



Moringa oleifera flowers: A review on nutritive benefits, medicinal values and culinary uses

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Abstract

Moringa Oleifera, native to India, grows in the tropical and sub-tropical regions of the world. It is commonly known as “Drumstick tree” or “Horse radish tree”. It can withstand both severe drought and mild frost conditions and hence widely cultivated across the world. Different parts such as roots, leaves, bark, flowers, fruits of immature pods and seeds are well known for its nutritional and medicinal potential; But most of the research has been regarding leaves and pods; Therefore in the present study, the nutritive value as well as medicinal benefits of the flowers were discussed. The flowers provide a rich and a rare combination of nutrients - minerals, vitamins, amino acids, antioxidants and other essential phyto-chemicals. This review explains the use of Moringa flowers across various researches for its nutritive value, medicinal applications and prominent pharmacological properties of this “Miracle tree flowers”.

Keywords: moringa oleifera flowers, nutritive benefits, medicinal values, culinary uses

1. Introduction

Moringa Oleifera popularly known as drumstick tree, is a tropical plant grown for its nutritious leafy greens. It is a well-recognized member of *Moringaceae* family of trees & Thought to be originated in the Sub-Himalayan forests of the Indian continent (Kunyanga *et al.*, 2013^[13] and Leone *et al.*, 2015)^[15]. It is beautiful tree mostly grown as backyard tree in most of the South Indian homes for its drumstick like fruits, tasty flowers & the leaves that are cooked and eaten as vegetable (Fuglie, 2000)^[8]. Every part of the plant can be used for herbal remedies (Dasthe, 1962). It is esteemed as a versatile plant due to its multiple uses. For centuries, people in many countries have used Moringa leaves as traditional medicine for common ailments. They are traditionally used for the cure of asthma, catarrh, chest congestion, cholera, conjunctivitis, cough, diarrhoea, eye & ear infections, fever, headaches, abnormal blood pressure, scurvy, semen deficiency, sore throat, tuberculosis etc. It is said to cure about 300 diseases & almost have all the vitamins found in fruits & vegetables. It is considered to be the most nutritious, rich plant on earth (Nwakalor and Chizoba, 2014). Different parts such as roots, leaves, bark, flowers, fruits of immature pods & seeds possess a number of therapeutic properties such as diuretic, antipyretic, antioxidant, anti-inflammatory, antihypertensive, antitumor, antiulcer. It can also be used as an anticancer agent as it is a natural, reliable and safe at established concentrations. Every part is a store house of important nutrients & anti-nutrients (A review on nutritive importance & its medicinal application by Lakshmi priya Gopala krishnan, 2016)^[14]. The leaves, seeds and flowers of Moringa oleifera all have great nutritional and therapeutic value (Olushola, 2006). *Moringa oleifera* has also promoted by World Health Organisation (WHO) as an alternative to imported food source to treat malnutrition.

Flowers

The flowers are surrounded by yellowish-white petals. The flowers bear fruits. The fruit is generally a three sided

Brown capsule of 20-45cm size, which holds dark brown globular seeds with a diameter around 1cm (Kunyanga *et al.*, 2013^[13], Leone *et al.*, 2015)^[15]. The flowers have been used to combat malnutrition, especially among infants & nursing mothers. Scientific research confirms that these humble flowers are a power house of nutritional value (A review on nutritive importance & its medicinal application by Lakshmi priya Gopal krishnan, 2016)^[14].

Nutritive benefits, medicinal values and culinary uses

Edible drumstick flowers, which have been used in the culinary arts for centuries, are experiencing renewed popularity. They serve as an essential ingredient in recipes, provide seasoning to dish, or simply be used to garnish (Sharma *et al.*, 2011)^[24]. These flowers has been used for various ailments in the indigenous medicine of South Asia, including the treatment of inflammation and infectious diseases along with cardiovascular, gastrointestinal, haematological and hepato protective disorders (The Wealth of India, 1962; Singh and Kumar, 1999; Morimitsu *et al.*, 2000^[16] Siddhuraju and Becker, 2003)^[25]. The flowers are used not just for their aesthetic sense but also for nutritive and medicinal properties. For several centuries medical practitioners have long been acknowledged the therapeutic properties of certain flowers. The flowers and leaves that are cooked and eaten as a vegetable. They are either mixed with other foods or fried in batter (Fahers, 2005). They are also eaten as vegetable curries, in salads, as pickles and used for seasoning. The flowers are eaten as vegetable flower in curries and taste like mushrooms (Price M, 2007^[20] and Duke, 1982)^[5]. They are also soaked in vinegar and are used with food or they are made into curries which are very wholesome (Rajangam, 2001). They are eaten raw as salads and are also used for making tea and also for preparation of pickles (Ame Ravani, 2018)^[2]. Eating the flowers cooked with unripe mango reduces summer heat in the body and prevents nutrient deficiency (Kumar *et al.*, 2010). Moringa flowers provide a rich, rare and perfect combination of nutrients, amino acids, antioxidants, anti-aging and anti-

inflammatory properties used for nutrition and healing. It has an impressive range of medicinal uses with high nutritional value. It is also promoted by World Health Organization (WHO) as an alternative to imported food source to treat malnutrition (Fuglie, 2000) ^[8]. The flowers, leaves and pods contain several nutrients which can be used to cure many diseases. Several reports highlight the importance of moringa in preventing diseases like cancer, diabetes, AIDS etc., hence consuming moringa leaves, flowers will solve most of the problems encountered by rural and urban people (Fuglie, 2000) ^[8]. Food product development is the need of the world today to fight malnutrition or under nutrition. They are used to combat malnutrition especially among infants and nursing mothers as they are shown to be rich in potassium and calcium (Fuglie, 2000) ^[8]. Its regular use during lactation helps the mother to get extra calcium, iron and potassium at no cost and also helps the healthy development of the baby with strong nerves and bones (Dasthe, 1962). The oven dried Moringa flowers contain more Vitamin A than carrots, more calcium than milk, more iron than spinach, more Vitamin C than oranges and more potassium than bananas. Scientific researches confirm that these flowers are the powerhouses of nutritional value (Fahers, 2005). It has very high nutritional properties including vitamins, proteins, β -carotene, aminoacids and various phenolics such as β -sitosterol, caffeoylquinic acids, quercetin, zeatin and kaempferol. It also contains both omega-3-fatty acids and omega-6-fatty acids in small amounts. (A review on nutritive importance and its medicinal applications by Lakshmi Priya Gopala krishnan, 2016) ^[14]. Various parts of this plant contain protein, vitamins, amino acids, important minerals and various phenolic compounds. The flowers are rich in vitamin A and C, β -carotene, potassium, calcium, iron and phosphorus and acts as a good source of natural antioxidants and thus enhance the shelf-life of fat containing foods due to the presence of various types of antioxidant compounds such as ascorbic acid, avonoids, phenolics and carotenoids (Singh *et al*, 2012 and Patel S, 2010) ^[19]. The lactagogue made of phytosterols, acts as a precursor for hormones required for reproductive growth. The flowers are rich in phytosterols like stigmaterol, sitosterol and kampesterol which are precursors for hormones. These compounds increase the oestrogen production which in turn stimulates the proliferation of the mammary gland ducts to produce milk. The immature pods and flowers showed similar amounts of palmitic, linoleic, linolenic, and oleic acids (Lakshmi priya Gopala krishnan, 2016 ^[14] and Dr. Mi Mi Yee, 2019) ^[4]. Gopalan *et al.*, (2004) reported that the drumstick flower contains trace of alkaloids and its ash is rich in potassium and calcium. Flowers contain nine amino acids, sucrose, D-glucose, wax (Rukmani *et al.*, 1998 and Ameer Ravani, 2017) ^[2]. The leaves and flowers are good sources of protein and dietary fibre with adequate profile of amino acids and ash. The extracts contain a great amount of ascorbic acid, polyphenols, tannins and flavonoids with high DPPH radical scavenging activity (Lakshmi priya Gopala krishnan, 2016 ^[14] and Price M, 2007) ^[20]. The fresh juice of the flowers is mixed with butter milk is given as a medicine to cure asthmatic attacks, scanty urination, indigestion, gravel in bladder. Juice is given twice with tender coconut water acts as a diuretic tonic-medicine during the treatment of nephritis, congestive heart failure, cystitis, pyelitis, gonorrhoea, etc., (Fahers, 2005). According to Hastwell

(1967-1971), the flowers and leaves are used in folk remedies for tumors. The flower juice is applied externally as an outer irritant (Chopra, 1996). A tablespoon of fresh flower juice is mixed with honey and a glassful of tender coconut water is given two to three times as a herbal medicine during the treatment of cholera, dysentery, diarrhoea, jaundice etc., The same medicine can be regularly used during all times by all irrespective of age. Every part of the plant can be used for herbal remedies. Regular use of the flower prevents the infection from round and pin worms. The stimulation action of this was also found in other organs. This can also be reducing pain and inflammation caused by injuries (Chopra, 1996). Drumstick flowers were used in treating cold and anaemia and reported to contain powerful antibiotic, pterygospermin which has fungicidal properties (Sreenivasan and Jyotsna, 2000). Flowers boiled with water and the preparation is used as a cold remedy (Rajangam, 2001). The fresh flower juice is applied with lime juice cures pimples, black heads & keeps one's face flower fresh. The flower is mixed with milk instead of water & the infants & children are fed once a day to help them grow healthy with strong bones, pulses, blood & develop high resistance against infection & malnutrition (Nadkaini *et al.*, 1984). The fresh flower juice is instilled in the nose to stop bleeding due to summer heat. It stops bad smelling in the nose & prevents nasal problems (National Research Council, 2006). Moringa's medical uses are many. The flower extracts are applied as a medicine to sores, they are rubbed for headaches. They are taken to promote digestion. Paste of these is applied over glandular swellings (Dastur, 1962). It is widely consumed for self-medication by patients affected by diabetes, hypertension, or HIV/AIDS (Vittal Kamble and Bhuvaneshwari G, 2018). The flower has different types of biological activities like antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, cholesterol lowering, antioxidant, anti-diabetic, Hepato protective, antibacterial, cardiac and antifungal activities and are being employed for the treatment of different ailments in the indigenous system of medicine (Patel S, 2010) ^[19]. All parts of trees are considered medicinal and used in the treatment of ascites, rheumatism, venomous bites and as cardiac and circulatory stimulant. The leaf, flower, root and seed are used for tumours (Dr. Mi Mi Yee, 2019) ^[4].

Conclusion

Food product development is the need of the world today to fight malnutrition or under nutrition. The plants foods are often neglected by the Indian society so development of food product which are nutritious and healthy to consume is necessary to meet the nutritional needs. The *Moringa oleifera* flowers are rich antioxidants, vitamin A and many other nutrients. It can be consumed by any age group of the society. It is a low cost product and affordable by the weaker sections of the society. Therefore present study was carried out to promote these flowers for consumption that will definitely enrich our food basket.

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