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Moringa oleifera – a nutritious naturalized tree adapted to South African conditions

Authors: Motiki M. Mofokeng, S.N. Mokgehle, H.T. Araya, N. Masondo, N.A. Araya, S.O. Amoo, and C.P. du Plooy
ARC-VIMP, Roodeplaat, Pretoria, South Africa
School of Agricultural Sciences, University of Mpumalanga, Mbombela

M*oringa oleifera* plays a significant role as herbal and food supplements in meeting the healthcare needs of growing populations globally and particularly in resource-poor communities. *Moringa oleifera* can contribute as a functional plant in the agricultural system in different regions of South Africa due to its multipurpose uses and good adaptability to both humid and dry climates. This plant is of Indian origin and the crop was brought into South Africa by various trade routes from foreign countries. *Moringa oleifera* is adapted to South Africa's environmental conditions and was quickly accepted due to its nutraceutical values. It is considered an indispensable plant for health management as its nutritional and medicinal properties have immense potential to combat malnutrition as well as prevent and 'heal' many ailments (Table 1). Different parts of the tree, e.g., fruit, flower, seed, bark, root, and gum, are a rich repository of proteins, vitamins, and minerals, including potassium, calcium, phosphorous, and iron, besides other bioactive phytochemicals. The plant is well studied worldwide, and findings revealed that it has various uses and applications, ranging from food and medicinal uses to water purification, biopesticide, and biodiesel production. Although all parts of the tree are traditionally used for different purposes, the leaves are generally mostly used. For example, milled Moringa leaves are packaged

into various products such as capsules, and tea. Moringa production and processing into different products contribute significantly to alleviating socio-economic challenges through food availability and improved income resulting in increased profitability, employment, social and cultural well-being from limited land.

In collaboration with stakeholders [Department of Science and Innovation, WITS University, Water Research Commission (WRC), University of Limpopo, and various community-based projects such as the Sedikong community Moringa project in Tooseng, Limpopo, Phedisanang Moringa project in Hamanskraal, Gauteng and the Makonde Indigenous Fruit Processing Association (MIPFA), Thohoyandou, Limpopo Province], the Agricultural Research Council (ARC) has made significant progress in optimising *M. oleifera* cultivation practices in South Africa.

Moringa can tolerate less fertile soils and harsh environmental conditions such as sweltering heat, recurrent droughts, and light frosts. Its productivity is highly dependent on field management practices, with optimum tree spacing and planting density adjusted based on production system and market requirements. For instance, the production of leaves for human consumption normally

increases at higher planting densities or narrower plant spacing (0.75 – 1.0 m intra-row x 1.0 – 2.0 m inter-row) when compared to pod production (2.0 - 2.5 m x 2.5 – 5.0 m), while much higher planting densities, at considerably narrower plant spacing, are used for fodder production (0.15 – 0.2 m intra-row x 0.2 – 0.5 m inter-row). The purpose of production influences the targeted yield achieved. Dry leaf yield ranges from 252 – 448 kg ha⁻¹, seed yield at 12% moisture content ranges from 50 – 100 kg ha⁻¹, while green fodder production ranges from 100 – 120 tons ha⁻¹.

A set of best agricultural practices will enable the development of a highly productive crop and increased yields. The ARC has

developed different cultivation technologies for *M. oleifera* production. The quality of the planting material, propagation techniques, irrigation, and nutrient management for increased production are crucial to developing a modern, sustainable, and profitable *M. oleifera* production site. Modern and sustainable production practices, such as drip irrigation and mulching, are being adopted by farmers (Figures 1A and B). Applying sustainable production systems such as mulch contributes to soil moisture conservation, improved soil structure, sustaining soil fertility, and increased plant growth and yield. Furthermore, the cultivation of *Moringa oleifera* in rural communities may strengthen the health conditions and livelihoods of the local populations.



Figure 1 A and B: Irrigation set-up for Moringa production at Tooseng in Limpopo province (A) and the application of mulching at Phedisang farm in Gauteng province (B)



Figure 2: Healthy Moringa trees ready for harvesting of the leaves.

Table 1: The uses and nutritional value of various parts of Moringa tree.

Part of the tree	Uses	Nutritional value
Leaves	Used in the management of asthma, hyperglycemia, dyslipidaemia, flu, heart burn, syphilis, malaria, pneumonia, diarrhoea, headaches, skin diseases, bronchitis, eye, and ear infections. Used to reduce blood pressure and cholesterol, and acts as an anticancer, antimicrobial, antioxidant, and antidiabetic agent.	Contains fibre, fat proteins and minerals like Ca, Mg, P, K, Cu, Fe, and S. Vitamins like Vitamin-A (Beta-carotene), vitamin B-choline, vitamin B1-thiamine, riboflavin, nicotinic acid, and ascorbic acid are present. Various amino acids like Arg, His, Lys, Trp, Phe, Thr, Leu, Met, Ile, Val are also present in the leaves.
Seeds	Used in the treatment of hyperthyroidism, Crohn's disease, herpes-simplex virus, arthritis, rheumatism, gout, cramp, epilepsy and sexually transmitted diseases, act as antimicrobial and anti-inflammatory agents	Contains fats, fibre, proteins, minerals, vitamins like A, B, C, and amino acids
Roots	Used as a cardiac stimulant, anti-ulcer, and anti-inflammatory agent	Contains minerals like calcium, magnesium, and sodium
Flowers	Used as hypocholesterolemic and anti-arthritis agents, can also cure urinary problems and colds.	Contains calcium and potassium and amino acids.
Pods	Used in the treatment of diarrhoea, liver and spleen problems, and joint pain.	Rich in fibre, lipids, non-structural carbohydrates, protein, and ash. Fatty acids like oleic acid, linoleic acid, palmitic acid, and linolenic acid are also present.



For more information:

Dr Meshack Mofokeng
 ARC-Vegetable, Industrial and Medicinal Plants
 E-mail: MofokengM@arc.agric.za

References available upon request.