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Moringa oleifera Lam.: A Biofunctional Edible Plant from India, Phytochemistry and Medicinal Properties

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Abstract

Moringa oleifera is a versatile horticulture tree with important medicinal, nutritional and industrial applications, widely distributed and used in India. The *Moringa* tree originated in India and was introduced to Africa from India and other countries as a health supplement. Almost all parts of the plant have shown nutritional value and are used in India for a variety of food preparations. In India, *M. oleifera* leaves are available in powder to treat mild malnourishment in children. About all parts like leaves, seeds and pods are used as vegetables. Phytochemicals such as flavonoids, tannins, triterpenoids, saponins, flavonoids, anthraquinones, alkaloids and others, are responsible for the medicinal value of this plant. This species is rich in protein, fatty acids, vitamins and minerals that form part of its quality as superfood. It has been reported to have strong antimicrobial, antioxidant, anti-inflammatory, hepatoprotective, diuretic, anthelmintic and antiurolithiatic properties, among others. People in India use this species to treat common illnesses because of its availability and easy preparation. This review provides information on the significant potential of *Moringa* and its nutritional, medicinal, pharmaceutical and industrial values.

Keywords: *Moringa oleifera*, medicinal value, phytochemicals, underutilized nutritional plant

1. Introduction

The genus *Moringa* belongs to the monogeneric family Moringaceae and comprises thirteen species distributed from semi-arid Africa to Asia. Of these, *M. oleifera* Lam. (Figure 1) is the most commonly known species distributed in the northwest India (Mabberley, 2017; Nadkarni, 1976; Ramachandran *et al.*, 1980; Jahn 1988; Somali *et al.*, 1984; Mughal *et al.*, 1999). The tree ranges in height from 5 to 10m (Morton, 1991). This tree grows rapidly, with recording growth of 6-7 m in areas with rainfall of less than 400 mm per year (Odee, 1998). Although it is wild in NW India, it can be cultivated in different areas, growing at elevations of up to 1,000 m above sea level on pasturelands, river basins or hillsides.

Moringa oleifera is also known with different names including, horseradish tree, ben oil tree, drumstick tree, miracle tree, and "Mother's Best Friend", Kelor tree (Anwar and Bhangar, 2003, Prabhu *et al.*, 2011). This species was introduced to Africa at the beginning of the twentieth century as a health supplement (Muluvi *et al.*, 1999). The ben oil seems to show promise for the manufacture of soap with high washing efficiency. This makes it suitable for poor areas where people cannot afford buying these products but they have the plant available for use.

This nutritional plant is little known in the western world despite of being considered one of the world's most beneficial trees due to the potential use of each part of plant (Table 1) either as fodder, vegetable or medicine in South Asia (Odebiyi and Sofowora, 1999). The leaves, fruit, flower and immature pods (Figure 1) of this tree are commonly used as a nutritious vegetable in several countries, making it a great potential food source in dry season areas where food could be scarce. Countries such as India, Pakistan and Philippines (Gopalakrishnan *et al.*, 2016; Anwar *et al.*, 2005; Anwar and Bhangar, 2003; D'souza and Kulkarni, 1993) use this species widely. *Moringa* is being used in diverse culinary ways and as a health supplement (McBurney *et al.*, 2004; Fahey, 2005; DanMalam *et al.*, 2001; Iqbal *et al.*, 2006). A leaf powder from the plant can be used for children with malnutrition, pregnant and lactating woman (Price, 1985). For example, In the Philippines, this plant is commonly used to increase the production of milk in lactating women, hence its name of "mother's best friend"; and it has also been prescribed to patients with anemia (Siddhuraaju and Becker, 2003; Estrella *et al.*, 2000).