

RESILIENT AGROSILVOPASTORAL SYSTEMS

CGIAR RESEARCH PROGRAM ON LIVESTOCK

Aims to increase the productivity of livestock agri-food systems in sustainable ways across the developing world.

Managing agrosilvopastoral systems: promoting multipurpose legume tree species

Moringa oleifera Lam.: a multi-purpose legume tree well suited for agroforestry

Moringa oleifera belongs to the Moringaceae family. It is native to the northwest region of India, south of the Himalayan mountain region. In recent centuries, this tree has spread along the tropical belt, from South India to Southeast and West Asia, the Arabian Peninsula, sub-Saharan Africa and from Central America.

Moringa oleifera can be used as alley cropping, animal forage, ornamental tree and in traditional medicine. Alley cropping with moringa is used to generate additional income, reduce soil erosion and, in the longer term, improve soil nutrient conditions.

Benefits:

- Fast growing multi-purpose tree
- Grows in tropical and sub-tropical climates
- It is drought-resistant
- Grows in a wide variety of poor soils
- Provides animal forage
- Used in traditional medicine and plant disease prevention



Scientific name:
Moringa oleifera Lam.

Common names:
Horseradish tree, Drumstick tree, Never Die tree & West Indian Ben tree (المورينغا)

Locations:
The southern Himalayas region & southern Asia region

Cultivation in the moringa alleys helped reduce the acidity of the soil (from 5.8 to 6.8). The nutritional characteristics of the moringa tree are excellent, so it can easily be used as a fresh forage material for cattle. The main important advantageous characteristic of moringa is its high productivity of fresh material (4-6 cuts /year = 50 to 80 t DM/ha). The chemical composition of moringa prove that leaves are good sources of nutrition for livestock (Crude protein (20.20%), crude lipid (6.5%), ash (10.31%), NDF (48.29%), ADF (35.36%). The seeds of moringa have good antioxidant activity. Traditional (Folk) medicine uses raw or crushed moringa seeds as a decoction for treating stomach pain, ulcers, poor vision, joint pain and for aiding digestion. The seed extract has been found to possess good antimicrobial activity against numerous bacterial and fungal species. Moringa seeds are used as nature-based solutions for the problem of water purification.



Moringa oleifera leaves



Moringa oleifera pods



Moringa oleifera seeds

Moringa is a fast-growing tree capable of reaching a maximum height of 7-12 m and a diameter of 20-40 cm. Usually, it has short straight stems (1.5-2.0 m) but sometimes poorly formed. The extended branches grow in a disorganized style and the canopy usually takes a shape of an umbrella. At the ends of the branches sprout alternate leaves, two or three times pinnate. Its leaves are 20 to 70 cm long, grayish fluffy when young, long petiole with 8 to 10 pairs of pinnae each carrying two pairs of opposite leaflets, elliptical or obovate and one at the apex (1 to 2 cm long). The flowers have a nice small and are 2.5 cm wide, in drooping axillary panicles 10 to 25 cm long. They are white or cream in color and with yellow-dotted at the base. The fruits are three lobed pods that hang down from branches and are 20 to 60 cm long in length. When they reach maturity, they become dry and open in 3 parts. The pods contain 12 to 35 seeds/pod. The seeds are round with a semi-permeable seed hull. Each tree can produce between 15,000 and 25,000 seeds / year. The average weight per seed is 0.3 g. Moringa seeds contain 30 to 40% oil. The lifespan of moringa can reach 20 years.

Establishment and Management

Moringa oleifera is a perennial softwood tree with relatively low demand for nutrients and water. The minimum annual rainfall is estimated at 250 mm and maximum at more than 3,000 mm. The presence of a long taproot makes it resistant to periods of drought. Its temperature range is 25 to 35 °C, but the tree will tolerate up to 48 °C under the shade and can survive a slight frost. A long period of frost can kill the tree on the ground, but it has the capacity to generate new shoots.

Moringa oleifera grows in tropical and subtropical climates. It is drought tolerant and can be grown in a wide variety of poor soils, with a pH between 4.5 and 9.0 (preferably 6.3 to 7.0). This tree grows at altitudes of up to 1,000 m. It can grow well on hillsides but is more commonly found in pastures or river basins. Moringa prefers well-drained sandy or loamy soil.

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Sowing and cuttings are the main methods of producing moringa plants. For seed production, sowing is preferable because improved varieties can be selected for cultivation. The seeds should be planted 2 cm deep and can germinate in 1-2 weeks. A low-density planting is necessary to produce seeds (3 x 3 m) with a triangular pattern. To produce leaves, the spatial distribution in plantation can vary intensive (20 x 20 cm), semi-intensive (50 x 100 cm), or integrated into an agroforestry system (2-4 m between rows).

In general, moringa seeds are sown during the rainy season and can germinate and grow without irrigation, but in periods of drought, drip irrigation is recommended (300-600 mm / year). Moderate irrigation before flower initiation could be beneficial, while abundant irrigation thereafter ensures better fruit set and greater yield. With adequate fertilization (120 kg N: P: K / ha) vegetative growth is better and a large quantity of seeds can be produced. Fertilization should be carried out during soil preparation before sowing or planting and at the start of the growing period. Soil-climatic conditions and technical practices greatly influence seed production, which can vary from 4 to 24 t of seeds / ha.

Effective Management

- Sowing and cuttings are the main methods of reproduction
- Seeds should be planted 2 cm deep
- Well-drained sandy or loamy soil
- Soil pH should be between 6.3 - 7.0
- Chemical fertilization: 120 kg N:P:K/ha
- Organic fertilization: manure or compost

ICARDA's Rangeland Ecology and Forages unit (REF)

The REF team promotes advances in rangeland ecology and pasture management in the dry areas. This series of factsheets is dedicated to the characterization of promising range and forage species aimed at alleviating the feed gap, limiting water runoff and soil erosion, restoring degraded rangelands and maintaining a healthy ecosystem.