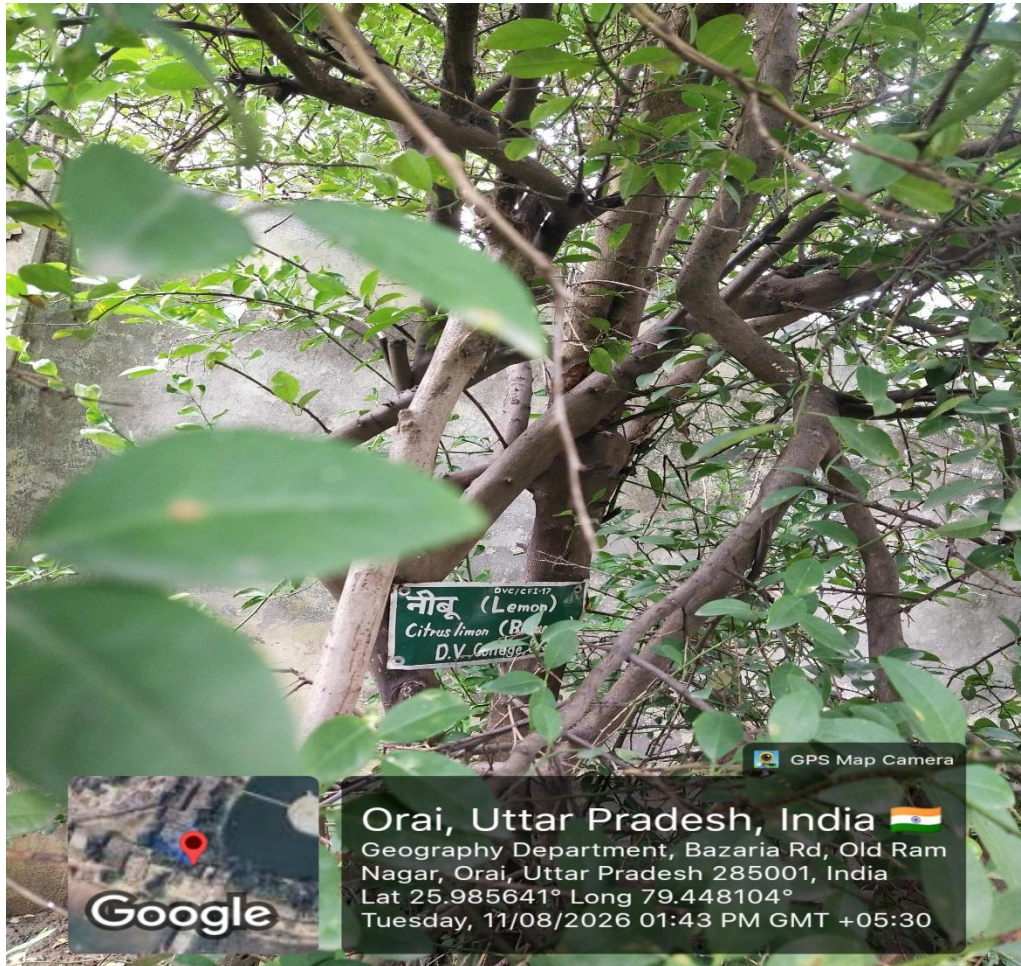


Lemon Tree (*Citrus limon* (L.) Osbeck)

The Lemon tree (*Citrus limon* (L.) Osbeck), commonly known as Lemon, is a small evergreen fruit tree belonging to the family Rutaceae. It is one of the most widely cultivated citrus species in the world, valued for its vitamin C-rich fruits, medicinal properties, aromatic essential oils, and extensive culinary and industrial uses. Lemon is an important commercial fruit crop in tropical and subtropical regions.



Botanical Details

Scientific name: *Citrus limon* (L.) Osbeck

Family: Rutaceae

Common names: Lemon, Nimbu, Lime Lemon

Origin: Believed to have originated in Northeast India, Northern Myanmar, and Southern China through natural hybridization.

Chromosome number: $2n = 18$

Habit

Small to medium-sized evergreen tree.

Height: 3–6 m (occasionally up to 8 m).

Rounded, dense crown with irregular branching.

Young branches often possess sharp thorns.

Root System

Well-developed taproot with an extensive fibrous lateral root system.

Performs best in well-drained, fertile soils.

Stem

Trunk is short with smooth to slightly rough grayish-brown bark.

Wood is hard and moderately durable.

Young shoots are green and sometimes purplish.

Leaves

Simple, alternate, ovate to elliptic, glossy green.

5–12 cm long with finely serrated margins.

Leaves contain numerous aromatic oil glands.

Petioles are narrowly winged.

Flowers

White, fragrant flowers often tinged with purple on the outside.

Bisexual and borne singly or in small clusters.

Rich in nectar and highly attractive to bees.

Flowering occurs several times a year under suitable climatic conditions.

Fruit

A hesperidium (modified berry), oval to elliptic.

Yellow when fully ripe with a thick aromatic rind.

Juicy pulp divided into 8–10 segments.

Rich in vitamin C, citric acid, flavonoids, potassium, and antioxidants.

Seeds

Few to many smooth, white seeds, although seedless cultivars are available.

Propagation is mainly by budding and grafting to maintain superior cultivars.



Ecological Importance

Carbon Sequestration

Perennial woody habit enables long-term carbon storage.

Contributes to orchard-based carbon sequestration.

Biodiversity Support

Flowers provide nectar and pollen for honeybees and other pollinating insects.

Dense canopy offers shelter for birds and beneficial insects.

Soil Conservation

Root system helps bind soil and reduce erosion in orchards.

Mulching with fallen leaves improves soil structure.

Agroforestry

Integrated with vegetables, legumes, medicinal plants, and spices.

Improves farm diversity and sustainable land use.

Climate Adaptation

Adapted to tropical and subtropical climates.

Moderate drought tolerance after establishment but requires regular irrigation for optimum fruit production.

Nutrient Cycling

Leaf litter contributes organic matter and supports soil microbial activity.

Economic Importance

Nutritional Value

Lemon is one of the richest natural sources of vitamin C.

Approximate nutritional composition (per 100 g edible portion):

Energy: 29 kcal

Carbohydrates: 9.3 g

Protein: 1.1 g

Dietary fiber: 2.8 g

Vitamin C: 53 mg

Potassium: 138 mg

Calcium: 26 mg

Culinary Uses

Lemon is widely used for:

Fresh juice

Pickles

Marmalade

Jams

Squash and beverages

Desserts

Salad dressings

Flavoring foods and confectionery

Medicinal Value

Different parts possess therapeutic properties.

Fruit juice: Traditionally used for scurvy prevention, indigestion, sore throat, and immune support.

Peel: Rich in essential oils and flavonoids with antioxidant and antimicrobial properties.

Leaves: Used in traditional medicine for fever and digestive disorders.

Essential oil: Used in aromatherapy and herbal medicine.

Essential Oil Industry

Lemon peel yields essential oil rich in limonene, widely used in:

Perfumes

Cosmetics

Soaps

Cleaning products

Food flavorings

Pharmaceutical preparations

Industrial Uses

Lemon juice and peel are utilized in:

Beverage industry

Food preservation

Pharmaceutical formulations

Cosmetic products

Household cleaning agents

Income Generation

Commercial orchards provide substantial income.

Supports juice processing, pickle manufacturing, essential oil extraction, nursery production, and export industries.

Botanical Applications in Sustainability

Suitable for organic farming, home gardens, and agroforestry systems.

Flowers support pollinator populations and honey production.

Peel waste can be converted into essential oils, pectin, compost, or bio-based products, reducing waste.

Improves biodiversity in mixed cropping systems.

Contributes to sustainable horticulture and climate-resilient fruit production.

Conclusion

The Lemon tree (*Citrus limon*) is a highly valuable fruit crop with outstanding botanical, ecological, nutritional, and economic importance. Its vitamin C-rich fruits, medicinal properties, essential oils, and wide industrial applications make it one of the most commercially significant citrus species. Furthermore, its role in supporting pollinators, sustainable agriculture, and value-added processing contributes greatly to food security, rural livelihoods, and environmentally sustainable horticulture.