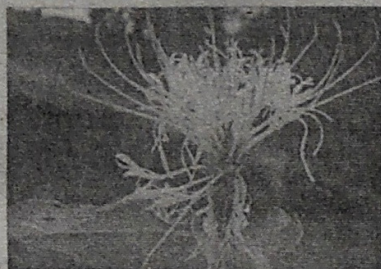


**Tora baghini (*Alpinia galanga*; Zingiberaceae):** It is a rhizomatous high value medicinal herb now very rare in wild. The leaves are long, elegant, blade-like, lanceolate, glabrous, ligule rounded; while the flowers are small greenish-white, dense-flowered. The fruit is orange-red.



Flowering of *Hedychium spicatum*

- **Economic part(s):** Rhizome.
- **Propagation:** Rhizomes with at least two nodes should be planted in raised beds or also in polybags. Seeds germination is very less.
- **Soil:** Loamy soil. Well suited to laterite soil with heavy organic manure, Species well adapted in hilly slopes in NE region
- **Land preparation and planting time:** Deep ploughs at least 3-4 times so that soil should be level. March-April.
- **Crop cycle:** 5-6 year
- **Crop spacing:** 15x15cm or 15x20cm.
- **Harvesting:** Crop can be harvested every year from the time of plantation.

**Kapoer kachari (*Hedychium spicatum*, Zingiberaceae):** It is a perennial rhizomatous herb. The leaves are oblong-lanceolate (25-35x 5-7) cm in size. Flowers arises from the in the axil of leafy green bracts. Spikes 20-30 cm long densely flowered. The flowers are borne from midsummer. Due to over collection the plant become rare in NE states

- **Economic part(s):** Rhizomes.

- **Propagation:** Rhizome cuttings are the best for commercial cultivation.
- **Soil:** The plant prefers sandy, loamy soils well grown under 20-30% shade.
- **Land preparation and planting time:** Medium plough with well drained. March-April
- **Crop cycle:** 2-5 years.
- **Crop spacing:** 60 x 45 cm
- **Harvesting:** Mature rhizomes can be harvested after second year onwards.

**Bach (*Acorus calamus* Linn.; Araceae):** A perennial rhizomatous semi aquatic herbs. Rhizomes are horizontal, jointed, and pale to dark brown in colour. Leaves green grass like, flower small yellow green. Inflorescence spadix, seeds oblong.

- **Economic part(s):** Rhizomes.
- **Propagation:** Rhizomes are dug out and cut in pieces and can be used as a planting material.
- **Soil:** The plants prefer clayey and loamy soil.



*Acorus calamus* planting in field

- **Land preparation and planting time:** Before the planting in a main field the land should be irrigated and deep ploughed with green manure. April-May
- **Crop cycle:** 1-2 years.
- **Crop spacing:** 30x30 cm.
- **Harvesting:** The crop can be harvested after one year.

## 51. MEDICINAL PLANT

### Sesame: A Nutritional and Medicinal Plant

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**Introduction:** Sesame (*Sesamum indicum* L., 2n = 2x = 26) is a very old oilseed crop and popularly grown in tropical and sub-tropical regions. It belongs to the order *Tubiflorae*, family *Pedaliaceae*. Africa and India has been considered to be the primary and secondary centre of origin of this crop.

It is also known as Gingelly, Til, Sinsin, Beniseed and Gergelim. In India, it is cultivated in Gujarat, Rajasthan, West Bengal, Tamil Nadu, Andhra Pradesh, Madhya Pradesh and Maharashtra. It is grown during *kharif*, *semi-rabi*, *rabi* and summer seasons as a sole or mixed crop. Sesame plays an

important role in human nutrition as provides energy rich healthy food and prevents aging. Sesame seed is usually cream-white, brown but mainly white or black in colour. Its seed is mainly used as a food ingredient in whole, broken, crushed, shelled, powdered and paste forms. Seeds have a nutty flavour and main ingredients of dishes like 'tahini' (seed paste) and the sweet called 'halvah'. Sesame has antioxidant property due to the presence of lignin and tocopherol. It also contains sesamin and sesamol, which are known to lower the cholesterol level and prevent coronary heart diseases. The hull contains large quantities of oxalic acid, crude fiber, calcium and other minerals. It has a high degree of resistance for oxidation and rancidity under ambient storage conditions. Because of the desirable quality attributes, storability, flavour, taste, softness and stability of oil, the sesame crop is known as "Queen of Oilseeds."

**Nutritional composition:** In addition to having major nutrients (oil, proteins and carbohydrates), sesame seeds are also rich source of many health beneficial minerals, vitamins and antioxidants which are essential for human health. Sesame seed contains about 46-52% oil, 20-28% protein, 6-7% moisture, 16% carbohydrate and 6-8% crude fibre. The oil contains good amount of oleic (35.9-47%), linoleic (35.6-47.6), palmitic (8.7-13.8%), stearic (2.1-6.4%) as well as arachidic acids (0.1-0.7%). Sesame oil is rich in poly-unsaturated fatty acids (46%), mono-unsaturated (39%) and saturated fatty acids (14%) (Toma and Tabekhia, 1979). Sesame seeds are rich in sulfur containing amino acids and limited in lysine and also contain significant amounts of oxalic (2.5%) and phytic (5%) acids (Kapadia *et al.*, 2002). In sesame seeds, globulin is the major protein fraction contains about 95% of 13S globulin and seems to be a simple, salt soluble, very susceptible to heat denaturation and similar in subunit structure to soybean 11S globulin with more hydrophobic properties. Seeds are rich source of copper, calcium and also rich in phosphorous, iron, magnesium, manganese, zinc and vitamin B<sub>1</sub> (Anilakumar *et al.*, 2010). The predominant mineral composition is calcium followed by potassium, magnesium and phosphorus, and other minerals are also presents but in trace amount. The higher oxidative stability of raw sesame oil could be attributed to the presence of such natural antioxidants as tocopherols, sesamin and sesamol (Elleuch *et al.*, 2007). The protein content of white Sudan sesame was high (~25%) and similar to other in proteins rich products like almond (20%) and hazelnut protein (21%). The ash content in raw sesame was also relatively high (~5%) compared to other products of great consumption like almond (3%) and the pistachio (2.7%) (Borchani *et al.*, 2010). Sesame meal has a composition of 7.92% moisture, 27.83% fat, 30.56% protein, 6.22% fiber, 5.27% ash and 28.14% carbohydrate (Onsaard, 2012).

#### Uses of sesame seed and health benefits:

Sesame is used as the whole seeds, seed oil and meal. Seed are eaten as raw or either roasted or parched. Commercially sesame oil is used directly for edible purpose, production of cosmetic items (soap, shampoo, shaving creams, make-up, skin and hair conditioning agents, moisturizers and bath oils) and pharmaceutical industry (drug delivery agent). Oil is not only used for cooking purposes but also for margarine production, in traditional medicines for their nutritive, preventive and curative properties. Oil is an excellent salad oil requiring little winterization and it can be used directly without refinement. It has antifungal, antibacterial and antiviral properties and also used for treatment of several chronic diseases. Oil is a source of phyto-nutrients such as omega-6 fatty acids, flavonoid, vitamins and dietary fibre, and with anti-cancer as well as other health-beneficial properties. Moreover, oil is also used as an adulterant with olive oil and "Vanaspati Ghee." Minor components of the oil are "Sesamin" and "Sesamol" which have been found to be effective synergists for pyrethrin, a plant insecticide. Sesamin has antihypertensive and antioxidant properties. Antioxidants play an important role in preventing damage due to active oxygens in the body which lead to various life style diseases such as circulatory disorders, carcinogenesis and aging (Namiki, 1990). Sesame oil is much more antioxidative than unroasted purified oil. It enhances recycling of vitamin E, improves liver functions and provides protection against alcohol induced oxidative stress. It decreases cholesterol levels (LDL) while increasing HDL levels (Ide *et al.*, 2003). Sesame cake is a by-product of the oil industry which is good source of proteins, used as animal feed and preparing other food supplements. Roasted seeds mix together with sugar syrup give a good sweet. Whole seeds can be baked for making biscuits. Oil is also used treat ulcers, healing wounds and burns. Oil has mild laxative effect could be used for constipation. Oil is also use as a synergist for pyrethrum sprays, illuminants and emollient.

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## 52. MEDICINAL PLANT

# Moringa – A Miracle Tree!

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*Moringa* tree can grow well in the humid tropic or hot dry land with average height that ranges from 5 to 10 m. It can survive in harsh climatic condition including destitute soil without being much affected by drought. It can tolerate wide range of rainfall requirements estimated at 250 mm and maximum at over 3000 mm and a pH of 5.0 to 9.0. Its trunk is soft, white corky and branches bearing a gummy bark. Each tripinnately compound leaves bear several small leaf legs. The flowers are white and the three wings seeds are scattered by the winds. The flowers, tenders leaves and pods are eaten as vegetables. The leaves are rich in iron and therefore highly recommended for expected mothers.

In some part of the world, *Moringa* is referred to as the 'drum stick tree' or the 'horse radish tree', whereas in others, it is known as the kelor, marango, mlonge, moonga, mulangay, nebeday, saijhan, sajna or Ben oil tree. It has been reported by Bureau of plant industry that *Moringa* is an outstanding source nutritional components.

Its leaves have the calcium equivalent of four times that of milk, the vitamin C content is seven times that of oranges, while its potassium is three times that of bananas, three times the iron of spinach, four times the amount of vitamin A in carrots, and two times the protein in milk. Besides, *Moringa* is also suggested as a viable supplement of dietary minerals. The pods and leaves of *Moringa* contains high amount of Ca, Mg, K, Mn, P, Zn, Na, Cu, and Fe. Although, minerals content of *Moringa* shows variation in composition with changes in location.

**Medicinal Properties of *Moringa*:** *Moringa* has enormous medicinal potential, which has long been recognized in the Ayurvedic and Unani system. Nearly every part of this plant, including root, bark, gum, leaf, fruit (pods), flowers, seed, and seed oil have been used for various ailments in the indigenous medicine.

***Moringa* Leaves:** (1) Leaves rubbed against the forehead can relieve headaches. (2) There is an anti-bacterial and anti-inflammatory effect when applied to wounds or insect bites. (3) Extracts can be used against bacterial or fungal skin complaints. (4) Leaf tea treats gastric ulcers and diarrhoea. (5)

Eating *Moringa* food products is good for those suffering from malnutrition due to the high protein and fibre content. (6) Leaves treat fevers, bronchitis, eye and ear infections, inflammation of the mucus membrane. (7) The iron content of the leaves is high, and they are reportedly prescribed for anemia in the Philippines. (8) Dried *Moringa* leaves treat diarrhoea in Malawi, Africa. (9) The powder ground from the seeds is also used in the treatment of scurvy skin diseases (common bacterial infections of the skin).

***Moringa* Flowers:** (1) Flower juice improves the quality and flow of mothers' milk when breast feeding. (2) Flower juice is useful for urinary problems as it encourages urination. (3) In Haiti, villagers boil *Moringa* flowers in water and drink the tea as a powerful cold remedy.

***Moringa* Pods:** (1) If eaten raw, pods act as a de-wormer and treat liver and spleen problems and pains of the joints. (2) Due to high protein and fibre content they can play a useful part in treating malnutrition and diarrhoea.

***Moringa* Seeds:** (1) Used for their antibiotic and anti-inflammatory properties to treat arthritis, rheumatism, gout, cramp, sexually transmitted diseases and boils. The seeds are roasted, pounded, mixed with coconut oil and applied to the problem area. Seed oil can be used for the same ailments. (2) Roasted seeds and oil can encourage urination. (3) They can also be used as a relaxant for epilepsy. (4) *Moringa* seeds are effective against skin-infecting bacteria *Staphylococcus aureus* and *Pseudomonas aeruginosa*. They contain the potent antibiotic and fungicide terygosperrin.

***Moringa* Roots, Bark and Gum:** (1) The roots and the bark have all of the properties described above but are more concentrated. Therefore much more care should be taken if using them as medicines. (2) The roots and bark are used for cardiac and circulatory problems, as a tonic and for inflammation. The bark is an appetizer and digestive. (3) In Senegal and India, roots are pounded and mixed with salt to make a poultice for treating rheumatism and articular pains. In Senegal, this poultice is also used to relieve lower back or kidney pain.