

## Almond

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### Almond



Almond tree with ripening fruit. Majorca, Spain.

### Scientific classification

Kingdom: Plantae  
(unranked): Angiosperms  
(unranked): Eudicots  
(unranked): Rosids  
Order: Rosales  
Family: Rosaceae  
Genus: Prunus  
Subgenus: Amygdalus  
Species: P. dulcis

### Binomial name

*Prunus dulcis*  
(Mill.) D.A.Webb

### Synonyms

*Prunus amygdalus* Batsch

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### Description

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The almond is a deciduous tree, growing 4–10 m (13–33 ft) in height, with a trunk of up to 30 cm (12 in) in diameter. The young twigs are green at first, becoming purplish where exposed to sunlight, then grey in their second year. The leaves are

3–5 inches long,<sup>[1]</sup> with a serrated margin and a 2.5 cm (1 in) petiole.

The flowers are white to pale pink, 3–5 cm (1–2 in) diameter with five petals, produced singly or in pairs and appearing before the leaves in early spring.<sup>[2][3]</sup>

Almonds begin bearing an economic crop in the third year after planting. Trees reach full bearing five to six years after planting. The fruit matures in the autumn, 7–8 months after flowering.

The almond fruit measures 3.5–6 cm (1–2 in) long. In botanical terms, it is not a nut, but a drupe. The outer covering or exocarp, fleshy in other members of *Prunus* such as the plum and cherry, is instead a thick, leathery, grey-green coat (with a downy exterior), called the hull. Inside the hull is a reticulated, hard, woody shell (like the outside of a peach pit) called the endocarp. Inside the shell is the edible seed, commonly called a nut. Generally, one seed is present, but occasionally two occur.

The fruit of the almond is a drupe, consisting of an outer hull and a hard shell with the seed (which is not a true nut) inside. Shelling almonds refers to removing the shell to reveal the seed. Almonds are sold shelled (i.e., after the shells are removed), or unshelled (i.e., with the shells still attached). Blanched almonds are shelled almonds that have been treated with hot water to soften the seedcoat, which is then removed to reveal the white embryo

The wild form of domesticated almond grows in parts of the Levant; almonds must first have been taken into cultivation in this region. The fruit of the wild forms contains the glycoside amygdalin, "which becomes transformed into deadly prussic acid (hydrogen cyanide) after crushing, chewing, or any other injury to the seed."

Wild almonds are bitter, the kernel produces deadly cyanide upon mechanical handling, and eating even a few dozen at one sitting can be fatal. Selection of the sweet type, from the many bitter types in wild, marked the beginning of almond domestication. How humans selected the sweet type remains a mystery.<sup>[8]</sup> It is unclear as to which wild ancestor of the almond created the domesticated species. Ladizinsky suggests the taxon *Amygdalus fenzliana* (Fritsch) Lipsky is the most likely wild ancestor of the almond in part because it is native of Armenia and western Azerbaijan where it was apparently domesticated.

While wild almond species are toxic, domesticated almonds are not; Jared Diamond argues that a common genetic mutation causes an absence of glycoside

amygdalin, and this mutant was grown by early farmers, "at first unintentionally in the garbage heaps, and later intentionally in their orchards".<sup>[9]</sup> Zohary and Hopf believe that almonds were one of the earliest domesticated fruit trees due to "the ability of the grower to raise attractive almonds from seed. Thus, in spite of the fact that this plant does not lend itself to propagation from suckers or from cuttings, it could have been domesticated even before the introduction of grafting".<sup>[7]</sup> Domesticated almonds appear in the Early Bronze Age (3000–2000 BC) such as the archaeological sites of Numeria (Jordan), or possibly a little earlier. Another well-known archaeological example of the almond is the fruit found in Tutankhamun's tomb in Egypt (c. 1325 BC), probably imported from the Levant.<sup>[7]</sup> Of the European countries that the Royal Botanic Garden Edinburgh reported as cultivating almonds, Germany is the northernmost, though the domesticated form can be found as far north as Iceland.

An almond shaker before and during a harvest of a tree

The world produced 2.00 million tonnes of almonds in 2011 according to Food and Agriculture Organization, with United States the largest producer at 0.73 million tonnes.<sup>[15]</sup> The apparent 50% decrease in production by the United States led to a calculated percent of world production decrease from 56% to 36%; however, a 2013 news article indicated that the United States produced at least 80% of the world's supply.<sup>[16]</sup>

Pollination



Mature almond fruit



### Smoked and salted almonds

While the almond is often eaten on its own, raw or toasted, it is also a component of various dishes. Almonds are available in many forms, such as whole, sliced (flaked, slivered), and as flour. Almonds yield almond oil and can also be made into almond butter or almond milk. These products can be used in both sweet and savoury dishes.

Along with other nuts, almonds can be sprinkled over breakfasts and desserts, particularly muesli or ice cream-based dishes. Almonds are used in marzipan, nougat, many pastries (including Jesuites), cookies (including French macarons, macaroons), and cakes (including financiers), nougat, and other sweets and desserts. They are also used to make almond butter, a spread similar to peanut butter, popular with peanut allergy sufferers and for its naturally sweeter taste. The young, developing fruit of the almond tree can be eaten whole ("green almonds") when they are still green and fleshy on the outside and the inner shell has not yet hardened. The fruit is somewhat sour, but is a popular snack in parts of the Middle East, eaten dipped in salt to balance the sour taste. Also in the Middle East they are often eaten with dates. They are available only from mid-April to mid-June in the Northern Hemisphere; pickling or brining extends the fruit's shelf life.

For dessert, almond cookies, Chinese almond biscuits, and Italian ricciarelli use almonds.

### Almond oil in a clear glass vial

Almonds are a rich source of oil, with values ranging between 36 to 60% of kernel dry mass. A study by Venkatchalam and Sathe suggests almonds contain approximately 44% oils, of which 62% is monounsaturated oleic acid (an omega-9 fatty acid), 29% is linoleic acid (a polyunsaturated omega-6 essential fatty acid), and 9% is saturated fatty acid.

"Oleum amygdalae", the fixed oil, is prepared from either sweet or bitter almonds and is aglyceryloleate, with a slight odour and a nutty taste. It is almost insoluble in alcohol but readily soluble in chloroform or ether. Sweet almond oil is obtained from the dried kernel of sweet almonds.<sup>[49]</sup>

The oil is good for application to the skin as an emollient, and has been traditionally used by massage therapists to lubricate the skin during a massage session.<sup>[50]</sup>

Almond oil can also be used as a wood conditioner of certain woodwind instruments, such as the oboe and clarinet.<sup>[51]</sup>

### Aflatoxins

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Almonds, like other tree nuts, are susceptible to aflatoxin-producing molds. Aflatoxins are potent carcinogenic chemicals produced by molds such as *Aspergillus flavus* and *Aspergillus parasiticus*. The mold contamination may occur from soil, previously infested almonds, and almond pests such as navel orangeworm. High levels of mold growth typically appear as gray to black filament like growth. It is unsafe to eat mold infected tree nuts.

Some countries have strict limits on allowable limits for aflatoxin contamination on almonds, and require adequate testing before the nuts can be marketed to their citizens. The European Union, for example, introduced a mandatory requirement since 2007 that all almond shipments to EU must be tested for aflatoxin. If aflatoxin does not meet the strict safety regulations, the entire consignment may be reprocessed to eliminate the aflatoxin or it must be destroyed.

The almond industry not only tests and processes almonds to ensure infected almonds do not reach the market, the industry also takes steps to prevent sources that cause contamination. These steps include proper orchard management, winter sanitation, early harvest, proper storage among others.