

## Tamarind: The Sweet and Sour Superfood for a Healthy Lifestyle

\*Alok Kumar<sup>1</sup> and Anjali Kumari Jha<sup>2</sup>

### Introduction:

Tamarind, scientifically called *Tamarindus indica*, is commonly referred to as the Indian date and belongs to the Leguminosae family. It is originated in East Africa and is now widely grown across the Indian subcontinent, West Indies, and Southeast Asia. It is now widely cultivated in many parts of the world, particularly in Asia, the Caribbean, and Latin America. In India it grows in the states of Andhra Pradesh, Madhya Pradesh, Bihar, Tamil Nadu, Karnataka, and West Bengal.



Tamarind is appreciated not only for its culinary uses in dishes like sauces, beverages,

and sweets but also for its medicinal benefits, as it is used in traditional medicine to treat a range of health issues. Its wide range of applications makes it a valuable resource in both healthcare and cooking. Its pods have a sweet, acidic taste and contain tartaric acid in quantities ranging from 12.2 to 23.8%. Ripe fruits comprise 33-50% pulp, with the shell and fiber accounting for 11-30% and the seeds for 25-40%.

It is a highly nutritious fruit, rich in vitamins (like C and thiamine), minerals (such as iron, calcium, and phosphorus), fiber, and antioxidants. Its pulp contains beneficial compounds like polyphenols and flavonoids, offering antioxidant and anti-inflammatory effects. These properties suggest that tamarind can support digestion, blood sugar control, heart health, and possess antimicrobial benefits. This review investigates the relationship between tamarind farming, the creation of value-added products, and the health benefits of tamarind-derived products. It aims to provide a thorough understanding of

\*Alok Kumar<sup>1</sup> and Anjali Kumari Jha<sup>2</sup>

<sup>1</sup>Department of Pomology and Post-Harvest Technology,

<sup>2</sup>Department of Vegetable and Spice Crops

Ph.D Research Scholar, UBKV, Cooch Behar, West Bengal, 736165

its agricultural practices, expanding product range, and its nutritional value in both traditional and modern settings.

**Climate and soil:** Tamarind is well-suited to a variety of ecological environments, which is reflected in its broad geographical spread across sub- and semi-arid tropical regions with alternating wet and dry seasons. It thrives with an average annual rainfall between 500 and 1500 mm, particularly during its growth, flowering, and fruiting stages (June to October). Tamarind grows best in areas with maximum annual temperatures ranging from 33 to 37°C and minimum temperatures between 9.5 and 20°C. It has also been found to grow at elevations of up to 1200 meters above sea level.

Tamarind can grow in a variety of soil types, including poor and rocky soils, with minimal or no cultivation. It is resistant to sodic and saline soils, but it performs best in deep, well-drained loamy alluvial soils and sandy loam. It does not tolerate water logging. The ideal pH range for tamarind cultivation is between 5.5 and 6.8, although it can also thrive in alkaline soils.

**Nutritional composition:** 100 grams of tamarind pulp provide 239 kcal of calories, 62.5 grams of carbohydrates, and 57.4 grams of sugar. The protein content is 2.8 g, with 0.6 g of fat, 0.2 g of which is saturated. Dietary fiber is 5.1 g. The essential vitamins include

81 µg of Vitamin A, 3.5 mg of Vitamin C, 0.1 mg of Thiamine (Vitamin B1), 0.1 mg of Riboflavin (Vitamin B2), and 1.9 mg of Niacin. Additionally, there is 14 µg of Folate (Vitamin B9). The mineral content includes 74 mg calcium, 2.8 mg iron, 92 mg magnesium, 113 mg phosphorus, 628 mg potassium, and 28 mg sodium.

**Botany:** Tamarind is a large, evergreen tree that grows to heights of 20 to 30 meters and has a thick trunk, which can reach up to 1.5 to 2 meters in diameter and 8 meters in circumference. The trunk splits about one meter above the ground and has multiple stems with broad, spreading branches that create a rounded crown with drooping ends. The tree's bark is rough, scaly, and brownish-gray, while its young twigs are slender and covered in fine hairs. The leaves are pinnate, typically 7.5 to 15 cm long, with 10 to 20 pairs of small, oblong leaflets. Its flowers are small, pale yellow or pink, with five petals and red or orange streaks, arranged in small clusters. The flower buds are pink due to the color of the sepals. Tamarind thrives in full sun and warm conditions, preferring deep, well-drained, loamy soil with a pH between 4.5 and 9. It grows slowly, tolerates dry periods of up to 5-6 months, and is ideal for semi-arid regions. It requires an average temperature of 25°C and is not frost-tolerant, but it can withstand heavy winds, including cyclones and typhoons.

**Tamarind Varieties Cultivated in India:** In India, various tamarind cultivars are developed, each with distinct traits and suitable for specific locations. Here are some popular tamarind cultivars which are grown in several parts of India, providing to diverse tastes and climatic circumstances.

**PKM-1:** Clonal selection from seedling type, early fruiting and yielding about 263 kg pods per tree per year.

**Urigan:** Long pod size with sweet pulp.

**Pratisthan:** Developed in Maharashtra, characterized by acidic-sweet pulp.

**Yogeshwari:** High-yielding variety with redcolored pulp.

**Raktichinch:** Fruits have an absolute redcolored pulp.

**Makhanwaan, Secthong, RI Manila** sweet: Sweet varieties of tamarind.

**Cumbum:** High-yielding variety.

**Jagdish:** Sweet-sour high-yielding variety, originating from Maharashtra.

**DTS I and DTS II:** High-yielding regular varieties released from Dharwad, Karnataka.

**Goma Prateek:** Released from CIAH, with a short juvenile period of 3-4 years.

**Processing:** Tamarind is consumed in various ways and serves multiple purposes. Besides fresh pods, processed tamarind,

commonly used in cooking, is available in different forms, such as fruit pulp. Traditional preservation methods include storing tamarind in salt, or as dry pulp either with or without the shell. Bundled pods can be kept at 20°C for weeks, while tamarind paste is stored in plastic bags or palm leaf mats and can last at 20°C for extended periods. It can also be frozen for up to a year or refrigerated for six months. If stored dry, pulp remains good for up to a year, but it turns black over time and can become sticky and soft in humid conditions due to pectolytic degradation.

Tamarind trees yield fruit for up to 50-60 years, with pod maturity occurring around 15 years. The fruit is ready for harvest when it produces a hollow sound when pressed, and the shell becomes brittle as the pulp shrinks. Maturity can also be indicated by changes in the testa color, although this happens gradually and may not always be reliable. Harvesting is selective, as fruits ripen at different times. Immature fruits are harvested for flavoring, while ripe sour tamarind is typically gathered by shaking branches. Sweet tamarind, which is more expensive, is handpicked carefully. To prevent damage, both types are harvested by clipping the pods. Fruits are usually allowed to ripen on the tree, reducing moisture content by about 20%. In humid climates, fruits are vulnerable to fungi and beetles, so they are often harvested before fully ripened.

**Uses:** *Tamarindus indica* is a widely found tree in West Africa with significant potential in local healthcare and traditional medicine. Its fruits are used as a febrifuge or laxative in the Sudan and Sahel regions. In Central West Africa, tamarind leaves and bark are commonly applied to treat wounds, while in West Africa, the bark is used for diarrhea, and in East Africa, the leaves serve the same purpose.

Tamarind has numerous uses, both culinary and religious. In some African cultures, it is considered a sacred tree, with various beliefs surrounding its historical significance. In cooking, tamarind is versatile, featured in sauces, soups, and liquids, as well as in jams, pickles, and sweets. To use it, the dry fruit is cracked open, and the seeds are removed to separate the fibers and pulp. Tamarind pods can be stored for weeks at around 20°C, while the pulp can be preserved for 4 to 6 months at 10°C when packed in high-density polyethylene. It is also used in making sauces, ketchups, soft drinks, and as a souring agent in dairy products.

#### **Pharmacological Properties:**

Tamarind has a variety of pharmacological properties, including antimicrobial, antioxidant, and laxative effects. It is used to treat a wide range of ailments, including abdominal pain, deep wounds, fever, severe malaria, blood infections, dysentery, diarrhea,

and cardiovascular irregularities. Tamarind offers many health benefits, including anti-venomous, anti-diabetic, anti-asthmatic, hepatoprotective, analgesic, anti-inflammatory, and parasitic activities.

**Conclusion:** Tamarind is a versatile and robust fruit with a high nutritional value, providing substantial health advantages through vitamins, minerals, antioxidants, and bioactive substances. Its ability to adapt to a variety of ecological situations and soil types makes it an important crop in tropical and semi-arid climates. Tamarind's potential to aid digestion, blood sugar balance, heart health, and antibacterial capabilities emphasizes its value in both traditional and modern applications. The continual development of tamarind-based goods emphasizes its agricultural and commercial relevance.

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