



INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 3, Issue 6)

Available online at www.ijariit.com

Moringa Oleifera: The Miracle Tree

Ruchita Haldar

CSIR-National Environmental Engineering Research
Institute, Nagpur, Maharashtra
ruchita.haldar@gmail.com

Sharda Kosankar

CSIR-National Environmental Engineering Research
Institute, Nagpur, Maharashtra
sn_dhadse@neeri.res.in

Abstract: *Moringa oleifera* (family Moringaceae) is the only genus which is cultivated most widely. Moringa is commonly known as drumstick tree, horseradish tree, benzoil tree etc. *Moringa oleifera* is very resistant, fast growing and requires very less amount of water to grow, i.e. it can grow also in drought conditions. Drumstick tree is a native of southern foothills of the Himalayas in north-west India, and it is widely cultivated in India in tropical and subtropical regions where the seed pods are used as a part of the diet.

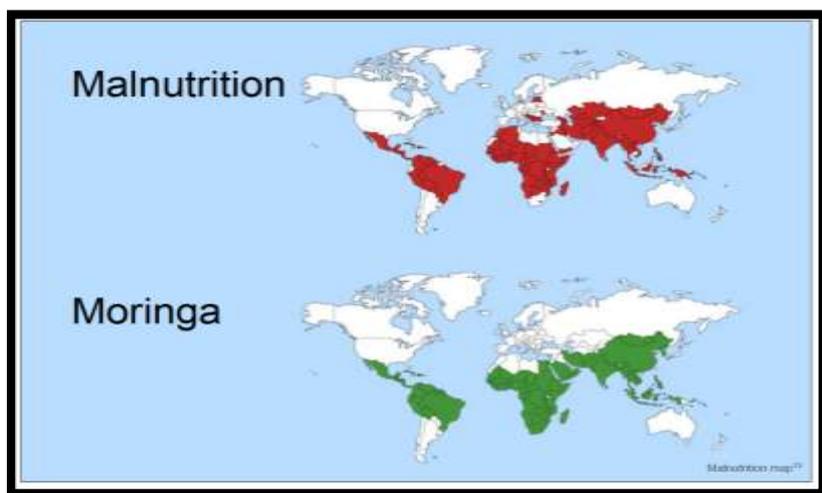
Moringa is used since the ancient times in India and is also a native of India. *Moringa* is having very high nutritional values with around 40 antioxidants and is rich in vitamins A, B, C, D, E and K. Not only vitamins but the plant is also very rich in mineral contents and contains Ca, Cu, Fe, K, Mg, Mn, and Zn. The properties and contents of *Moringa* can cure a number of deficiencies and diseases. The consumption of *Moringa* can control blood pressure, eyesight, prepare mental alertness and bone strength. *Moringa* is also used as a fodder for livestock. Therefore, this paper is enlightening the use of *Moringa* as a rich source of food for the nutritional enrichment.

Keywords: *Moringa oleifera*, Vitamins, Minerals, Antioxidants, Nutrition.

INTRODUCTION

Moringa oleifera is a deciduous tree, which is having a very fast growth. Its maximum height can reach up to 10-12m whereas, the trunk can have a diameter upto 45cm. The flowers of *Moringa* have yellow-white petals and are bisexual. The petals are five in number and are unequal as well as thin veined. The flowers are 1-1.5cm long with 2cm in broadness. After plantation of *Moringa*, the flowering occurs within the six months. The bark is whitish coloured with thick cork. The young shoots have purple or greenish hairy bark. In cold regions, flowering takes place once a year (April to June). The pods are hanging, three-sided brown or green coloured capsule shaped (20-45cm in size) with globular pods with a diameter of approximately 1 cm. The shape of seeds is trinocular with whitish papery wings and can be dispersed by wind or water (Leone, 2015; Olson, 2010).

The moringa pods (drumstick) production in India is 1.1 to 1.3 million tonnes which is largest in the world. The largest producer and the largest area both are in Andhra Pradesh followed by Karnataka and Tamil Nadu. It is a continual plant and the pod production can be started after one year. In the first year of cultivation moringa pods are readily edible, but in the successive year's moringa also bear nonedible bitter pods. It is commercially cultivated plant having big advantages and medicinal values, and therefore now a day it is cultivated under Agroforestry. (Foidl, 2001).



Moringa's Growing Regions and Regions of Malnutrition

Classification

Order	Capparales
Family	Moringaceae
Genus	<i>Moringa</i>
Species	<i>Oleifera</i>

History of the Miracle Tree

The Moringa tree is known from 150 B.C. Uses of moringa pods as a vegetable by ancient king and queens to make their skin beautiful. Studies have revealed that there is evidence of Moringa consumption in eighty countries and is known in 200 languages. Not only in India, Moringa is widely used in other cultures like Roman, Greek, Egyptian etc. In ancient times there is reference that the Maurian warriors of India were given the Drumstick leaf juice also known as the Elixer drink. They believed that this juice adds extra energy and is a stress releaser along with a pain reliever which was occurred during the war.

Edible parts of Moringa

The Moringa tree needs very less amount of water to grow and when fully grown each and every part of the tree can be made a part of the diet makes it different from other plants and therefore it is also called as the "Miracle tree". The nutrients present in milk, carrot, and orange are all together present in the single fruit. The Moringa tree can grow very well in the regions of malnutrition and therefore called as a botanical platypus. The whole Moringa tree is edible and the barks are also sometimes taken as medicine for Diarrhea. Moringa root's taste is very much like horseradish, and therefore it is also called as horseradish tree. The edible parts of moringa are, root, flowers, and leaves, fruits and seeds. From a long time it was used as a medicine to treat skin infections, scurvy, tumors, bronchitis, and anaemia. The tiny leaves of Moringa are equal to 7 times the Vitamin C of Oranges, 4 times the Vitamin A of Carrots, 4 times the Calcium of Milk, 3 times the Potassium of Bannanas, 2 times the Protein of Yogurt.

Having the value of so many nutrients in a single tree, Moringa plays an important role in as a food source in the areas of malnutrition. Moringa leaves are rich in these nutrients, with the added benefit of omega-3 fatty acids and many phytochemicals.

Leaves

The Leaflets are very nutritious and many recipes can be made in a variety of ways. The most common way of preparing the moringa leaves dish is the spinach recipe. The young leaves are the source of starch or porridge made with corn meal. The dried leaves of Moringa can be added to sauces to improve its nutritional value.

Pods

The young pods are called "drumsticks" because of the shape of the pods by Indian communities. It can be cooked in many varieties in different regions of India. Many people cooked it as a vegetable, while some communities make a mixed vegetable recipe called "sambar dal" which is very famous in south India. They are commonly found in Indian and Asian markets in fresh forms as well as canned forms. The Moringa pods are supplied to Europe and Asia by India, Kenya, and Srilanka.

Flowers

One year of matured Moringa tree is able to produce pods. The recipes of flowers of moringa are generally made in two ways one is frying it as it is and the other way is making the flowers mixed with batter and deep fried it. It can be eaten as a special food and is highly nutritious. The flowers are rich in Ca and K. The flowers of Moringa are the source of nectar for bees.

Seeds

The seeds are also part of the edible portion of Moringa. The seeds are peeled off from the outer coating and can be eaten as peas when they are fresh and green, the dry seeds cannot be eaten due to the bittering of the outer coating of the seed. The mature seeds consist of 40% of the oil. Moringa oil contains 73% Oleic acid which can be used for cooking and can be sold as “ben oil”. (Duke J.A,1987). The oil cake of Moringa seed is bitter in taste and contains anti-nutritional elements, like haemagglutinins, glucosinolates, alkaloids, and saponin. (Farooq, 2007).

Roots

The roots are not truly edible but the trees which are a few months old can be taken out and used in the diet in place of horse radish. The bark of the root is thoroughly scrapped off because of the presence of alkaloids including the toxic and active moringinine. It is observed that eating a large amount of the drumstick roots or consuming it frequently can lead to nervous problems as it contains pterygospermin and an alkaloid called spirachin, which is a nerve-paralyzing agent.

Other Uses of Moringa

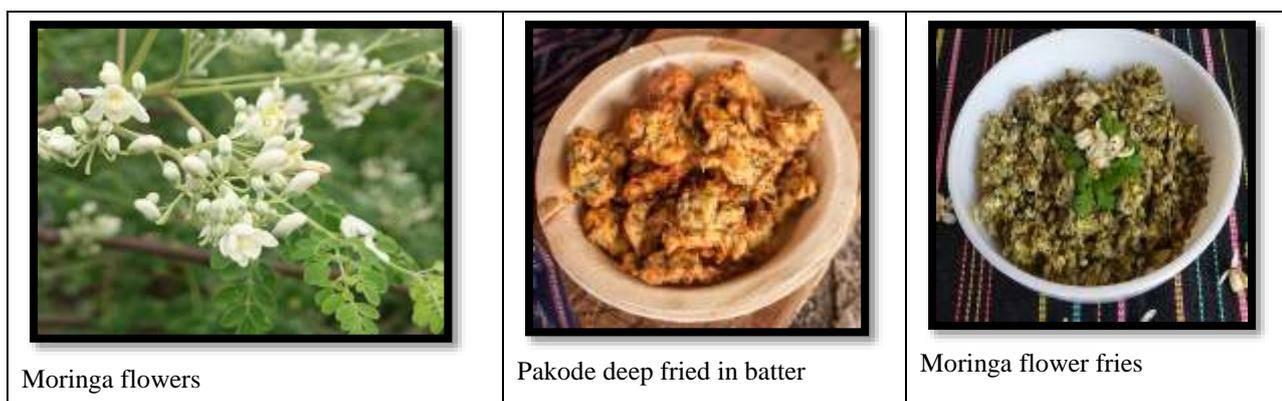
Woods

This is the part which can be used as firewood or charcoal and is not edible. The Drumstick tree wood is very soft. The firewood of Moringa is good but it makes poor charcoal. The woods of Moringa is also used in the making of paper pulp according to (Foidl). Another use of the woods of Moringa is that a blue dye is prepared from the woods in Senegal and Jamaica.

Use as an Antibiotic

The compound Pterygospermin and related compounds (isothiocyanates) are present in the Moringa plant, it has been observed that, it contains the antibiotic and fungicidal activity. It is also effective against many infections and further research is needed to know the efficiency of an extract of Moringa leaves, flowers seeds, bark, and roots.

Plant product	Recipe	Recipe
 <p data-bbox="108 1429 277 1458">Moringa leaves</p>	 <p data-bbox="608 1420 839 1449">Moringa leaves in dal</p>	 <p data-bbox="1010 1413 1286 1442">Moringa Leaves sauté fry</p>
 <p data-bbox="108 1753 261 1783">Moringa pods</p>	 <p data-bbox="608 1809 807 1839">Moringa Pod Dish</p>	 <p data-bbox="1010 1816 1206 1845">Moringa pod dish</p>



CONCLUSION

The Moringa tree is drought resistant and is very inexpensive, therefore it can be grown in almost every region including the areas of malnutrition. The *Moringa Oleifera* plant provides a very good nutrition and also can cure and prevent a number of diseases. It is a matter of fact that inspite of having so many properties beneficial for humans, the knowledge of eating moringa among most of the population is unknown. Moringa is said to be a Miracle tree as it can cure the issue of malnutrition. Almost each and every part of this tree is edible and can surely eliminate malnutrition. It consists proteins, vitamins, carbohydrates which are present in multiple amounts as compared to other healthy nutritional products.

There is a number of food preparations which can be made from a single tree using its different parts. The poor countries and the regions of malnutrition should promote the plantation of *Moringa oliefera* instead of waiting for help from the other countries to solve the issue of malnutrition. Exporting and growing the Moringa tree can also be beneficial which can solve the problem of poverty and hunger and as well as can cure many diseases. Therefore, Moringa is a miracle plant having many benefits for humanity and can be grown at large scale as it is the high quality gift of nature.

SUGGESTIONS

- Many types of research prove that, it is a natural water purifier so there is a need to explore this technique on a large scale.
- It is highly nutritious, it can be used to overcome malnutrition problems by making supplementary nutritional tablets.
- The complete tree is having medicinal properties, therefore detail studies are required to prove its use on various diseases.
- As it is very easy to cultivation Moringa, it should be promoted as a cash crop.

REFERENCE

1. Anwar F, and MI Bhangar (2003) Analytical characterization of Moringa oleifera seed oil grown in temperate regions of Pakistan. *Journal of Agricultural and Food Chemistry* 51: 6558-6563.
2. Babu SC (2000) Rural nutrition interventions with indigenous plant foods: a case study of vitamin deficiency in Malawi. *International Food Policy Research Institute, Washington, DC. Biotechnology, Agronomy Soc. Environ.* 4(3): 169-179.:
3. Caceres A, A Saravia, S Rizzo, L Zabala, E De Leon, F Nave (1992) Pharmacologic properties of Moringa oleifera. 2: Screening for antispasmodic, anti-inflammatory and diuretic activity. *Journal of Ethnopharmacology* 36: 233-237.
4. Carter Seeds, 1611-A SO Melrose Dr. #1, Vista, CA, 92083; 800/872-7711; <http://www.carterseeds.com>
5. Costa-Lotufo LV, MTH Khan, A Ather, DV Wilke, PC Jimenez, C Pessoa, MEA de Moraes MO de Moraes (2005) Studies of the anticancer potential of plants used in Bangladeshi folk medicine. *Journal of Ethnopharmacology* 99: 21-30.
6. Dahot MU, and AR Memon (1987) Properties of Moringa oleifera seed lipase. *Pakistan Journal of Scientific and Industrial Research* 30(11): 832-835.
7. Dayrit FM, AD Alcantar, and IM Villasenor (1990) Studies on Moringa oleifera seeds, Part I: The antibiotic compound and its deactivation in aqueous solution. *Philippine Journal of Science.* 119: 23-32
8. Delisle H, S Bakari, et al. (1997) Provitamin A content of traditional green leaves from Niger. *Cahiers Agricultures* 6(6): 553-560
9. Department of Agriculture, Forest Service, Southern Forest Experiment Station. 12 p
10. Duke JA (1987) Moringaceae: Horseradish-tree, benzolive-tree, drumstick-tree, sohnja, moringa, murunga-kai, malunggay, p. 19-28. In: M. Benge (ed.) *Moringa: A multipurpose vegetable and tree that purifies water.* Sci. & Technol./ For., Environ., & Natural Resources Agro-Forestation Tech. Ser. 27. US AID, Washington, D.C.
11. ECHO's web site contains information about Moringa and our bookstore has several Moringa publications: <http://www.echonet.org>
12. Ellison Horticultural PTY.Ltd 267 Rous Road, A/stonville NSW 2477 Australia p: 6144-214255
13. Ezeamuzie IC, AW Ambakederemo, et al. (1996) Anti-inflammatory effects of Moringa oleifera root extract. *International Journal of Pharmacognosy* 34(3): 207-212.

14. Faizi .S, BS Siddiqui, R. Saleem, K. Aftab, F. Shaheen, AH Gilani (1998) Hypotensive constituents from the pods of *Moringa oleifera*. *Planta Medica* 64: 225-228.
15. Farooq, A and Rashid, U (2007). Physico-chemical characteristics of *Moringa oleifera* seeds and seed oil from a wild provenance of Pakistan. *Pak. J. Bot.*, 39(5): 1443-1453,
16. Foidl, N, Makkar, H.P.S. and Becker, K. (2001) The potential of *Moringa oleifera* for agricultural and industrial uses.
17. Francis, John K. Liogier, Henri A. (1991). Naturalized exotic tree species in Puerto Rico. Gen. Tech. Rep. SO-82. New Orleans, LA: U.S.
18. Fuglie LJ (1999) *The Miracle Tree: Moringa oleifera: Natural Nutrition for the Tropics*. Church World Service, Dakar. 68 pp.; revised in 2001 and published as *The Miracle Tree: The Multiple Attributes of Moringa*, 172 pp.
19. Fuglie LJ (2000) New Uses of *Moringa* Studied in Nicaragua. ECHO Development Notes #68, June, 2000.
20. Fuglie, Lowell J, ed. *The Miracle Tree: Moringa oleifera: Natural Nutrition for the Tropics*. Training Manual. 2001. Church World Service, Dakar, Senegal
21. Galan MV, AA Kishan, AL Silverman (2004) Oral broccoli sprouts for the treatment of *Helicobacter pylori* infection: A preliminary report. *Digestive Disease Science* 49(7-8): 1088-1090.
22. Galan MV, AA Kishan, AL Silverman (2004) Oral broccoli sprouts for the treatment of *Helicobacter pylori* infection: A preliminary report. *Digestive Disease Science* 49(7-8): 1088-1090
23. Gassenschmidt U, KD Jany, B Tauscher, and H Niebergall (1995) Isolation and characterization of a flocculating protein from *Moringa oleifera* Lam. *Biochimica Biophysica Acta* 1243: 477-481.
24. Ghasi S, E Nwobodo, and JO Ofili (2000)
25. Horti Nursery (for bulk orders), 25 1st Fl. Raji Medical Bldgs, 1103 EVN Rd. ERODE, 638009, TN INDIA; p:91-424-261815; fax: 91-424-267588; e-mail: kodis@eth.net
26. <http://californiagardening.blogspot.in/2015/11/moringa-leaves-pods-harvest-health.html>
27. <http://ladysphinger.com/edible-moringa-flower-fritter/>
28. <https://www.alibaba.com/showroom/drumstick-vegetable.html>
29. Hurov's Seeds & Botanicals, P. O. Box 1596, Chula Vista, CA, 91912; , 619/ 690-1741
30. Kenya Forestry Research Institute (KEFRI), P. O. Box 20412, Nairobi, Kenya, Tel. (254) 154-32891; Fax (254) 154-32844; E-mail kefri@arcc.or.ke.
31. Kumar International, Ajitmal 206121, Etawah, Uttar Pradesh, India. Shivalik Seeds Corporation, 47, Panditwari, P. O. Prem Nagar, Dehra Dun - 248007, U. P., India; tel. 91-135-683-348; fax 91-135-683-776; E-mail: hilander@del2.vxnl.net.in
32. Leone A, Spada A, Battezzati A, Schiraldi A, Aristil J, Bertoli S (2015). "Cultivation, Genetic, Ethnopharmacology, Phytochemistry, and Pharmacology of *Moringa oleifera* Leaves: An Overview". *Int J Mol Sci.* **16** (6): 12791–835.
33. Manzoor, M, F.Anwar, T.Iqbal, and M.I.Bhnager. 2007. Physico-chemical characterization of *Moringa concanensis* seeds and seed oil. *J. Am. Oil Chem. Soc.*, 84: 413-419.
34. *Miracle Tree* book by Church World Service: <http://www.moringatrees.org/>
35. *Moringa News* network of people interested in *Moringa* and clearinghouse for *Moringa* information: <http://www.moringanews.org/>
36. Olson, M. E. (2010). *Flora of North America Committee, ed. Flora summary: Moringaceae: Drumstick Family*. *Flora of North America, North of Mexico.* **7**. New York and Oxford. pp. 167–169.
37. Samuel Ratnam, Inland & Foreign Trading Co., (Block 79A, Indus Road #04-418/420, Singapore, Tel: 0316 p 2722711, fax: 2716118)
38. Tanzania National Tree Seed Programme, P.O. Box 373, Morogoro, Tanzania; Tel: (255)-56-3192 or (255)-56-3903; Fax: (255)-56-3275; E-mail: ntsp@twiga.com
39. The home page of the family Moringaceae by Mark Olson: <http://www.mobot.org/gradstudents/olson/moringahome.html>
40. Trees for Life {2005}. *Moringa Book*. <http://www.treesforlife.org/project/moringa/book/default.asp>.
41. Trees for Life *Moringa* information: <http://www.treesforlife.org/project/moringa/default.en.asp>
42. University of Leicester's Department of Engineering page on *moringa*: <http://www.le.ac.uk/engineering/staff/Sutherland/moringa/moringa.htm>
43. <http://www.avrdc.org/LC/indigenous/moringa.pdf>
44. http://www.hdra.org.uk/pdfs/international_programme/Moringa.pdf
45. <http://www.ars-grin.gov:8080/npgspub/xsql/duke/plantdisp.xsql?taxon=1435>