# Avocado: A Health Trustworthy Powerful Superfood

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Avocado (*Persea americana*) is a tropical fruit originated from the Aztec word "Ahuacatl". Ancient Aztec, Olmec and Maya cultures praised avocado as one of the gifts of God among many fruits. The more easily pronounced name of avocado is created by Sir Henry Sloane in 1669. It is believed that 12,000 years ago (7,000 and 5,000 B.C.) avocado appeared in Puebla (Central America) and Southern Mexico. Several millennia before this wild variety was cultivated and Archaeologists in Peru found domesticated avocado seeds buried with Incan mummies dating back to 750 B.C. and there is evidence that avocados were cultivated in Mexico as early as 500 B.C. Fast forward to 1871, when Judge R.B. Ord of Santa Barbara successfully introduced avocado to the U.S. with trees from Mexico. 'Hass' variety was discovered in the late 1920s and Rudolph Hass patented in 1935. American Dietetic Association (ADA) in 1999 considered *P. americana* as an effective food due to its high nutritional value that has an important role in human health.

Avocado was introduced by the American missionary, residing in Bangalore between the years 1906 and 1914 was from Royal Botanical Gardens, Ceylon. More than a dozen varieties of Avocado are grown in many parts of the hill stations near Nilgris, Palani, Kodaikanal, Yercaud, Coorg, etc. The influx of Americans in very large numbers soon after the Second World War, renewed interest in the propagation of avocados. In the meantime, the Government of Mysore opened a research station for non-citrus fruits at Hessaraghatta, Bangalore and about 150 avocado seedlings of different species were introduced by the research station in different parts of Karnataka, Kerala, Tamil Nadu, Sikkim and other states. There are three main production regions of avocado in India, the Kodaikanal area, Ooty area of Tamil Nadu, Gundlupet and Kodagu region of Karnataka and a minor area in North Eastern India.

**Production of avocado**

The avocado cultivation has gained an overwhelming popularity during last one decade due to nutrition value of the fruit. Avocado production of the world was 10.27 million tonnes in 2023 with CAGR (Compound Annual Growth Rate) of 6.10 %. Mexico is the largest producer of Avocado in the world followed by Colombia, Dominican Republic, etc. Mexico supplies 45 % of the international avocado market. USA is the number one importer in the world, followed by the Netherlands, which plays an important role as transit country in the international trade. The top-ranking export countries are Mexico, Peru, Colombia and Chile.

'Arka Supreme' is a high yielding hybrid developed from Central Horticultural Experiment Station (IIHR), Chettalli in 2020. A fully-grown tree yields about 175-200 kg/plant, with an average fruit weight of 367-428 g. In 2021, Indian market reached nearly 2.5 million US Dollars in 2021. The value of avocado market in India reached nearly 5000 tonnes. With the advent of the COVID-19 pandemic, the demand for avocado-based products has witnessed a staggering rise as an immune boosting fruit or super food.

**Plant morphology of avocado**

Avocados can be grown on a wide range of soils, but they are extremely sensitive to poor drainage and cannot withstand waterlogging. They are intolerant to saline conditions. Optimum range of pH is from 5 to 7. The tree avocado is evergreen all over the year with a height of 40-80 feet from the ground and has a lot of long branches. The shape of the leaves is round oval and ovate and about length in 3-10 inches. The size of the avocado flower is small and greenish. The shape of avocado fruit may be round, ovate or pear-shaped and the skin of the fruit is different in colour and appearance in all varieties. The skin may have more flexibility, smooth to scratchy and yellow-green, purplish-red or black in appearance. The pulp colour of the avocado fruit is yellow-greenish to bright-yellowish and it is oily in texture when ripped, but the inner surface will be fibrous. Avocado fruit contains one large seed i.e. ovate or

oval-shaped and it makes the weight of the fruit about 10 to 25 % of the total weight.

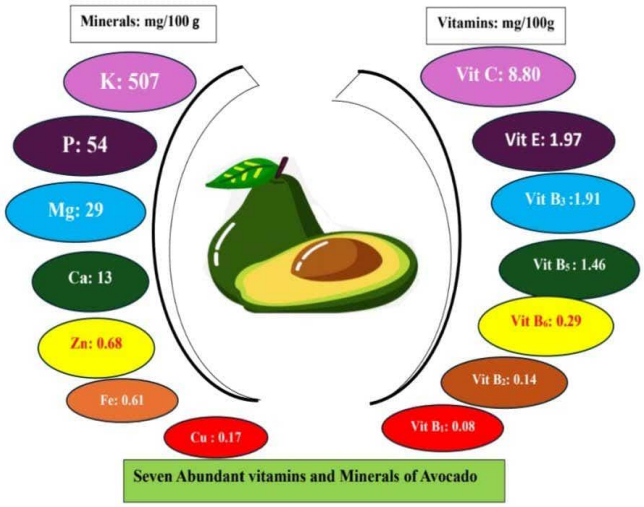
Picture of Avocado Tree, Flower, Seed.

Avocado is a member of the flowering plant group belongs to the kingdom; *Plantae*, family: *Lauraceae*, order; *Laurales*, genus; *Persea*, and species; *P. americana*. Avocado is the most important and only edible fruit of the family *Lauraceae* and has a high nutritional and commercial value. Mexico is the leading producer of avocado due the main climatic requirements of the tree are related to the temperature and rain fall, and the varieties behave differently according to their race. The organoleptic quality of the fruit being very smooth buttery texture with mild flavour (less sweet) and is gaining popularity worldwide and is recognised as "superfood" because of the nutraceutical and therapeutic properties. It has potential applications in the nutrition field and the byproducts of the fruit are used in preparation of starch and pharmaceutical industries etc.

**Nutritional status**

Avocado has been recognized for its higher nutritional value and health benefits. A whole avocado provides 140 to 228 kcal (~585–1000 kJ) of energy. This fruit has a lipid content approximating 25% of the edible portion with an energy density like chicken breast. Avocado pulp is rich in MUFA (Mono-unsaturated fatty acids) 9.8 mg/100 g. Oleic acid is the principal fatty acid in avocado, comprising 45 % of its total fatty acids. In terms of its total fat content and fatty acid composition, avocado oil is similar to olive oil. Other fatty acids present include palmitic and palmitoleic acids with smaller amounts of myristic, stearic, linolenic, and arachidonic acids. A single serving can provide about 2 g protein and 2 g of fiber with a glycemic index of 1±1. Most of the lipids (77-80 %) in the seeds are neutral lipids, whereas glycolipids and phospholipids represent the 7.4 and 10.9 %, respectively.

Fiber constitutes most of its carbohydrate content (~9 g of fibre and 12 g of carbohydrate per avocado) and can reach up to 13.5 g in larger avocados. Fiber prevents constipation and lowers the risk of colon cancer, regulating the immune system and inflammation, lower blood cholesterol, improve the




Seven Abundant vitamins and Minerals of Avocado

microflora of the intestines by working as a prebiotic etc.

Avocado is notable for their higher potassium content (507 mg/100 g of fresh weight), and it provides 60 % more than an equal serving of banana. Potassium intake helps to maintain cardiovascular health and muscle function by regulating the blood pressure through the modulation of liquid retention in the body. Carotenoids, including lutein, zeaxanthin, and α- and β-carotene found in the pulp of the avocado are potent free radical scavengers. It protects the skin from ultraviolet radiation, keeps the eyes healthy by providing antioxidant protection to help minimize any kind of damage even from the ultraviolet light. Xanthophylls suppress the damage of blood vessels by decreasing the amount of oxidized low-density lipoproteins (LDL). The 68 g serving of Hass avocado contains about 57 mg of phytosterols, which is significantly higher compared to other fruits. Avocado phytosterols have been reported to reduce the risks of coronary heart disease. Vitamin C in avocado helps in reducing skin inflammation, promotes wound healing and soothes the dry skin. The fruit contributes to a healthy-looking skin and healthy hair due to the presence of Vitamin E. Folate helps in reducing the risk of miscarriage and neural tube defects in babies.

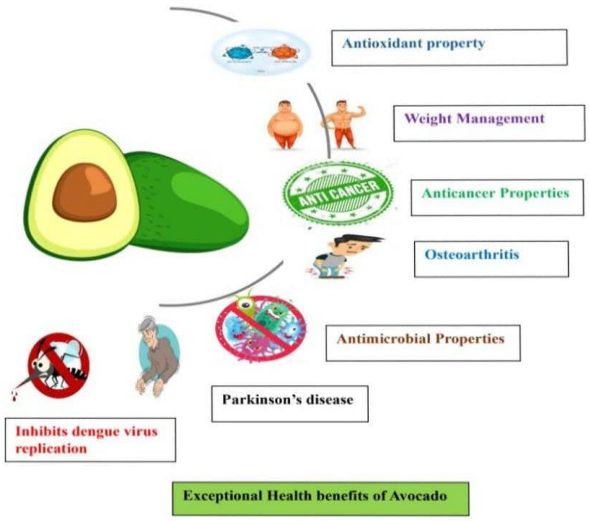
**Surprising therapeutic/functional properties of Avocado**

**Antioxidant property:** Procyanidins, flavonols, hydroxybenzoic, condensed tannins, phenolic acids are the polyphenolic compounds responsible for antioxidant properties of fruit pulp, peel and seed of avocado.

**Anticancer Properties:** Avocado pulp, peel, seed, leaf and root bark have anti cancerous property. Scopoletin is a aromatic chemical compound (plant coumarin and phytoalexin) reduced the carcinogens-induced toxicity and the size of skin papilloma in vivo. Various key cell cycles for cancer cell replication, apoptotic and tumor invasion markers are modulated by scopoletin compound present in the fruit.

**Osteoarthritis (OA):** Avocado–soybean unsaponifiable (ASU) combination represents one of the most commonly used treatments for symptomatic OA. It has anti-inflammatory effects attributed to many phytosterols and isoflavones, which suggests its possible role in the prevention of osteoarticular, autoimmune, and menopausal disorders.

**Antimicrobial Properties:** Antibacterial activity of the extracts derived from different parts of avocado (peel, seed, and pulp) was found against *Bacillus cereus, S. aureus, L. monocytogenes, E. coli, Pseudomonas spp*., and *Yarrowia lipolytica*. The highest inhibitory activity against the Gram-positive bacteria- *B. cereus* and *L. monocytogenes* was observed, while *E. coli* was the most sensitive among the tested Gram-negative bacterial species.




**Parkinson's disease (PD):** Polyphenols of avocado have demonstrated antioxidant properties, anti-infammatory, and regulation of autophagy which is important in human neurodegenerative disorders including PD.

**Inhibits dengue virus replication:** Natural product (2R,4R)-1,2,4-trihydroxyheptadec-16-yne (THHY), extracted from unripe avocado (*Persea americana*) fruit, can inhibit DENV-2 replication in a concentration-dependent manner and efficiently suppresses replication of all DENV serotypes (1–4). Further revealed that the NF-κB-mediated interferon antiviral response contributed to the inhibitory effect of THHY on DENV replication.

**Weight Management:** Analysis of the 2001–2012 NHANES (national Health and Nutritional Examination Survey) dataset reported avocado consumers were 33% less likely to be overweight or obese and 32% less likely to have an elevated waist circumference compared to non-consumers.

**Conclusion**

Avocado pulp and by-products such as peel, seed, and leaves obtained from industrial processing of avocado contain bioactive compounds (phytochemicals) such as polyphenols, carotenoid, and tocopherols. These bioactive compounds have acquired a greater interest in the scientific society due to their Anti-oxidant, Anti-cancerous, Anti-Inflammatory, Anti-microbial properties as well as dermatological uses. Avocado and their byproducts can be used effectively in the food, nutraceutical, pharmaceutical and cosmetic industries. The avocado can be made popular by increasing its organoleptic quality by incorporating into compatible foods and by increasing the volume of cultivation to reduce the market prize. Utilisation of the fruit can be enhanced by use of advanced technologies to extract the valuable micronutrients and bioactive compounds present in it.

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