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Amla Insights: Unveiling The Superfruit's Health Benefits

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Abstract:

Indian gooseberry or amla is a tiny, sour fruit that is highly valued in traditional medicine, especially Ayurveda. Amla, a superfruit with many health advantages has become more well-known due to its high antioxidant content. With just 100 grams, the fruit provides more than double the daily required intake of vitamin C. Its medicinal benefits are further enhanced by the presence of several beneficial phytonutrients. Amla juice has long been used to treat glaucoma, asthma, bronchitis, conjunctivitis and lung tuberculosis. Both historical use and current scientific studies have backed its inclusion in modern diets confirming its status as a potent superfruit thanks to its diverse range of health-promoting properties.

Introduction:

Origin and Habitat:

Amla or Indian gooseberry (*Emblica officinalis Gaertn. Syn. Phyllanthus emblica*) is the most significant fruit crop grown in the Indian subcontinent. Because of its extraordinary medicinal qualities, Unani and Indian holistic medical systems have prized amla. The genus Emblica and family Euphorbiaceae comprise. Another name for it is the "wonder fruit" of the twenty-first century.

The amla is native to Southeast China, Bangladesh, Sri Lanka, South East Asia and India. This tropical deciduous plant is found throughout several countries, including Cuba, Sri Lanka, Iran, Iraq, the West Indies, Florida, Pakistan and Cuba. From the North-West Himalayan states of Jammu and Kashmir, Himachal Pradesh and Uttaranchal to the Eastern states of Assam, Manipur, Tripura and Meghalaya, its grows natively in India. States like Uttar Pradesh, Madhya Pradesh, Haryana, Karnataka and Tamil Nadu are home to a large Amla population. India is the world's largest producer of amla. The top four Indian states in terms of production of goosberry are Gujarat, Tamil Nadu, Madhya Pradesh and Uttar Pradesh.

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A deciduous tree with a 60–70-year lifespan, amla can be seen bearing fruit in tropical and dry subtropical regions. Cultivating amla requires light to somewhat heavy soil with an alkaline pH of 6.5 to 9.5. It does not grow well in sandy or heavy soils. Amla trees require between 640 and 800 mm of annual rainfall on average to thrive in cultivation and they can withstand temperatures as low as 45°C. The amla tree needs warm conditions to start bearing fruit.

The plant should not be exposed to strong winds in the summer or freezing temperatures in the winter when it is just starting to grow. Practically, amla propagation is carried out by budding. One-year-old seedlings are budded in the month of July to cultivate new plants. It plants are planted during the rainy season because they do best on soil that is moist and has enough air humidity. Harvesting typically takes place between November and February, at which point the fruit's light green color turns yellow. In addition to being hard to touch, ripe fruits turn from white to brown in the seed.

Classification:	**Vernacular Names:**
➢ **Kingdom:** *Plantae*	➢ **English:** Indian gooseberry
➢ **Order:** *Euphorbiales*	➢ **Sanskrit:** Aamalaki
➢ **Family:** *Euphorbiaceae*	➢ **Hindi:** Amla
➢ **Genus:** *Emblica*	➢ **Kannada:** Nelli Kayi
➢ **Species:** *Emblica officinalis*	➢ **Marathi:** Amla

Morphological Characteristics:

The tree can reach upto 8 to 18 meters in height, with thin and light grey bark. Usually twisted and branching, the stem measures 3-6 feet in width. It has green, simple, sub-sessile leaves that resemble pinnacles when they are closely grouped along branches. Greenish-yellow in color, the blooms fruit has a rounded form, is fleshy, has no stalk and is divided into sinlobes. The surface of the fruit is firm, glossy and translucent. When fruits are raw, they are green; when they ripen turn

Fig 1: Amla Fruit

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greenish-yellow. Six trigonous seeds encased in three-crustaceous, two-seeded cocci are present in each fruit.

Nutritional and Chemical Composition:

The fruit has the highest concentration of vitamin C 600 mg per 100 g, it more than oranges and tangerines. It is also abundant in vitamins and minerals. High quantities of calcium (129.77 mg/100 g) are found in amla fruit powder, which is followed by phosphorus, iron and magnesium. The RDA of calcium for humans can be met by consuming 50 g of amla powder. Additionally, trace minerals like manganese, iron, cobalt and chromium are reported to be rich in amla. While octadecatrienoic acid, teradecanoic acid and omega-3 fatty acid are the main fatty acids in amla. Also, glucose is the main carbohydrate in amla. The seed oil of amla is yellowish in color and comprises stearic, palmitic, myristic and oleic acids (about 17 % of fined oil). Phthalic acid, hydroquinone, dodecane and benzoicacid are the minor ingredients in amla oil that give it its antibacterial qualities. The bitterness of amla comes from a high concentration of ellagitannins.

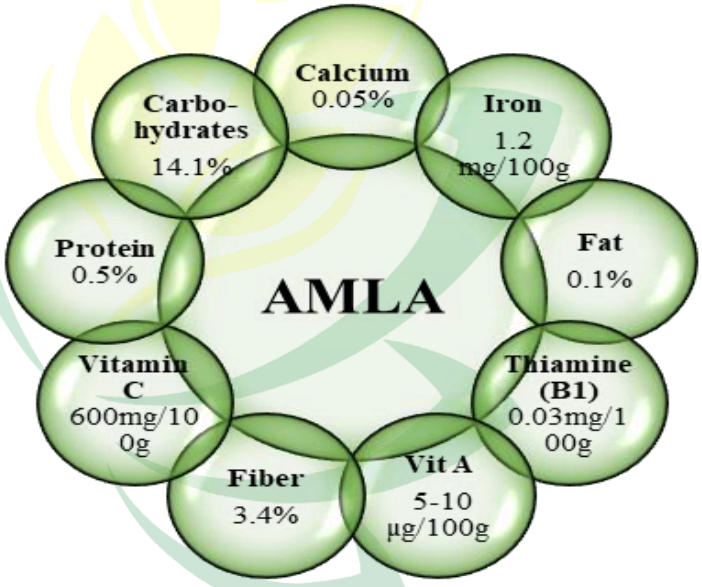

Fig 2: Nutritional value of fruit of Amla per 100 grams

Alkaloids, benzoid, diterpene, sterol, flavonoids, furamlactone, tannins, gallic acid, quercetin and phyllaembic chemicals are the main phytochemical classes that can be found in amla. Rich in pectin and vitamin C, amla has a sour and astringent taste. Two hydrolyzable tannins, emblicanin A and emblicanin B, are what give amla its antioxidant properties. The protein content and ascorbic acid content of the edible amla fruit tissue are three and 160 times

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higher respectively than an apple and the fruit also have a higher content of the majority of minerals and amino acids than apples.

The fruit's seeds contain phosphatides, an essential oil and a fixed oil. This tree's leaves, bark and fruits are all high in tannin. The bark has leucodelphinidin and the root has ellagic acid and lupeol. Brownish-yellow fixed oil (16%) is extracted from the seeds. It contains the following fatty acids: myristic (1.0%), stearic (2.15%), palmitic (3.0%), linolenic (8.8%), linoleic (44.0%) and oleic (28.4%). Vitamin C oxidation is retarded by a chemical compound found in fruit called leucoanthocyanins (Polyphenol). It provides a fair amount of nicotinic acid and vitamin B.

Table 1: Chemical constituents present in various parts of Amla

Part	Phytochemical
Fruits	Vitamin C, Flavonoids (Quercetin, Kaempferol, Rutin), Phenolic Compounds (Gallic acid, Ellagic acid, p-Coumaric acid), Tannins, Alkaloids (Emblicanin A and B), Minerals (Calcium, Iron, Phosphorus), Essential Oils
Seeds	Flavonoids, Polyphenols, Tannins, Fatty Acids, Phytosterols
Leaves	Vitamin C, Alkaloids, Tannins, Flavonoids (Quercetin), Gallic acid
Root	Phyllaemblicin A, B, C and Phyllaemblic acid
Bark	Gallic acid, Ellagic acid and Quercetin

Natural Benefits and Medicinal Properties:

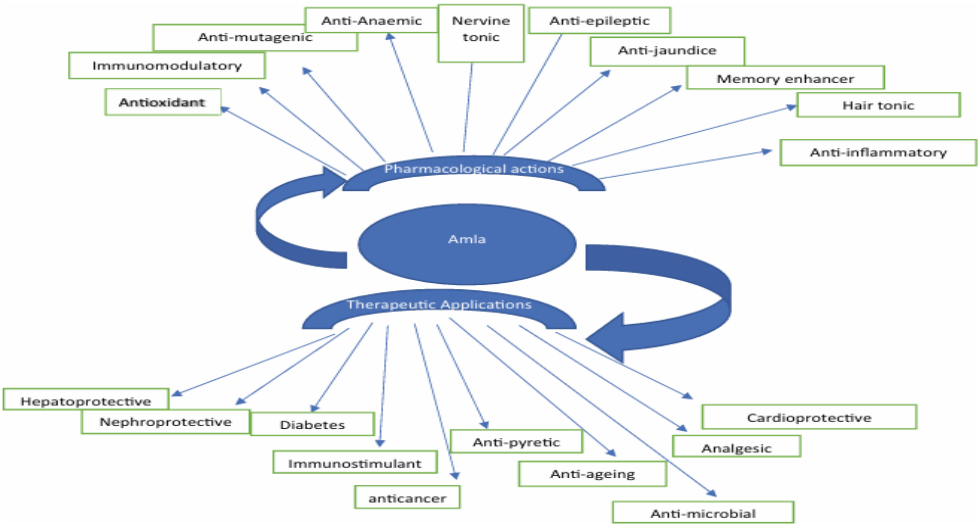

Fig. 3: Various health implications of amla

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- **Antianaemic activity:** Amla rich in ascorbic acid (vitamin C) which is essential for iron absorption. It supplements can be particularly beneficial for individuals with iron deficiency anemia.
- **Antidiarrheal Activity:** A tender shoot of the plant can be given with buttermilk to treat diarrhea and dyspepsia; while fresh green leaves combined with curd offer similar benefits. The leaves also serve as a bitter tonic and are used in infusion with fenugreek seeds for chronic dysentery.
- **Scurvy:** Amla being an exceptionally rich source of vitamin C is one of the most effective treatments for scurvy. A recommended remedy involves taking one teaspoon of dry amla powder mixed with an equal amount of sugar, three times a day with milk.
- **Eye Disorders:** When amla and its tannoids are used for eye disorders; they help mitigate oxidative stress by normalizing changes in lipid peroxidation levels, protein carbonyl content and antioxidant enzyme functions. Additionally, amla has been shown to stop hyperglycemia-induced lens protein aggregation and insolubilization.
- **Antioxidant Activity:** The fruit and seeds of amla contain high levels of gallic acid, which is a major component of the total phenolic content. This compound has potent antioxidant properties and plays a crucial role in scavenging free radicals, helping to maintain redox balance and protect against various degenerative disorders. It being rich natural source of vitamin C is an effective antioxidant that helps eliminate free radicals.
- **Anticancer:** Amla extracts Emblicanin A & B content is also linked to their anti-cancer qualities. Blocking the expression of mutagens, inhibiting apoptosis, immunoprotective, hematoprotective and cytoprotective effects, lowering ROS and NO levels, and interfering with the cancer cell cycle by expressing C25 phosphate and kinase activity in tumor cell lines are the main mechanisms underlying amla's anti-carcinogenic activity. Therefore, eating amla can help delay the occurrence of cancer in people.
- **Antidiabetic Activity:** Consuming amla can help manage diabetes through diet. It lowers the activity of α-amylase and α-glucosidase, which regulates blood glucose levels. Ellagic acid is a major component that causes anticoagulation action.
- **Balances Stomach Acids:** Amla aids digestion without increasing body temperature, making it ideal for relieving mild to moderate hyperacidity and other pitta-related digestive issues.

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- **Excellent Source of Vitamin C:** Amla is one of the most concentrated sources of vitamin C in the plant kingdom. The human body may absorb vitamin C more readily when the fruit is eaten whole. The presence of tannins in amla helps stabilize vitamin C, protecting it from oxidation by heat or light.
- **Cardioprotective:** Amla provides significant benefits for heart health including protection against heart disease, atherosclerosis and cardiovascular disorders. The high polyphenol content in amla juice contributes to reducing low-density lipoprotein oxidation and damage, which is essential for reversing atherosclerosis. Additionally, it supports the recovery of heart muscles after surgical interventions highlighting its potential as an antioxidant, cardioprotective agent and free radical scavenger.
- **Antibacterial Activity:** A number of gram-positive and gram-negative bacteria have been demonstrated to be inhibited in their growth by various aqueous extracts of amla. It is thought that amla's antimicrobial properties stem from the way microorganisms prevent adherence to epithelial cells and denaturize cell proteins, which lowers the number of colonies.

Conclusion and Future Perspectives:

Amla (Indian gooseberry) is a potent superfruit known for its high vitamin C content and diverse phytochemicals that provide numerous health benefits, including antidiabetic, antioxidant, anticancer and cardioprotective properties. Supported by both traditional and modern medicine, amla's potential as a natural remedy is well-established.Future research should focus on isolating its bioactive compounds, enhancing their therapeutic delivery through modern technologies and validating their benefits through clinical trials. This will pave the way for developing standardized amla-based nutraceuticals and pharmaceuticals, contributing to preventive and therapeutic healthcare. Sustainable cultivation and optimized extraction techniques will be key to leveraging amla's full potential in the pharmaceutical and wellness industries.

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