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Moringa Oleifera-A Treasure Box of Nutrients and Medicinal Elements

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Abstract

For centuries *Moringa Oleifera* is widely used for its health benefits. Its record is found in medicinal texts from over 5000 years ago. In Ayurvedic medicine, it is referred to as digestive (*Pachana Karma*) and purgative (*Virechan Karma*). Its reference is found in *Charak Samhita* and *Sushruta Samhita*, two ancient books written in BC. When compared to all other mostly acknowledged nutritious and medicinal plants *Moringa Oleifera* surpass them all in its composition of protein, vitamins, calcium, potassium, iron, zinc, amino acids, dietary fiber, etc. Most of the scholars turned their attention to the study of *Moringa Oleifera*. In their study, they demonstrated the presence of valuable and essential phytochemicals through phytochemical analysis of *Moringa Oleifera*. But still, the majority of the population is unaware of numerous pharmacological applications of various parts of *Moringa Oleifera*. The present paper will try to focus on the benefits of the chemical composition, nutritional values, and medicinal properties of the *Moringa Oleifera* plant. Many studies related to *Moringa Oleifera* proved the effect of *Moringa Oleifera* as an anti-oxidant, anti-microbial, and anti-carcinogenic agent.

The present paper will also deal with methods of plantation, propagation, and its requirement of soil, water, temperature, and its various stages of development from seed to flowering and fruiting the *Moringa Oleifera* plant. Every part of this plant is useful, in this paper special reference will be given to the health benefits of the leaves, flowers, and seeds of *Moringa Oleifera*.

Keywords: *Moringa oleifera*, nutrients, protein, vitamins, anti-oxidant, anti-inflammatory

Introduction

There are various names for *Moringa Oleifera*. In English language it has many names like west Indian ben tree, drumstick tree, mother's best friend, the miracle tree, horseradish tree, Benzolive in French, gawara in Nigeria, tellamunga in Telugu, murungai in Tamil, soanjna in Punjabi, saragavo in Gujrati, saijna in Assamese, shevga in Marathi. The tender leaves, flowers, and pods are used as vegetables in all over the world. Each part of this tree is source of vitamin E, vitamin C, hydroxybenzoic and hydroxycinnamic acids, beta carotene, sulphur amino acid, essential and non-essential amino acid. Seeds of *Moringa Oleifera* contains mono-unsaturated omega-9 fatty acid, carbohydrates and minerals in moderate amount.

Taxonomic Classification

Moringa Oleifera belongs to Genus *Moringa*, which is the sole Genus in the family *Moringaceae*. While out of fourteen species of *Moringaceae* family *Moringa Oleifera* is native to Indian subcontinent and now habituated in South America, Africa, America and Caribbean Islands and all over the world.

Plantation and Propagation

This plant can be grown in all kinds of temperatures and soil conditions but it mostly prefers temperatures around 25-35

degree C. It requires a net rainfall of ethoaround 250-3000mm. There are two methods of propagation of *Moringa Oleifera*. In the first method, seeds are sown directly to the soil or in plantation bags. Another method of propagation is through mature cuttings. But commercially plants grown from cutting are more sensitive to heavy rain and wind as it does not grow deep root system. While transporting saplings from one place to another place utmost care should be taken as the tap roots of the plants are tender and prone to get affected. Poultry manure gives the best results as compared to other fertilizers

Moringa Oleifera is an evergreen tree that grows fast and reaches a height of 10-12 meters. Its leaves are compound, with each pinnate consisting of 4 to 6 pairs of leaflets, that are green in color and its shape elliptical to oval structure. Within the first six months of planting this tree starts flowering. Its inflorescences are 4-8 inches long, bearing fragrant, bisexual, pentamerous, zygomorphic flowers. Flowering starts in March and continues till August. Generally flowering happens only once a year but in favorable and suitable conditions of weather and rainfall flowering can happen twice a year or throughout the year. There are some perennial and annual varieties (like PKM1 and 2).

Fruits (pods) of *Moringa Oleifera* are hanging, three-valved, 10 to 60 cm long (depending upon the native and hybrid

variety of *Moringa Oleifera*) in its younger stage its color is green after maturity it turns brown.

There are very few plants like *Moringa Oleifera* whose leaves are highly nutritious. Green leaves of *Moringa Oleifera* are collected, washed, and dried in the shade and crushed to powder, and stored in airtight container. When added to the food this powder provides vitamins, protein, and minerals. This powder enhances the nutritional contents of the food items. Its dry leaves contain carbohydrates, fiber, moisture and minerals.

Chemical compositions and nutritional values of *Moringa Oleifera* plants alter with varying soil and climatic conditions. Even fresh green leaves and dried leaves show variation in values obtained.

Nutritional Values and Health Benefits of *Moringa Oleifera*

For centuries *Moringa Oleifera* is widely used for its health benefits. It is a very good source of antioxidants and bioactive compounds. *Moringa Oleifera* tree must be called *Kalpvrksh*, as every part of this plant (i.e. leaves, flowers, pods, seeds, and roots) is benevolent to humankind and a storehouse of minerals, vitamins, and protein. Leaves of *Moringa Oleifera* contain many vitamins and minerals. 21 grams of fresh leaves contain two grams of protein, as per recommended dietary allowances (RDA) are concerned. *Moringa Oleifera* leaves contain 19% vitamin B6, 11% Iron, 12% Vitamin C, 11% Riboflavin (B2), 9% Vitamin A, 8% Magnesium.

Medicinal uses of Different parts of *Moringa Oleifera oleifera*

Leaves of *Moringa Oleifera* contain fiber and have a purgative, laxative effect. It lowers the risk of gastrointestinal diseases like constipation by increasing the water content of stool and the volume of defecation. It helps to ease bowel movement. Fresh leaves have antibacterial, anti-inflammatory, antioxidant, antiseptic, and disinfectant function. Leaves are crushed and applied to sores, wounds, and skin infections. Juice extracted from *Moringa Oleifera* leaves relieves joint pain, asthma, blood pressure, and bone health. In rural areas, it is still used as medicine of smallpox.

The phytochemical analysis of *Moringa Oleifera* extract revealed the presence of phenols, tannins, flavonoids, steroids, alkaloids, glycosides, terpenoids, saponins, etc. A phenolic compound acts as an antioxidant and prohibits the electron deficiency of free radicals. Thus it can help for disinfecting skin and to relieve itching. Tannin in *Moringa Oleifera* leaves acts as an anti-oxidant, anti-microbial, and anti-carcinogenic agent.

Flavonoids are found in many parts of *Moringa Oleifera* like roots, flowers, and covering of seeds but in leaves it is found in high concentration. Various types of flavonoids present in *Moringa Oleifera* leaves are kaempferol, quercetin, isorhamnetin, apigenin, rutin, rhamnetin, and myricetin. Flavonoids have many medical benefits like anticancer, antioxidant, antiviral, anti-inflammatory properties. 100 gm of extract of dried leaf of *Moringa Oleifera* content 6.20gm of Flavonoids.

One of the basic reasons for infant mortality and child malnutrition is insufficient milk production by breastfeeding mothers. *Moringa Oleifera* leaves contain alkaloid and steroid, which act as galactagogue and has the potential to lower child mortality rate when it is supplemented as a superfood to lactating mothers. It is generally known as the

mother's best friend as it has the potential to increase milk production.

Moringa Oleifera is a boon to developing countries as it helps in combating nutritional deficiencies as it is a rich source of protein, vitamin C, Calcium, Amino Acids, Vitamin A, Potassium, Iron, Fiber, and Vitamin E. A single plant of *Moringa Oleifera* surpasses the nutritional contents of milk, carrot, oranges, spinach, oats, eggs, and almonds, in many times.

Flowers of *Moringa Oleifera* are not merely used for decorating salad and juices instead they are highly nutritious and possess medicinal properties. Like leaves, flowers of *Moringa Oleifera* is a very good source of Vitamins, Protein, Calcium, Potassium, Iron, Amino acid, dietary fiber, ascorbic acid, Polyphenols, Tannin, and Flavonoids. Vitamin A in flowers improves the vision of the eyes. Flowers stimulate the shrinking of the gallbladder. The flowers have an aphrodisiac effect and are used as stimulants. Erectile Dysfunction is a serious issue for diabetic patients with high blood pressure, and excessive fat in the blood.

Polyphenols in *Moringa* leaves may increase the blood flow by decreasing nitric oxide production which results in lowering blood pressure. One study showed that, when *Moringa* seed extract was administered to a healthy rat it helped to relax penile muscle and penile blood flow. *Moringa* also solved the problem of erectile dysfunction in diabetic rats.

Many studies conducted on animals like rabbits, rats, and pigs, concluded that flowers, leaves, and seeds of *Moringa Oleifera* help in keeping the heart and the liver healthy as bad cholesterol like VLDC, and LDC are controlled and lowered by increasing the excretion of faecal cholesterol. High Lipid Peroxidation is associated with the unhealthy and damaged liver which may be the result of insufficient intake of Vitamin C. Antioxidants in seed extracts of *Moringa Oleifera* detoxify the liver by reversing the oxidative stress markers. Glucosinolates, a chemical found in *Moringa Oleifera* seeds and leaves can prevent cancer by inhibiting cancer cells.

Flowers of *Moringa Oleifera* are often eaten raw or cooked. Sometimes fresh/dried flowers are used to make herbal tea. But before using flowers they must be cleaned by removing the petals of flowers as moths and insects are attracted and entered inside the flowers.

Oil is extracted from seeds of dried *Moringa Oleifera* either by solvent extraction or cold-pressing. Its oil is often called ben oil and was used in the perfume industry for many centuries. Like other parts of this plant seeds/oil contain many nutrients and medicinal properties. Phytochemistry of seeds revealed the presence of protein, sterols, tocopherols, monounsaturated fats, oleic acid, ferulic acid, zeatin, tocopherols, phytosterol, and quercetin. Many components have antioxidant and anti-inflammatory properties.

The presence of monounsaturated fat and sterols makes *Moringa* oil a more nutritious edible cooking oil which helps to lower bad cholesterol. This oil is also used as a moisturizer for skin and hair.

Though *Moringa Oleifera* flowers and leaves are highly nutritious, it should not be given to pregnant women and children prior prescription of the health care provider. These products may cause abortion in the first trimester.

Conclusion

Moringa Oleifera is one of the most utilized and cultivated plants for domestic and commercial purposes. All parts of the *Moringa Oleifera* tree have nutrient capacity; it can

strengthen food security and promote rural development. In many developing countries, the products of this tree are used to fight malnutrition.

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