

## Marvellous Multinutritional Tree: Moringa

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### Introduction

Products made from various herbs and plants are generally considered safe for consumption because these are good source of bioactive chemicals and multifunctional healing agents. According to the report of Food and Agriculture Organisation (FAO) about 70–80% of the world's population relies on herbal medicine to prevent and treat illnesses and about 25% of synthetic drugs are made from medicinal plants (Pan et al. 2013). Over the past few decades, developing nations have experienced an increase in food demand as a means of addressing the issues of hunger and malnutrition. India stands at 107<sup>th</sup> rank among 121 countries in Global Hunger Index (2022), which is determined by factors such as child stunting, wasting and death. These issues can be addressed by one of the Indian born super food crop that is moringa or drum stick. The drumstick or horseradish tree, *Moringa oleifera* Lam. (2n = 28), a native species of the Indian subcontinent, fast growing, drought-resistant tree belongs to family Moringaceae. It has the potential to tackle malnutrition as it is an affordable and naturally accessible source of numerous essential vitamins, minerals and nutraceuticals.

This highly appreciated plant serves multiple purposes, due to its variety of minerals, vitamins and antioxidants potential. In particular, indigenous people can use almost all tree components as food or medication in their traditional medical practises. The leaves, immature pods, seeds, and flowers are all rich sources of essential phytochemical, vitamins and minerals. Proteins and vital amino acids from the leaves and seeds are crucial for human nutrition. Protein electrolytes from seeds can be used to purify water. Additionally, Moringa seeds and leaves have a variety of biological uses, including the protection of tissues and organs as well as analgesic, antiulcer, antihypertensive and immunomodulating properties.

### Nutraceutical value and health benefits:

It is regarded as a very effective supplement due to its high protein content. In fact, moringa is said to provide 7 times more vitamin C than oranges, 10 times more vitamin A

than carrots, 17 times more calcium than milk, 9 times more protein than yoghurt, 15 times more potassium than bananas and 25 times more iron than spinach (Rockwood et al., 2013).

**Table 1: Proximate profiles of Moringa fresh leaves, dry leaves, and leaf powder.**

Nutrients	(g/100g of fresh sample)		
	Fresh leaves	Dry leaves	Dry leaf powder
Protein(g)	6.7	29.4	27.1
Fats(g)	1.7	5.2	2.3
Carbohydrate(g)	12.5	41.2	38.2
Fiber(g)	0.9	12.5	19.2

Greater amount of protein will be available in dry leaves of moringa (Islam *et al.*, 2021). Building, maintaining, and repairing body tissues all depends on protein. All organs, muscles, skin, hair, and eyes are comprised of protein. Compared to adults, children require more protein per pound of body weight. Hence moringa dry leaf powder can be supplemented to the children for proper growth and development of body.

**Table 2: Proximate nutrient compositions (mg/100g) in different parts of moringa tree**

Nutrients	Fresh leaves	Dry leaves	Seeds	Pods	Nutrients	Fresh leaves	Dry leaves	Seeds	Pods
VitaminB1	0.06	2.02	0.05	0.05	Magnesium	42	448	635±8:66	24
VitaminB2	0.05	21.3	0.06	0.07	Phosphorus	70	252	75	110
VitaminB3	0.8	7.6	0.2	0.2	Potassium	259	1236	—	259
VitaminC	220	15.8	4:5±0:17	120	Copper	0.07	0.49	5:20±0:15	3.1
VitaminE	448	10.8	751±4:41	—	Iron	0.85	25.6	—	5.3
Calcium	440	2185	45	30	Sulphur	—	—	0.05	137

(Olagbemide and Alikwe, 2014)

#### Leaves:

The leaves are excellent source of nutrients, minerals, carotenoids and xanthins. According to research reports, 100 grams of dry weight of leaves contains 2.09 to 35 g of fibre (Ogbe and Affiku, 2011). Furthermore, the number of proteins, vital amino acids,

minerals, and vitamins extracted from just 100 grams of leaf powders is greater than the recommended daily requirement for adults according to the World Health Organization. This dried leaf powder can be kept in storage for a very long time without going rancid. By sprinkling the powder on our plates, we can use it in our regular food and maintain a healthy diet, also by adding into soups and sauces. Phytochemicals like tannins, sterols, saponins, terpenoids, phenolics, alkaloids and flavanoids like quercetin, isoquercetin, kaempfericetin, isothiocyanates and glycoside compounds are present in the leaves. Additionally, Moringa leaves provide health benefits for people who are obese because of their low caloric value. The daily consumption of 10 g of leaf powder by malnourished children has been shown to aid in weight gain and speed up recovery compared to the control group after 6 months (Zongo et al., 2013).

The leaves extracts have been shown anti-proliferative effects thereby can inhibit the growth of cancer cells (Gopalakrishnan et al., 2016). Moringa has been shown to cure both Type 1 and Type 2 diabetes. Antiatherosclerotic, neuroprotectant, anti-inflammatory, cardioprotective and antiulcer activity was found in leaves (Hessah, 2018). Moringa leaves can aid in the treatment of night blindness since vitamin A is a type of needed nourishment for normal eyesight, particularly in dark situations (Lopezteros et al., 2017). Asthma, hyperglycemia, dyslipidemia, influenza, heartburn, syphilis, malaria, pneumonia, diarrhoea, headaches, scurvy, skin conditions, bronchitis, eye and ear infections, and migraines can be treated with moringa leaves. Additionally lowers blood pressure and cholesterol while acting as a neuroprotectant, anticancer, antibacterial, antioxidant, antidiabetic and anti-atherosclerotic agent. The antioxidant and anti-diabetic activities of leaves are due to the presence of flavonoids. The anticancer properties of the isothiocyanates, quercetin and other flavonoids have been identified as anti-proliferative and anticancer agents. Minerals and vitamins present strengthen the immune system and treat a variety of illnesses (Mbikay 2012, and Ijarotimi et al., 2013).

**Flowers:**

After processing, moringa blossoms become a ready snack or tea as well as a nutritional supplement because they are a good source of a wide range of nutrients, including proteins, potassium, calcium, antioxidants (tocopherol) and polyunsaturated fatty acids (Pontual et al., 2012). Fried flowers taste like mushroom (Arise et al., 2014). In addition, the

flower powders are more suitable than leaves to be food additives as they have no effect on food colour and appearance. They are useful for beekeepers since flower produces higher. Moringa flowers act as hypocholesterolemic, anti-arthritis agents can cure urinary problems and cold (Fuglie, 2005).

**Pods and seeds:**

Approximately 38.67–43.60 g of fat, 9.98–51.80 g of crude protein, 17.26–20.00 g of crude fibre, 3.36–18.00 g of carbohydrates in 100 g of drumstick seeds (Falowo et al. 2018). It has been documented that adding moringa seed powder to wheat flour can significantly increase the amount of protein in bread and cookies (Ogunsina et al., 2011). Mature pods are cooked as a bean substitute, while the immature ones are consumed raw. The moringa seedcakes can be used as green manure or fertiliser, while the seeds can be utilised in cosmetics and as a source of biodiesel.

Moringa seeds have antimicrobial and anti-inflammatory properties making them useful in the treatment of a variety of conditions including hyperthyroidism, chrohn's disease, anti-herpes-simplex virus, arthritis, gout, cramp, epilepsy and sexually transmitted illnesses. Flavanoids responsible for its anti-inflammatory properties. Antimicrobial activities are brought on by the antibiotic pteridosperm (Nair, 2011). Pods are used to alleviate pain in the joints, liver, spleen issues and diarrhoea. The presence of PUFA in the pods can be used in the diet of obese people (Fuglie 2005).

**Root bark:**

Minerals include calcium, magnesium, and sodium, as well as alkaloids like morphine and moriginine are present in the roots and bark of moringa. The alkaloid gives the bark its antiulcer, heart stimulant and muscle-relaxing properties (Adeyemi et al., 2014 and Choudhury et al., 2013). Moringa's tap root is used as a spice. The tree's gum can be used to make calico prints. Additionally, the gum and roots contain anti-inflammatory, anti-bacterial, and anti-fungal qualities (Shank., 2013).

**Conclusion:**

A well-known source of nutrients and antioxidants is the moringa oleifera plant. Moringa leaves are not as well-known worldwide as other plants like spinach and fenugreek, but they are currently substituted in Southeast Asian soups, lentil dishes and other dishes. The possibility for using moringa as a food supplement and food fortifier still has a knowledge

deficit. The uses of moringa are enormous but are hardly ever investigated. It can be used to produce foods that can help prevent malnutrition. The literature provides a comprehensive overview of the chemical make-up, nutritional value, prospective applications, and pharmacological properties of the plant. Identification, isolation, and standardization of plant extracts may be taken into consideration for in-depth studies that can aid in the further development of potential food products with health benefits and nutrients to treat various lifestyle-related ailments as well as malnutrition.

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