

## *Prunus armeniaca* L. Fruit: nutritional profile, medicinal value and their utilization in the food industry - a review

### Fruta *Prunus armeniaca* L.: perfil nutricional, valor medicinal y su utilización en la industria alimentaria - una revisión

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#### ABSTRACT

This article focuses on the significance of the *Prunus armeniaca* L. (apricot) fruit, as well as its nutritional content, therapeutic benefits, and application in the food sector. Since fruit consumption has been linked to a lower risk of many diseases due to its nutritional and therapeutic properties. In order to enhance health, current nutritional research trends recommend ingesting 400 g or more of fruits per day. More than 60 scientific publications with the keywords “fruits importance”; “Apricot - overview, geographical extent, nutritional profile, medicinal value, and uses in the food industry” were taken into consideration for this review from a number of databases. The *Prunus armeniaca* L., one of the most popular stone fruits in the world and a member of the Rosaceae family, appears to be based on available data. The apricot fruit is highly regarded for its distinctive flavor and high nutritional value, which includes protein, amino acids, fibre, carbohydrates, minerals, vitamins, and bioactive substances. They have a variety of pharmaceutical properties, including antidiarrheal, anticancer, antioxidant, antimicrobial, antifungal, anthelmintic, hepatoprotective, cardioprotective, and renoprotective activities. Various culinary items, including jam, juice, cookies, puree, fruit bars, and dried fruit, contain apricots. The information of the apricot fruit, including its vernacular names, hierarchy, species, description of the plant, origin and geographic scope, nutritional profile, therapeutic value, and other uses in the food industry, is all included in this review study. The data gathered will be useful for scientific research.

Keywords - Apricot, nutrient content, pharmaceutical properties, culinary items.

#### RESUMEN

Este artículo se centra en la importancia del fruto de *Prunus armeniaca* L. (albaricoque), así como en su contenido nutricional, beneficios terapéuticos y aplicación en el sector alimentario. Ya que el consumo de frutas se

ha relacionado con un menor riesgo de padecer muchas enfermedades debido a sus propiedades nutricionales y terapéuticas. Para mejorar la salud, las tendencias actuales de investigación nutricional recomiendan ingerir 400 g más de frutas por día. Más de 60 publicaciones científicas con las palabras clave “importancia de las frutas”; Para esta revisión se tuvo en cuenta “Albaricoque: descripción general, extensión geográfica, perfil nutricional, valor medicinal y usos en la industria alimentaria” a partir de varias bases de datos. La *Prunus armeniaca* L., una de las frutas de hueso más populares del mundo y miembro de la familia de las Rosáceas, parece basarse en los datos disponibles. La fruta del albaricoque es muy apreciada por su sabor distintivo y su alto valor nutricional, que incluye proteínas, aminoácidos, fibra, carbohidratos, minerales, vitaminas y sustancias bioactivas. Tienen una variedad de propiedades farmacéuticas, que incluyen actividades antidiarreicas, anticancerígenas, antioxidantes, antimicrobianas, antifúngicas, antihelmínticas, hepatoprotectoras, cardioprotectoras y renoprotectoras. Varios productos culinarios, como mermeladas, jugos, galletas, purés, barras de frutas y frutos secos, contienen albaricoques. En este estudio de revisión se incluye toda la información del fruto del albaricoque, incluidos sus nombres vernáculos, jerarquía, especie, descripción de la planta, origen y alcance geográfico, perfil nutricional, valor terapéutico y otros usos en la industria alimentaria. Los datos recopilados serán útiles para la investigación científica. Palabras clave - Albaricoque, contenido de nutrientes, propiedades farmacéuticas, artículos culinarios.

## INTRODUCTION

Fruits are a crucial component of a human’s balanced lifestyle. In addition to being a staple of the diet, humans ingested fruits as an element of their religious rituals and for therapeutic in many cultures across the globe (Vayalil, 2012). Fruits are a second supplier of essential nutrients. Compared to grains, several fruits have substantially higher nutritive possibilities (Ranjha et al., 2022). The provision of food and nutritional security depends heavily on these valuable commodities. A good diet is greatly facilitated by fruit consumption. The better foodstuff derived from fruits that might enhance people’s fitness and prosperity is thus increasing the preference of people who are culturally concerned. Current nutritional research trends have advised consuming 400 g or more of fruits each day to promote health (Chang et al., 2016; Yahia et al., 2019). Fruits are beneficial for numerous bodily metabolic processes since they have high potassium and low salt content. Phytochemicals, which have anti-inflammatory, antioxidant, and health-promoting characteristics including lower BMI (Body Mass Index), bone disorders, obesity, diabetes, cardiovascular disease by maintaining healthy bowel movements, and stroke, are known to be prevented by eating more fruits (Tiwari, 2019; Amina et al., 2022). Carotenoids, flavonoids, xanthophylls, tocopherols, and phenolic compounds are examples of phytochemicals that assist the body get rid of reactive oxygen species. Antioxidant-rich fruits can help to keep the metabolism in control and enhance the appearance of the skin (Kaur et al., 2020; Sabbadini et al., 2021).

The Rosaceae family includes *Prunus armeniaca* L. (apricot), one of the world’s most widely grown stone fruits (Giovannini et al., 2022). Rosaceae is one of the biggest families of Angiosperms, with over roughly 100 genera and 3,400 species that contain almonds, apples, peaches, plums, strawberries, and cherries (Moustafa and Cross,

2019). Apricot was most likely named by Romans from a combination of two words: “praecocia” from Latin, which means “early matured”, because apricots develop in the early summer as opposed to ancient Asian peaches, or “albarquq” from Arabic, which means “short ripening time” (Jaafar, 2021).

The major reason apricots are grown all over the world is for their premium fruit, which may be dried, eaten fresh, or processed by the food sector (Mratinić et al., 2011). The apricot-dried fruit is even used in the manufacture of various culinary items like jam, juices, sauces, canning, liquor, puree for baby food, wine, and vinegar (Zhebentyayeva et al., 2012). Vitamins A, C, B group, H (biotin), and E, among others, are present in their fruits, which are distinguished by their rich sugar level. The primary carotenoid molecule in apricots was discovered to be  $\beta$ -carotene, the primary precursor of provitamin A that have been linked to a number of health advantages, including a reduced risk of heart disease and some malignancies, a reduction in oxidative stress, an improvement in the immune system, and protection against age-related macular degeneration. In many regions across the world, apricots have been utilized extensively in culture for a very long time (García-Martínez et al., 2013; Gorina et al., 2019; Kafkaletou et al., 2019). Due to its nutritional content and therapeutic capabilities, which give it the label “golden fruit,” it is one of the most significant fruits in terms of commerce and ranks third behind plum and peach (Al-Soufi et al., 2022).

This review highlights the overview of apricot fruit.

#### Vernacular Names

The word “apricot” has several different names across the world. The *Prunus armeniaca* plant is also known as – (CABI, 2019)

English	apricot tree
Spanish	albaricoquero; chabacano; damasco
French	abricotier; apricottier
Russian	Abrikos
Chinese	xing chu
Portuguese	albicoqueiro; alpercheiro; damasqueiro
Greece	Veryokkia
Italy	Albicocco
Netherlands	Abrikozenboom
Poland	Morela
Hungary	Kajszi
India	Khubani

#### Taxonomical Hierarchy

The taxonomical hierarchy of the apricot plant is – (CABI, 2019)

Domain	Eukaryota
Kingdom	Plantae
Phylum	Spermatophyta
Subphylum	Angiospermae
Class	Dicotyledonae
Order	Rosales
Family	Rosaceae
Subfamily	Prunoideae
Genus	Prunus
Species	Prunus armeniaca

### Species

There are some species of apricot in the genus Prunus - (Contributors, 2022)

<i>Prunus armeniaca</i> var. <i>ansu</i>	<i>Prunus armeniaca</i> var. <i>meixianensis</i>
<i>Prunus armeniaca</i> var. <i>armeniaca</i>	<i>Prunus armeniaca</i> var. <i>xiongyueensis</i>
<i>Prunus armeniaca</i> var. <i>holosericea</i>	<i>Prunus armeniaca</i> var. <i>zhidanensis</i>

Description of the Plant: According to botany, apricot plants may grow up to 9-12 m in height and have a diameter of 35-40 cm. It grows along with oval-shaped leaves, a sharp edge, and white blooms with five petals. The fruit is ellipsoidal or circular, 3-6 cm in size, and has a longitudinal groove. When the fruit reaches the maturing phase in late summer, it first becomes yellow, then orange, and ultimately dark purple. White to pink blooms begin to mature in March. It surrounds a woody stone that contains the seed, a firm endocarp, a soft mesocarp, and an exocarp that is glabrous. They range in color from yellow to orange (Figure 1). Relying on elevation and region, apricot fruits often begin to mature in the final week of May and proceed up to the end of August. When the soil pH ranges from 6.0 and 7.0, and the soils are well-drained, it is possible to achieve good plant development (Erdogan-Orhan and Kartal, 2011; Raj et al., 2012; González-García et al., 2020; Göttingerová et al., 2020).

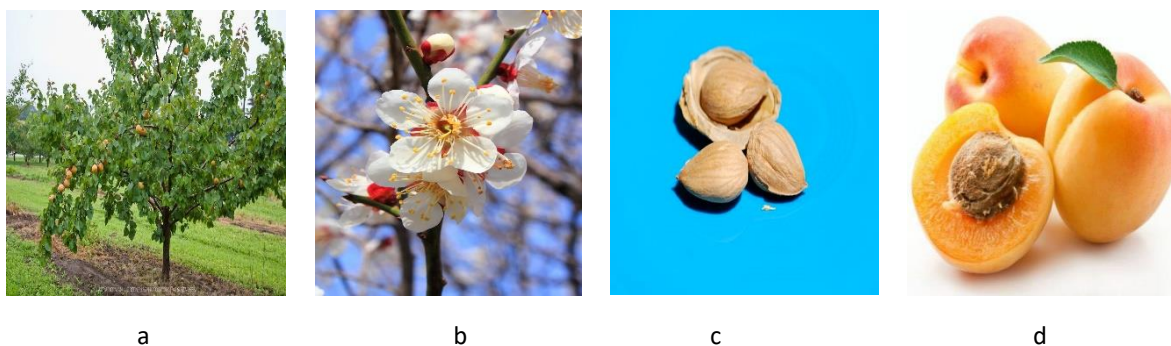


Figure 1. Apricot: (a) whole plant; (b) flowers; (c) seeds; (d) fruits

**Origin and Geographic Scope:** Apricot is a temperate fruit that thrives in seasons that are distinct. It necessitates a frigid winter, spring, and early summer with reasonably high temperatures. The apricot tree is a deciduous tree that requires the cold weather for appropriate hibernation and bud growth (400-600 hours below 7.2 °C). Apricots cannot be grown in subtropical climates (Fatima et al., 2018).

According to some reports, indicate apricots were first grown in India in approximately 3000 BC. And Soviet botanist Nikolai Vavilov suggested that this species may have its origins in China, it has long been cultivated in Armenia, thus the name *armeniaca*. Apricots are grown in many places of the world, including all Mediterranean nations, South Africa, South and North America, Front and Central Asia, Syria, Iran, Palestine, Afghanistan, Northern India, and other hilly areas (Gorina et al., 2019; Amina et al., 2022; Saadi et al., 2022).

The world's largest producer of both fresh and dried apricots is Turkey (Polat and Caliskan, 2013). Around 38,31,823 tonnes of apricots are produced worldwide over an area of 5,20,455 hectares (ha). On an area of 2,400 ha, India generates roughly 10,000 tonnes of grown apricots. Approximately 4.17 tonnes/ha are produced on average by apricots (Sharma et al., 2013). Algeria, Turkey, Iran, Italy, Pakistan, Spain, Uzbekistan, and France produced 3,881,204 tonnes of apricots in 2016, accounting for 67% of global output (González-García et al., 2020). Ladakh is the largest expanding region in India. About 96.70 thousand square kilometers, accounting for 75% of the nation's frigid. The second most important and commercially feasible agricultural product in Ladakh is the apricot, after poultry. It included the Indian districts of Leh and Kargil and is located between longitude 32°5'-36° north and 75°15'-80°15' east (Prakash et al., 2020).

**Nutritional Profile:** The tasty flavor alluring aroma, vibrant colors, and fruit's nutritious benefits are the key reasons why customers greatly value apricots. The flavor, appearance, and nutritional value of apricots are enhanced by the presence of several bioactive substances, including polyphenols, carotenoids, triacylglycerols, high-oleic lipids, tocopherols, phytosterols, squalene, fatty acids, volatiles, polysaccharides, pectins, reductive sugars, dietary fibres, minerals, vitamins, and include specified quantities of starches, lipids, and proteins, according to physical and chemical engineering elements of apricot fruit (Igual et al., 2012; Raj et al., 2016; Karatas, 2022). The minerals and vitamins content of apricot has been shown to vary depending on the variety, temperature, type of soil, and stage of ripeness at harvest (Mirnezami et al., 2020).

Carotenoids and polyphenols from apricots are of great interest. Carotenoids not just to promote growth, embryonic development, and visual acuity, but they also shield opposed to cancer. The main phenolic constituents in apricot include chlorogenic (5-caffeoylquinic acid) and neochlorogenic acids, caffeic acid, p-coumaric acid, ferulic acid, (+)-catechin, (-)-epicatechin, and rutin, which significantly increase their antioxidant capacity. Antioxidants like polyphenols may shield cellular components from oxidative damage and lower the risk of oxidative stress-related degenerative illnesses (Huang et al., 2013; Dulf et al., 2017). Rutosides of quercetin and of kaempferol, and glucosides make up the most of the flavanols found in apricots, while quercetin 3-rutinoside (rutin) plays a major role (Kan et al., 2014; Iglesias-Carres et al., 2019; Gómez-Martínez et al., 2021).

Apricots' nutritional value and subtle aroma are both correlated with their major metabolites, which include organic acids and sugars. The most prevalent sugar is sucrose, which is followed by fructose, glucose, and sorbitol. Fruit sweetness, scent, and user happiness all depend on sucrose and fructose. Apricots mostly include citric and malic acids, with traces of ascorbic, succinic, and quince acids (Tomás-Barberán et al., 2013; Suna et al., 2014; Alajil et al., 2021). These organic acids offer a number of advantages in addition to help give fruits their organoleptic qualities. While oxalic acid is used to cure wounds and ulcers, succinic acid aids in the treatment of diabetes, citric acid serves as a crystal thickener in bones, and malic acid has some antibacterial qualities (Muzzafaar et al., 2018).

Here below are some proximate composition in Table 1 (Sartaj et al., 2015; Sharif et al., 2015); minerals, vitamins, and organic acids in Table 2 (Moustafa and Cross, 2019; Jaafar, 2021); and amino acids in Table 3 (Hussain et al., 2021) of apricot fruit.

Table I. Proximate Composition of Apricot Fruit

Constituents	g/100 g
Moisture	84.39
Crude Protein	03.01
Crude Fat	01.53
Crude Fiber	02.37
Ash	04.94
Carbohydrate	11-13

Medicinal Values: There have been a number of pharmacological benefits associated with apricots, including those that are anticancer, antiatherosclerotic, antihyperlipidemic, antidiarrheal, antituberculosis, antiamyloidogenic, antiparasitic, antioxidant, antimicrobial, antifungal, antiaging, antiviral, antimutagenic, anthelmintic, hepatoprotective, cardioprotective, and renoprotective activity (Sehgal, 2012; Tomás-Barberán et al., 2013; Karabulut et al., 2014; Minaiyan et al., 2014; Gupta et al., 2018; Raj et al., 2021; Tareen et al., 2021; Kitic et al., 2022; Safal et al., 2022).

Traditionally, apricot is used to treat tumors, anemia, colds, cough, and fever, as well as laryngitis, bronchitis, hemorrhages, and Alzheimer's disease. According to reports, apricot fruit can improve fertility, eye inflammation, and spasm (Fратиanni et al., 2018; Shrivastav and Lata, 2019).

#### Utilization in the Food Industry

Fresh apricots are consumed, but lesser amounts are also processed into jam, juice, puree, boiled, fruit bars, cookies, and dried fruit (Rai et al., 2016; Abd-Elnoor, 2019; Aziz et al., 2020; Zahra et al., 2020; Bashir et al., 2022). Here, below some food products of apricot based-

Apricot-date bar: The pastes of apricots and dates were combined using a mixer. The blended fruits were completely combined with other ingredients (roasted gram flour, peanuts, skim milk powder, common salt,

potassium sorbate, and BHA/BHT). After blending, the mixture was rolled out onto a sheet on a stainless-steel surface, and then cutting blades were used to cut apricot-date bars (Salim-ur-Rehman et al., 2012).

**Dried apricot fruit date jam:** A thick consistency that is capable of holding fruit bugs in place was achieved by boiling the fruit pulp with precise amounts of sugar, citric, and pectin acid. Date shreds were added after the fruit pulp had been boiled for a while with the addition of sugar. In another bowl, a little portion of the mixture was added along with the determined amount of pectin. The fruit mixture was then mixed with the pectin and pulp mixture, which was followed by the addition of citric acid, which lowers the pH of the jam to improve setting. At regular intervals, the mixture was boiled and checked to see if it had reached the necessary °Brix (°B). Once it reached 68 °B, it was filled hot into glass bottles that had already been sterilized. The test-bottle samples were kept. The ingredients used to make jam are as follows: 1.2% acidity, 1.5% pectin, 5% dates, 45% apricot pulp, and 68% sugar (ul Haq and Darakshan, 2014).

**Apricot powder drink:** A dehydrator using hot air and the sun to dry apricots was the two ways used to create apricot powder. In the process of hot air drying, slices of apricots were dried in a cabinet drier at  $58 \pm 2$  °C for 10-12 hours to produce the powder. And in the sun-drying method, chopped apricot fruits were put in clean trays and left in direct sunshine for five days until they reached a steady weight. After that, ground dry fruit was preserved (Ahmed et al., 2020).

**Apricot fruit juice:** Firstly, the local market was utilized to acquire fresh, intact apricot fruits, which were then kept in the refrigerator at 4 °C and consumed within a week. The apricot was taken out of the fridge and allowed to get to room temperature before being turned into juice. The juice was extracted locally using a juice extractor after the apricot had been cleaned and chopped using a sharp knife. To remove contaminants from the juice for future tests, it was also centrifuged and filtered through a cotton cloth (Rahaman et al., 2020).

**Apricot cookies:** Apricot pulp powder, wheat flour, sugar, shortening, sodium bicarbonate, glucose, sodium chloride, and water were the components of the cookies. For 2 minutes at low speed, sugar and fat were blended. To create a homogenous cream, sodium chloride and baking ingredients that had previously been dissolved in water were added to the fat mixture and mixed at high speed for 5 minutes. The prepared cookie dough was sheeted, cut into circles, and cooked in an electric oven for 15 minutes at 120 °C. The cookies were baked, then allowed to cool before being placed in plastic bags and kept at room temperature (Nisar et al., 2021).

## CONCLUSION

In cold and temperate climates, apricots are a significant fruit crop. It is well recognized by several names across the rest of the globe. With an emphasis on the nutritional profile, medicinal benefits, and use of apricot fruit in the food industry, this study aims to highlight the most recent findings on the subject. This fruit includes a variety of macro- and micronutrients, amino acids, organic acids, and bioactive compounds. Additionally, they have a variety of pharmacological properties that aid in the treatment of certain disorders. Many food items in the food sector are manufactured in dried or fresh apricot form.

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