Article

# Oil potential of Moringa

**R. Banerji*, S.C. Verma and P. Pushpangadan**
National Botanical Research Institute, Lucknow-226 001
*Corresponding author, E-mail: ranjanbanerji@rediffmail.com

## Introduction

India has become the largest importer of vegetable oils in the world in the past two years and it is assumed that India's fats and oil imports will reach 8.5 MMT by the year 2020 (Ref.1). However, the country is trying hard to limit import of fats and oils. This is combined with the country's limited potential to expand oilseeds acreage and continuing growth of edible oils demand which consistently out passes domestic production. To meet the growing demand of fats and oils, concerted efforts have been made to increase the seed yield and by tapping minor oilseeds of tree origin. In this context, ***Moringa*** has the potential to be utilized as an additional source of oil.

***Moringa***, commonly called Drumstick or Horse Radish Tree (Hindi-*Sainjna*), is a fast growing tree and is propagated quite easily. It is widely distributed in tropical parts of the country. ***Moringa oleifera* Lam**. is cultivated in a big way for its nutritive pods and is popular in Indian household. The tree can be propagated by seeds or from cuttings. Practically all parts of ***Moringa*** are useful. The leaves, a good source of vitamin C and minerals, serve as cattle feed. The nutritional value of ***Moringa*** has been reported earlier[2]. The pods at different stages of maturity are consumed as vegetable. The tree has also gained importance as raw material for paper pulp[3].

***Moringa*** oil is known as Ben oil in trade. The oil of ***M. peregrina* Fiori** from North Africa is the prime source of commercial Ben oil[4]. Ben oil has been used as a potential source of edible oil in the Middle East and African countries. Although the tree is widely cultivated in India, the oil is seldom extracted for commercial purposes and does not form an article of commerce. The oil finds use in rheumatism and goiter[5]. The oil was highly prized for lubricating watches, but was replaced by sperm whale oil[6]. Since the ban is imposed on killing whales Ben oil may regain its earlier status.

We studied oil potential of ***Moringa oleifera*** from Vietnam and the composition of the oil was compared with some Indian clones of ***Moringa*** and with that of olive and avocado oils.

For evaluation some seeds of ***M. oleifera*** were procured from Vietnam (MV). The seeds from two other clones viz. ***M. oleifera*** cv. 'Barahmasi' (May harvest, MO4) and ***M. oleifera*** clone no. 8 (MO8) were procured from the garden of the Institute. The powdered seeds were extracted with petroleum ether (40-60 °C) in a Soxhlet extractor, which yield pale yellow oil (Table 1). The oil from each sample was purified and refined by usual methods and iodine values, saponification values were determined. The fatty acid composition of each of the oils was studied by gas chromatography. A Hewlett Packard gas chromatograph Model 5890 Series II equipped with a flame ionization detector (FID) and attached to a Wipro computer 486 was used. A stainless steel column (180X0.3cm) with 5% DEGS on chromosorb W (HP) was employed at the temperatures of column injector and detectors maintained at 170, 220 and 250°C, respectively while nitrogen was used as carrier gas at 30 ml/min.

Moringa oleifera

## Chemical composition and utilization

The oil content in the seeds from different samples is given in Table 1. ***M. concanensis*** **Nimmo** showed the highest oil yield. The iodine and saponification values of all the oils were found in the range of 80.3-86.7 and 195.8-197.2, respectively.

The fatty acid composition showed that oleic acid is the major fatty acid of all the oils ranging from 79.4 to 85.0% (Table 2), highest being in oil from Vietnam followed by ***M. concanensis*** (83.8%). Other fatty acids present in the oils are palmitic, palmitoleic, stearic, linoleic and arachidic acids. Palmitic acid ranged from 9.1 to 9.7% in Indian clones as compared to Vietnam clone, which showed only 5.0% palmitic acid. Similarly, the oil from Vietnam showed low content (0.8%) of stearic acid as compared to ***M. oleifera*** cv. 'Barahmasi', a clone of ***M. oleifera*** (MO8) and ***M. concanensis***, which ranged from 2.4 to 2.7% (Table 2).

The oil from ***Moringa*** species compares well with olive oil and avocado oil as far as the oleic acid content is concerned (Table 2). Thus, ***Moringa*** may serve as an additional source of oil for industrial as well as edible oil.

The fats and oils that have been used over the centuries and are considered classical by the cosmetic chemists include almond, castor, coconut, olive, peanut, persic (from apricot or peach kernels) and sesame oil, cocoa and palm butter, sandalwood oil, avocado oil and wheat germ oil. In recent years Ben oil has found use in skin care. ***Moringa*** being an indigenous plant and widely distributed in the country and its seeds are available in plenty, if exploited properly in combination with natural skin caring products can be a new potential commodity in cosmetic industry.

## References


1. Anonymous, Asia increasing importance to global fats, oils trade, INFORM, 2001, **12,** 399-403.
2. Verma S C, Banerji R, Misra G and Nigam S K, Nutritional value of *Moringa*, *Curr Sci,* 1976, **45,** 769.
3. Guha S R D, Doundiyal S N and Mathur G M, Mechanical pulps for new print grade papers from *M. pterigosperma*, *Indian For,* 1968, **94,** 635-638.
4. Benthal A P, Trees of Calcutta and its neighbourhood, Thacker Spink and Co. Ltd., Calcutta, 1946.
5. Jayaweera D M A, Medicinal plants (Indigenous and Exotic) used in Ceylon, Part IV, Magnoliaceae, Rubiaceae, Moringaceae, National Science Council of Sri Lanka, p. 101, 1982.
6. Burkill I H, Dictionery of Economic Products of the Malay Peninsula, Crown Agents for the Colonies, London, 1935.


**Table 1:** Oil content and physico-chemical properties of ***Moringa*** oil

| Sample | Oil% | Refractive index | Iodine value | Sap. Value |
|---|---|---|---|---|
| MV | 23.0 | 1.4675 | 86.7 | 195.8 |
| MO4 | 17.8 | 1.4680 | 80.3 | 196.1 |
| MO8 | 23.0 | 1.4700 | 82.9 | 196.7 |
| MC | 33.0 | 1.4690 | 84.0 | 197.2 |

MV= ***Moringa oleifera*** Vietnam, MO4= ***Moringa oleifera*** cv. 'Barahmasi', MO8= ***M. oleifera*** clone no. 8, MC= ***M. concanensis***

**Table 2:** Comparative fatty acid compositions of ***Moringa*** and other oils

| Sample | Fatty acid composition | | | | | |
|---|---|---|---|---|---|---|
| | Palmitic | Palmitoleic | Stearic | Oleic | Linoleic | Arachidic |
| MV | 5.0 | 2.7 | 0.8 | 85.0 | 2.3 | 4.2 |
| MO4 | 9.5 | 2.0 | 2.7 | 79.4 | 1.3 | 5.0 |
| MO8 | 9.7 | 2.3 | 2.4 | 80.0 | 2.0 | 3.6 |
| MC | 9.1 | 2.8 | 2.4 | 83.8 | 1.3 | 0.6 |
| Olive | 9.5 | - | 1.4 | 81.6 | 7.0 | - |
| Avocado | 7.2 | - | 0.6 | 80.9 | 11.3 | - |

Olive = ***Olea europea*** **Linn.**, Avocado = ***Persea americana*** **Mill**. *syn. P. gratissima* Gaertn.f.