hospital garden in the south-west of the country, these trees were introduced by Indian physicians who were working at these hospitals before forty years ago. In the last four years, the cultivation of this species was expanded in many parts of the country for its nutritional and medicinal value. Morphological description is provided to facilitate further identification of this species and to warrant its future detection as well.

**Keywords:** Food supplement, Horseradish, Moringa, Moringaceae, New record.

### Introduction

*Moringa oleifera* is commonly referred to as either Horseradish tree (referring to the taste of its roots) or Drumstick tree (describing the shape of its pods) (Shih *et al.* 2011) while less frequently referred to as 'The Tree of Life' or 'Miracle Tree' due to its economic importance and versatility (Abe and Ohtani 2013, Bakre *et al.* 2013; Taher *et al.* 2017.)

The genus *Moringa* comprises of 14 species distributed Africa, Madagascar, western Asia and the Indian subcontinent (Iqbal *et al.* 2006). *Moringa* is the only genus in the family Moringaceae. The genus *Moringa* has generally been divided into three sections: Moringa, Donaldsonia and Dymoringa, section Donaldsonia or the 'bottle tree' group consists of four species of trees, mostly from southern Africa and Madagascar, with swollen trunks and radially symmetrical flowers (Olson 2002). A second group known as the 'tuberous clade', comprising section Dymoringa and part of section Moringa, consists of six species of tuberous shrubs and sarcorhizal trees from north-eastern Africa with thick and fleshy tuberous roots (Olson 2002). The third group, to which *M. oleifera* belongs, is known as the 'slender tree clade'. It consists of three species of slender-trunked trees, from the Indian subcontinent and the Arabian Peninsula, with tough roots and bilaterally symmetrical flowers (Olson 2002). The other two species in this group are *M. concanensis* and *M. peregrina*. (Csurhes and Navie 2010)

*M. oleifera* is native to the Western and sub-Himalayan parts of Northwest India, Pakistan, and Afghanistan, and now it is widely cultivated across Africa, South-East Asia, Arabia, South America and Caribbean Islands (Santos *et al.* 2015). It is a fast-growing tree, grows best in the tropical regions of the world those have semi-arid or monsoonal climates, adaptable to a wide range of environmental situations, it has a wide climatic tolerance and can grows in conditions that range from humid to arid in tropical and subtropical regions, the

optimal annual rainfall for this species is thought to range from 700 to 2200 mm, but it is capable of growing in areas with an annual rainfall of between 250 and 3000 mm, it is very drought tolerant and can even survive in relatively arid areas (Csurhes and Navie 2010). This species is introduced intentionally into Libya for its nutritional and medicinal value, this is because almost all parts of the tree are utilized as natural medicine for many of diseases, for example, the flowers, leaves and roots are used for the treatment of ascites, rheumatism and venomous bites and as cardiac and circulatory stimulants in folk remedies, the oil is applied externally for skin diseases, the roots of the young tree and also root bark are rubefacient and vesicant. Moreover, leaf juice is used in hiccough (emetic in high doses); cooked leaves are given in influenza. The root-bark is used as antiviral, anti-inflammatory, analgesic, stem-bark and flowers are hypoglycemic, infusion of seed is anti-inflammatory, antispasmodic and diuretic, also given in venereal diseases, *Moringa* supports a healthy cardiovascular system, promotes normal blood-glucose levels, neutralizes free radicals that causes cancer, provides excellent support of the body's anti-inflammatory mechanisms, enriches anaemic blood and supports immunesystem. it also improves eyesight, mental alertness and bone strength. It has potential benefit in malnutrition, general weakness, lactating mothers, menopause, depression and osteoporosis (Chukwuebuka 2015).

### Material and methods

The plants of *M. oleifera* were reported as cultivated species in many regions of Tripoli city. The specimens were collected and brought to the national herbarium of the Botany Department, Faculty of Sciences,

Tripoli University. Then the samples were subjected to the general herbarium techniques, and then examined carefully and characterized with detailed description. Plant identification and authentication procedure were carried out at the National herbarium of Botany Department, Faculty of Science, University of Tripoli using the data from the following literature (Taher *et al.* 2017, Santos *et al.* 2015, Csurhes and Navie, 2016). Finally, the plant specimens are given voucher number (197615111), then the Voucher specimens were deposited at the same herbarium.

**Accepted name:** *Moringa oleifera* Lam.

**Synonym:** *Anoma moringa* (L.) Lour., *Guilandina moringa* L., *Hyperanthera decandra* Willd., *Hyperanthera moringa* (L.) Vahl, *Hyperanthera pterygosperma* Oken, *Moringa edulis* Medic., *Moringa erecta* Salisb., *Moringa moringa* (L.) Small, *Moringa myrepsica* Thell., *Moringa nux-eben* Desf., *Moringa octogona* Stokes, *Moringa oleifera* Lour., *Moringa parviflora* Noronha, *Moringa polygona* DC., *Moringa pterygosperma* Gaertn., *Moringa zeylanica* Pers., *Copaiba langsdorfii* (Desf.) Kuntze, *Copaifera langsdorffii* Desf., orth. var., *Copaifera nitida* Hayne, *Copaifera sellowii* Hayne (Csurhes and Navie, 2016).

**Common names:** Annual drumstick, Annual moringa, Behen tree, Behn tree, Ben oil tree, Ben tree, Benzolive tree, Cabbage tree, Clarifier tree, Drum stick, Drum Stick plant, Drum stick tree, Horse radish tree, Kelor, kelor tree, Miracle tree, Moringa, Moringa tree, Mother's best friend, Never die, River Nile tree, West Indian ben. (Csurhes and Navie, 2016).

### Description of species

Large tree up to 12 m, with smooth pale grey bark, younger parts pubescent. Leaves alternate, tripinnately imparipinnate, 25 - 60

cm long (including 4-15 cm long petiole); rachis pubescent, slender, pulvinate and jointed at base; pinnae 5-11, stalk of the pinna 1-3 cm long, articulated at base; pinnules 5-11, petiolule of pinnule 4-8 mm long; rachis of the pinnule articulated with a small rounded gland; leaflets 4 – 6 pairs, ovate, elliptic, or oblong, 1-2 (-2.4) cm long, 0.5-1.8 cm broad, sparsely tomentose above, glabrous below, petiolule 1-4 mm long. Inflorescence a widely spreading panicle 8-30 cm long, bracteate, 10-30 cm; bracts linear, 1 mm. Flowers white to cream, fragrant, 2.5 cm across, with 2 dorsal sepals and 1 dorsal petal usually remaining unreflexed and forming a projecting "keel" while the rest of the perianth reflexes down to form a "banner" at right angles to the "keel, pedicel 1-2 cm long. Calyx with 5 sepals, tube hairy; lobes slightly unequal, petaloid, imbricate, linear to lanceolate 1.3-1.5 cm long, 5-6 mm broad, reflexed, with prominent yellow streaks in the center, entire, obtuse. Petals 5, white, the anterior petal erect, others reflexed, ascending imbricate, spatulate with prominent veins, 1.2-1.8 cm long, 5-6 mm broad, acute, entire. Stamens 5; about a cm long, filaments villous at base, yellow. Ovary oblong single carpelled hairy, 5 mm long; style cylindrical. Fruit long capsule 9-ribbed, pendulous, 3-valved, 20-50 cm long, somewhat tomentose when young, dehiscent, green when young turning brown at maturity. Seeds subglobose, embedded in the pits of the valves, brown, 3-angled, winged, 8 – 15 mm in diameter excluding wings, wings 0.5-1 cm wide, blackish, rounded (Fig. 1 – 6). From Csurhes & Navie (2016), Santos *et al.*, (2015) and Taher *et al.* (2017).

## Results and Discussion

A few plants of *M. oleifera* were recorded in petroleum clinic garden in Tripoli, and Ghat hospital garden in the south-west of the country, it was introduced by indian

physicians who were working at these hospitals before forty years ago. In the last four years, this species was highly cultivated in many parts of the country for its nutritional and medicinal value, in fact the recent introduction of this species was referred to Mr. Mohammed El-Kammoushi who brought the seeds from Egypt and distributed it to the people, so he contributed to the spread of the plant in many parts of Libya, since then, many Libyan people became interesting with cultivation and utilization of Moringa tree due to presence of a variety of essential phytochemicals present in its leaves, pods and seeds. In fact, it is said to provide 7 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yoghurt, 15 times more potassium than bananas and 25 times more iron than spinach (Rockwood *et al.* 2013). Various parts of the plants such as leaves, roots, seeds, barks, fruits, flowers and immature pods act as cardiac and circulatory stimulants, possess antipyretic, antiepileptic, anti-inflammatory and antiulcer (Taher *et al.* 2017).



**Figure 1.** *M. oleifera* habit.



**Figure 2.** *M. oleifera* inflorescence.



**Figure 5.** *M. oleifera* fruits.



**Figure 3.** *M. oleifera* flower, front view



**Figure 6.** *M. oleifera* seeds



**Figure 4.** *M. oleifera* flower, side view

For all these medicinal importance and others, *M. oleifera* has been cultivated in many parts of Libya and became familiar to the most Libyan people in addition to its nutritional value where it used as food, its leaves either eaten raw, in salad or cooked dry or fresh and involved in many traditional meals.

*M. oleifera* has naturalized in at least 70 countries across the tropical and subtropical regions of the world. In many countries it is regarded as a resource rather than a weed due to its multiple uses, for example, in Africa, it is highly prized as a fodder tree during droughts and famines. Nonetheless, there are

numerous references in the literature to this species being invasive or potentially invasive (Csurhes and Navie 2010). According to Csurhes and Navie (2010) *M. oleifera* is ranked as a ‘moderately invasive’ species that is spreading but still occurs at low densities and is not considered to be an immediate problem. *M. oleifera* appears on several invasive species lists at an international level. For example, it is listed in the *Global compendium of weeds* (Randall 2002), where it is described as both an environmental weed and casual alien species, and in the *Global invasive species list* that was derived from it (Rice 2003). It also appears on the list of plant species that are thought to threaten Pacific islands’ ecosystems (PIER 2007).

*M. oleifera* is introduced and recorded in Libya as a new addition to the flora of Libya which add a new family as well. It introduced intentionally for its medicinal and nutritional importance, but on other hand it should be an alert of the probable invasiveness and emerging problem, and may cause serious impacts, which requires the implementation of an appropriate management plan, including quarantine and potential eradication.

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