

Fruits

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For the technology company, see [Apple Inc.](#) For other uses, see [Apple \(disambiguation\)](#).

"Apple tree" redirects here. For other uses, see [Apple tree \(disambiguation\)](#).

"Apple blossom" redirects here. For other uses, see [Apple Blossom \(disambiguation\)](#).

Apple



Fruit



Flowers

Scientific classification

Kingdom: [Plantae](#)
(unranked): [Angiosperms](#)
(unranked): [Eudicots](#)
(unranked): [Rosids](#)
Order: [Rosales](#)
Family: [Rosaceae](#)
Genus: [Malus](#)
Species: ***M. pumila***

Binomial name

Malus pumila

[Miller](#), 1768

Synonyms[1][2]

- *Malus communis* Desf.
- *Malus domestica* Borkh.
nom. illeg.
- *M. frutescens* Medik.
- *M. paradisiaca* (L.) Medikus
- *M. sylvestris* Mil.
- *Pyrus malus* L.
- *Pyrus malus* var.
paradisiaca L.
- *Pyrus dioica* Moench

The **apple tree** (*Malus pumila*, commonly and [erroneously](#) called *Malus domestica*) is a [deciduous tree](#) in the [rose family](#) best known for its sweet, [pomaceous fruit](#), the **apple**. It is [cultivated](#) worldwide as a [fruit tree](#), and is the most widely grown species in the [genus Malus](#). The tree originated in [Central Asia](#), where its wild ancestor, *Malus sieversii*, is still found today. Apples have been grown for thousands of years in Asia and Europe, and were brought to North America by [European colonists](#). Apples have [religious](#) and [mythological](#) significance in many cultures, including [Norse](#), [Greek](#) and [European Christian traditions](#).

Apple trees are large if grown from seed. Generally apple [cultivars](#) are propagated by [grafting](#) onto rootstocks, which control the size of the resulting tree. There are more than 7,500 known [cultivars of apples](#), resulting in a range of desired

characteristics. Different cultivars are bred for various tastes and uses, including [cooking](#), eating raw and [cider](#) production. Trees and fruit are prone to a number of [fungal](#), [bacterial](#) and pest problems, which can be controlled by a number of [organic](#) and non-organic means. In 2010, the fruit's [genome](#) was [sequenced](#) as part of research on disease control and selective breeding in apple production.

Worldwide production of apples in 2014 was 84.6 million [tonnes](#), with China accounting for 48% of the total [\[3\]](#)

Botanical information



Blossoms, fruits, and leaves of the apple tree (*Malus pumila*)

The apple is a [deciduous](#) tree, generally standing 1.8 to 4.6 m (6 to 15 ft) tall in cultivation and up to 12 m (39 ft) in the wild. [\[4\]](#) When cultivated, the size, shape and branch density are determined by [rootstock](#) selection and trimming method. The [leaves](#) are [alternately arranged](#) dark green-colored simple ovals with serrated margins and slightly downy undersides. [\[5\]](#)

[Blossoms](#) are produced in spring simultaneously with the budding of the leaves, and are produced on spurs and some long shoots. The 3 to 4 cm (1.2 to 1.6 in) flowers are white with a pink tinge that gradually fades, five [petaled](#), with an [inflorescence](#) consisting of a [cyme](#) with 4–6 flowers. The central flower of the inflorescence is called the "king bloom"; it opens first, and can develop a larger fruit. [\[5\]\[6\]](#)

The fruit matures in late summer or autumn, and cultivars exist with a wide range of sizes. Commercial growers aim to produce an apple that is 7.0 to 8.3 cm (2.75 to 3.25 in) in diameter, due to market preference. Some consumers, especially those in Japan, prefer a larger apple, while apples below 5.7 cm (2.25 in) are generally used for making juice and have little fresh market value. The skin of ripe apples is generally red, yellow, green, pink, or russeted although many bi- or tri-colored cultivars may be found. [\[7\]](#) The skin may also be wholly or partly russeted i.e. rough and brown. The skin is covered in a protective layer of [epicuticular wax](#). [\[8\]](#) The exocarp (flesh) is generally pale yellowish-white [\[7\]](#) though pink or yellow exocarps also occur.

Wild ancestors

Main article: [Malus sieversii](#)

The original wild [ancestor](#) of *Malus pumila* was *Malus sieversii*, found growing wild in the mountains of Central Asia in southern Kazakhstan, Kyrgyzstan, Tajikistan, and [Xinjiang](#), China. [\[5\]\[9\]](#) Cultivation of the species, most likely beginning on the forested flanks of the [Tian Shan](#) mountains, progressed over a long period of time and permitted secondary [introgression](#) of genes from other species into the open-pollinated seeds. Significant exchange with *Malus sylvestris*, the crabapple, resulted in current populations of apples being more related to crabapples than to the more morphologically similar progenitor *Malus sieversii*. In strains without recent admixture the contribution of the latter predominates. [\[10\]\[11\]\[12\]](#)

Genome

In 2010, an Italian-led consortium announced they had sequenced the complete [genome](#) of the apple in collaboration with horticultural genomicists at [Washington State University](#). [\[13\]](#) using 'Golden Delicious'. [\[14\]](#) It had about 57,000 genes, the highest number of any plant genome studied to date [\[15\]](#) and more genes than the human genome (about 30,000) [\[16\]](#) This new understanding of the apple genome will help scientists in identifying genes and gene variants that contribute to resistance to disease and drought, and other desirable characteristics. Understanding the genes behind these characteristics will allow scientists to perform more knowledgeable selective breeding. The genome sequence also provided proof that *Malus sieversii* was the wild ancestor of the domestic apple—an issue that had been long-debated in the scientific

community.[13]

History



Wild *Malus sieversii* apple in Kazakhstan

The center of diversity of the genus *Malus* is in eastern present-day [Turkey](#). The apple tree was perhaps the earliest tree to be cultivated,[17] and its fruits have been improved through selection over thousands of years. [Alexander the Great](#) is credited with finding dwarfed apples in [Kazakhstan](#) in 328 [BCE](#):[5] those he brought back to Macedonia might have been the progenitors of dwarfing root stocks. Winter apples, picked in late autumn and stored just above freezing, have been an important food in Asia and Europe for millennia.[17]

Apples were introduced to North America by colonists in the 17th century[5] and the first apple orchard on the North American continent was planted in [Boston](#) by Reverend [William Blaxton](#) in 1625.[18] The only apples native to North America are [crab apples](#), which were once called "common apples".[19] Apple cultivars brought as seed from Europe were spread along Native American trade routes, as well as being cultivated on colonial farms. An 1845 United States apples nursery catalogue sold 350 of the "best" cultivars, showing the proliferation of new North American cultivars by the early 19th century.[19] In the 20th century, irrigation projects in [Eastern Washington](#) began and allowed the development of the multibillion-dollar fruit industry, of which the apple is the leading product.[5]

Until the 20th century, farmers stored apples in [frostproof cellars](#) during the winter for their own use or for sale. Improved transportation of fresh apples by train and road replaced the necessity for storage.[20][21] In the 21st century, long-term storage again came into popularity, as "controlled atmosphere" facilities were used to keep apples fresh year-round. Controlled atmosphere facilities use high humidity, low oxygen, and controlled carbon dioxide levels to maintain fruit freshness.[22][23]

Society and culture

Main article: [Apple \(symbolism\)](#)



"Brita as [Iduna](#)" (1901) by [Carl Larsson](#)

Germanic paganism

In [Norse mythology](#), the goddess [Iðunn](#) is portrayed in the *Prose Edda* (written in the 13th century by [Snorri Sturluson](#)) as providing apples to the [gods](#) that give them [eternal youthfulness](#). English scholar [H. R. Ellis Davidson](#) links apples to religious practices in [Germanic paganism](#), from which [Norse paganism](#) developed. She points out that buckets of apples were found in the [Oseberg ship](#) burial site in Norway, and that fruit and nuts (Iðunn having been described as being transformed into a nut in *Skáldskaparmál*) have been found in the early graves of the [Germanic peoples](#) in England and elsewhere on the continent of Europe, which may have had a symbolic meaning, and that nuts are still a recognized symbol of [fertility](#) in southwest England.[24]

Davidson notes a connection between apples and the [Vanir](#), a tribe of gods associated with [fertility](#) in Norse mythology, citing an instance of eleven "golden apples" being given to woo the beautiful [Gerðr](#) by [Skírnir](#), who was acting as messenger for the major Vanir god [Freyr](#) in stanzas 19 and 20 of *Skírnismál*. Davidson also notes a further connection between fertility

and apples in Norse mythology in chapter 2 of the [Völsunga saga](#) when the major goddess [Frigg](#) sends King [Rerir](#) an apple after he prays to Odin for a child, Frigg's messenger (in the guise of a crow) drops the apple in his lap as he sits atop a [mound](#).^[25] Rerir's wife's consumption of the apple results in a six-year pregnancy and the [Caesarean section](#) birth of their son—the hero [Völsung](#).^[26]

Further, Davidson points out the "strange" phrase "Apples of [Hel](#)" used in an 11th-century poem by the [skald](#) Thorbiorn Brúnarson. She states this may imply that the apple was thought of by Brúnarson as the food of the dead. Further, Davidson notes that the potentially Germanic goddess [Nehalennia](#) is sometimes depicted with apples and that parallels exist in early Irish stories. Davidson asserts that while cultivation of the apple in Northern Europe extends back to at least the time of the [Roman Empire](#) and came to Europe from the [Near East](#), the native varieties of apple trees growing in Northern Europe are small and bitter. Davidson concludes that in the figure of [Iðunn](#) "we must have a dim reflection of an old symbol: that of the guardian goddess of the life-giving fruit of the other world."^[24]

Greek mythology



[Heracles](#) with the apple of [Hesperides](#)

Apples appear in many [religious traditions](#), often as a mystical or [forbidden fruit](#). One of the problems identifying apples in religion, [mythology](#) and [folktales](#) is that the word "apple" was used as a generic term for all (foreign) fruit, other than berries, including nuts, as late as the 17th century.^[27] For instance, in [Greek mythology](#), the [Greek hero Heracles](#), as a part of his [Twelve Labours](#), was required to travel to the Garden of the Hesperides and pick the golden apples off the [Tree of Life](#) growing at its center.^{[28][29][30]}

The Greek goddess of discord, [Eris](#), became disgruntled after she was excluded from the wedding of [Peleus](#) and [Thetis](#).^[31] In retaliation, she tossed a golden apple inscribed [Καλλίστη](#) (*Kalliste*, sometimes transliterated *Kallisti*, 'For the most beautiful one'), into the wedding party. Three goddesses claimed the apple: [Hera](#), [Athena](#), and [Aphrodite](#). [Paris](#) of [Troy](#) was appointed to select the recipient. After being bribed by both Hera and Athena, Aphrodite tempted him with the most beautiful woman in the world, [Helen](#) of [Sparta](#). He awarded the apple to Aphrodite, thus indirectly causing the [Trojan War](#).

The apple was thus considered, in ancient Greece, to be sacred to Aphrodite, and to throw an apple at someone was to symbolically declare one's love; and similarly, to catch it was to symbolically show one's acceptance of that love.^[32] An epigram claiming authorship by Plato states:

I throw the apple at you, and if you are willing to love me, take it and share your girlhood with me; but if your thoughts are what I pray they are not, even then take it, and consider how short-lived is beauty.
— [Plato](#), *Epigram VII*^[33]

[Atalanta](#), also of Greek mythology, raced all her suitors in an attempt to avoid marriage. She outran all but [Hippomenes](#) (also known as [Melanion](#), a name possibly derived from *melon* the Greek word for both "apple" and fruit in general)^[29] who defeated her by cunning, not speed. Hippomenes knew that he could not win in a fair race, so he used three golden apples (gifts of Aphrodite, the goddess of love) to distract Atalanta. It took all three apples and all of his speed, but Hippomenes was finally successful, winning the race and Atalanta's hand.^[28]

Christian art



Adam and Eve by [Albrecht Dürer](#) (1507), showcasing the apple as a symbol of sin.

Though the forbidden fruit of [Eden](#) in the [Book of Genesis](#) is not identified, popular Christian tradition has held that it was an apple that [Eve](#) coaxed [Adam](#) to share with her.[\[34\]](#) The origin of the popular identification with a fruit unknown in the Middle East in biblical times is found in confusion between the [Latin](#) words *mālum* (an apple) and *mālum* (an evil), each of which is normally written *malum*.[\[35\]](#) The tree of the forbidden fruit is called "the tree of the knowledge of good and evil" in [Genesis 2:17](#), and the Latin for "good and evil" is *bonum et malum*.[\[36\]](#)

[Renaissance](#) painters may also have been influenced by the story of the [golden apples](#) in the [Garden of Hesperides](#). As a result, in the story of Adam and Eve, the apple became a symbol for knowledge, immortality, temptation, the fall of man into sin, and sin itself. The [larynx](#) in the human throat has been called the "[Adam's apple](#)" because of a notion that it was caused by the forbidden fruit remaining in the throat of Adam.[\[34\]](#) The apple as symbol of sexual [seduction](#) has been used to imply human sexuality, possibly in an ironic vein.[\[34\]](#)

Cultivars

Main article: [List of apple cultivars](#)



Red and green apples in India

There are more than 7,500 known [cultivars](#) of apples.[\[37\]](#) Cultivars vary in their [yield](#) and the ultimate size of the tree, even when grown on the same [rootstock](#).[\[38\]](#) Different cultivars are available for [temperate](#) and [subtropical](#) climates. The UK's National Fruit Collection, which is the responsibility of the Department of Environment Food and Rural Affairs, includes a collection of over 2,000 cultivars of apple tree in Kent.[\[39\]](#) The University of Reading, which is responsible for developing the UK national collection database, provides access to search the national collection. The University of Reading's work is part of the European Cooperative Programme for Plant Genetic Resources of which there are 38 countries participating in the Malus/Pyrus work group.[\[40\]](#)

The UK's national fruit collection database contains a wealth of information on the characteristics and origin of many apples, including alternative names for what is essentially the same 'genetic' apple cultivar. Most of these cultivars are bred for eating fresh (dessert apples), though some are cultivated specifically for cooking ([cooking apples](#)) or producing [cider](#). [Cider apples](#) are typically too tart and astringent to eat fresh, but they give the beverage a rich flavor that dessert apples cannot.[\[41\]](#)

Commercially popular apple cultivars are soft but crisp. Other desired qualities in modern commercial apple breeding are a colorful skin, absence of [russeting](#), ease of shipping, lengthy storage ability, high yields, disease resistance, common apple shape, and developed flavor.[\[38\]](#) Modern apples are generally sweeter than older cultivars, as popular tastes in apples have varied over time. Most North Americans and Europeans favor sweet, subacid apples, but tart apples have a strong minority following.[\[42\]](#) Extremely sweet apples with barely any acid flavor are popular in Asia[\[42\]](#) and especially [Indian Subcontinent](#).[\[41\]](#)

Old cultivars are often oddly shaped, russeted, and have a variety of textures and colors. Some find them to have a better

flavor than modern cultivars,[\[43\]](#) but they may have other problems which make them commercially unviable—low yield, disease susceptibility, poor tolerance for storage or transport, or just being the 'wrong' size. A few old cultivars are still produced on a large scale, but many have been preserved by home gardeners and farmers that sell directly to local markets. Many unusual and locally important cultivars with their own unique taste and appearance exist; apple conservation campaigns have sprung up around the world to preserve such local cultivars from extinction. In the United Kingdom, old cultivars such as '[Cox's Orange Pippin](#)' and '[Egremont Russet](#)' are still commercially important even though by modern standards they are low yielding and susceptible to disease.[\[5\]](#)

Cultivation

Breeding

See also: [Fruit tree propagation](#) and [Malling series](#)



An apple tree in Germany



Blooming apple tree on [Kota Batu, Indonesia](#)

In the wild, apples grow readily from seeds. However, like most perennial fruits, apples are ordinarily propagated asexually by [grafting](#). This is because seedling apples are an example of [extreme heterozygotes](#)", in that rather than inheriting DNA from their parents to create a new apple with those characteristics, they are instead significantly different from their parents.[\[44\]](#) [Triploid](#) cultivars have an additional reproductive barrier in that 3 sets of chromosomes cannot be divided evenly during meiosis, yielding unequal segregation of the chromosomes (aneuploids). Even in the case when a triploid plant can produce a seed (apples are an example), it occurs infrequently, and seedlings rarely survive.[\[45\]](#)

Because apples do not breed true when planted as seeds,[grafting](#) is generally used to produce new apple trees. The [rootstock](#) used for the bottom of the graft can be selected to produce trees of a large variety of sizes, as well as changing the winter hardiness, insect and disease resistance, and soil preference of the resulting tree. Dwarf rootstocks can be used to produce very small trees (less than 3.0 m (10 ft) high at maturity), which bear fruit earlier in their life cycle than full size trees.[\[46\]](#) Dwarf rootstocks for apple trees can be traced as far back as 300 BC, to the area of [Persia](#) and [Asia Minor](#). [Alexander the Great](#) sent samples of dwarf apple trees to [Aristotle's Lyceum](#). Dwarf rootstocks became common by the 15th century, and later went through several cycles of popularity and decline throughout the world.[\[47\]](#) The majority of the rootstocks used today to control size in apples were developed in England in the early 1900s. The [East Malling Research Station](#) conducted extensive research into rootstocks, and today their rootstocks are given an "M" prefix to designate their origin. Rootstocks marked with an "MM" prefix are Malling-series cultivars later crossed with trees of '[Northern Spy](#)' in [Merton, England](#).[\[48\]](#)

Most new apple cultivars originate as seedlings, which either arise by chance or are bred by deliberately crossing cultivars with promising characteristics.[\[49\]](#) The words 'seedling', 'pippin', and 'kernel' in the name of an apple cultivar suggest that it

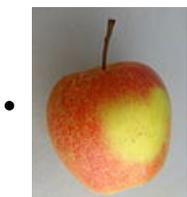
originated as a seedling. Apples can also form [bud sports](#) (mutations on a single branch). Some bud sports turn out to be improved strains of the parent cultivar. Some differ sufficiently from the parent tree to be considered new cultivars.[\[50\]](#)

Since the 1930s, the Excelsior Experiment Station at the [University of Minnesota](#) has introduced a steady progression of important apples that are widely grown, both commercially and by local orchardists, throughout [Minnesota](#) and [Wisconsin](#). Its most important contributions have included '[Haralson](#)' (which is the most widely cultivated apple in Minnesota), [Wealthy](#)', 'Honeygold', and '[Honeycrisp](#)'.

Apples have been acclimatized in Ecuador at very high altitudes, where they can often, with the needed factors, provide crops twice per year because of constant temperate conditions year-round.[\[51\]](#)



Alice



[Ambrosia](#)



Ananasrenette



Aroma



[Discovery](#)



Bramley



Arkansas Black



Fuji



Golden delicious



**Goldrenette,
(Reinette)**



Gala



Jonagold



James Grieve



Granny Smith



McIntosh



Yellow Transparent



Pacific rose



Lobo



Sampion (Shampion)



Summerred



[Pink Lady](#)



[Belle de Boskoop](#)



Red Delicious



Cox Pomona

Pollination

See also: [Fruit tree pollination](#)



Apple blossom from an old [Ayrshire](#) cultivar



[Orchard mason bee](#) on apple bloom, [British Columbia, Canada](#)

Apples are self-incompatible; they must [cross-pollinate](#) to develop fruit. During the flowering each season, apple growers often utilize [pollinators](#) to carry pollen. [Honey bees](#) are most commonly used. [Orchard mason bees](#) are also used as supplemental pollinators in commercial orchards. [Bumblebee queens](#) are sometimes present in orchards, but not usually in enough quantity to be significant pollinators.[\[50\]\[52\]](#)

There are four to seven pollination groups in apples, depending on climate:

- Group A – Early flowering, 1 to 3 May in England ([Gravenstein](#), Red Astrachan)
- Group B – 4 to 7 May ([Idared](#), [McIntosh](#))
- Group C – Mid-season flowering, 8 to 11 May ([Granny Smith](#), [Cox's Orange Pippin](#))
- Group D – Mid/late season flowering, 12 to 15 May ([Golden Delicious](#), Calville blanc d'hiver)
- Group E – Late flowering, 16 to 18 May ([Braeburn](#), Reinette d'Orléans)
- Group F – 19 to 23 May (Suntan)
- Group H – 24 to 28 May (Court-Pendu Gris - also called Court-Pendu plat)

One cultivar can be pollinated by a compatible cultivar from the same group or close (A with A, or A with B, but not A with C or D).^[53]

Cultivars are sometimes classified by the day of peak bloom in the average 30-day blossom period, with pollenizers selected from cultivars within a 6-day overlap period.

Maturation and harvest

See also: [Fruit picking](#) and [Fruit tree pruning](#)

Cultivars vary in their yield and the ultimate size of the tree, even when grown on the same rootstock. Some cultivars, if left unpruned, will grow very large, which allows them to bear much more fruit, but makes harvesting very difficult. Depending on the tree density (number of trees planted per unit surface area), mature trees typically bear 40–200 kg (88–441 lb) of apples each year, though productivity can be close to zero in poor years. Apples are harvested using three-point ladders that are designed to fit amongst the branches. Trees grafted on dwarfing rootstocks will bear about 10–80 kg (22–176 lb) of fruit per year.^[50]

Crops ripen at different times of the year according to the cultivar. Cultivar that yield their crop in the summer include 'Gala', 'Golden Supreme', 'McIntosh', 'Transparent', 'Primate', '[Sweet Bough](#)', and 'Duchess'; fall producers include 'Fuji', 'Jonagold', 'Golden Delicious', 'Red Delicious', 'Chenango', 'Gravenstein', 'Wealthy', 'McIntosh', 'Snow', and 'Blenheim'; winter producers include 'Winesap', 'Granny Smith', 'King', 'Wagener', '[Swayzie](#)', 'Greening', and 'Tolman Sweet'^[19]

Storage

Commercially, apples can be stored for some months in controlled-atmosphere chambers to delay [ethylene](#)-induced ripening. Apples are commonly stored in chambers with higher concentrations of [carbon dioxide](#) and high air filtration. This prevents ethylene concentrations from rising to higher amounts and preventing ripening from occurring too quickly. Ripening continues when the fruit is removed from storage.^[54] For home storage, most cultivars of apple can be held for approximately two weeks when kept at the coolest part of the refrigerator (i.e. below 5 °C). Some, including '[Granny Smith](#)' and '[Fuji](#)', can be stored up to a year without significant degradation^{[55][56]}

Pests and diseases



Leaves with significant insect damage

Main article: [List of apple diseases](#)

See also: [List of Lepidoptera that feed on Malus](#)

Apple trees are susceptible to a number of [fungal](#) and [bacterial](#) diseases and insect pests. Many commercial orchards pursue a program of chemical sprays to maintain high fruit quality, tree health, and high yields. A trend in orchard management is the use of organic methods.^[citation needed] These prohibit the use of synthetic pesticides, though some older pesticides are allowed. [Organic](#) methods include, for instance, introducing its natural predator to reduce the population of a particular pest.

A wide range of pests and diseases can affect the plant; three of the more common diseases/pests are mildew, aphids and apple scab.

- **Mildew**: which is characterized by light grey powdery patches appearing on the leaves, shoots and flowers, normally in spring. The flowers will turn a creamy yellow color and will not develop correctly. This can be treated in a manner not dissimilar from treating **Botrytis**; eliminating the conditions which caused the disease in the first place and burning the infected plants are among the recommended actions to take.^[57]
- **Aphids**: There are five species of aphids commonly found on apples: apple grain aphid, rosy apple aphid, apple aphid, spirea aphid and the woolly apple aphid. The aphid species can be identified by their color, the time of year when they are present and by differences in the cornicles, which are small paired projections from the rear of aphids.^[57] Aphids feed on foliage using needle-like mouth parts to suck out plant juices. When present in high numbers, certain species reduce tree growth and vigor.^[58]
- **Apple scab**: Apple scab causes leaves to develop olive-brown spots with a velvety texture that later turn brown and become cork-like in texture. The disease also affects the fruit, which also develops similar brown spots with velvety or cork-like textures. Apple scab is spread through fungus growing in old apple leaves on the ground and spreads during warm spring weather to infect the new year's growth.^[59]

Among the most serious disease problems are **fireblight**, a bacterial disease; and *Gymnosporangium* rust, and **black spot**, two fungal diseases.^[58] **Codling moths** and **apple maggots** are two other pests which affect apple trees. Young apple trees are also prone to mammal pests like mice and deer, which feed on the soft bark of the trees, especially in winter.^[59]

Production

Main article: [List of countries by apple production](#)

World production of apples in 2014 was 84.6 million **tonnes**, with China producing 48% of this total (table).^[3] Other major producers with 6% or less of the world total were the United States, Turkey, Poland and Italy.

Apple production – 2014

Country	Production (millions of tonnes)
 China	40.9
 United States	5.2
 Poland	3.2
 Turkey	2.5
 Italy	2.5
World	84.6

Source: [FAOSTAT](#) of the [United Nations](#)^[3]

Nutrition

Apples, with skin (edible parts)

Nutritional value per 100 g (3.5 oz)

Energy	218 kJ (52 kcal)
Carbohydrates	13.81 g
Sugars	10.39
Dietary fiber	2.4 g
Fat	0.17 g
Protein	0.26 g

Vitamins

Vitamin A equiv. beta-carotene lutein zeaxanthin	3 µg	(0%)
	27 µg	(0%)
	29 µg	(1%)
Thiamine (B₁)	0.017 mg	(2%)
Riboflavin (B₂)	0.026 mg	(1%)
Niacin (B₃)	0.091 mg	(1%)
Pantothenic acid (B₅)	0.061 mg	(3%)
Vitamin B₆	0.041 mg	(1%)
Folate (B₉)	3 µg	(6%)
Vitamin C	4.6 mg	(1%)

Vitamin E	0.18 mg	
Vitamin K	2.2 µg	(2%)
Minerals		
Calcium	6 mg	(1%)
Iron	0.12 mg	(1%)
Magnesium	5 mg	(1%)
Manganese	0.035 mg	(2%)
Phosphorus	11 mg	(2%)
Potassium	107 mg	(2%)
Sodium	1 mg	(0%)
Zinc	0.04 mg	(0%)

Other constituents

Water	85.56 g
Fluoride	3.3 µg

[Link to Full Nutrient Report of USDA Database entry](#)

- Units
- µg = [micrograms](#) • mg = [milligrams](#)
- IU = [International units](#)

Percentages are roughly approximated using [US recommendations](#) for adults.

A typical apple serving weighs 242 grams and provides 126 [calories](#) with a moderate content of [dietary fiber](#) (table).^[60] Otherwise, there is generally low content of [essential nutrients](#) (table).

Human consumption

See also: [Cooking apple](#) and [Cider apple](#)



An apple core, the remainder of an apple that has been mostly eaten

Apples are often eaten raw. The whole fruit including the skin is suitable for human consumption except for the seeds, which may affect some consumers.^[*citation needed*] The core is often not eaten and is discarded. Cultivars bred for raw consumption are termed dessert or [table apples](#).

Apples can be canned or juiced. They are milled or pressed to produce [apple juice](#), which may be drunk unfiltered (called

[apple cider](#) in North America), or filtered. The juice can be [fermented](#) to make [cider](#) (called hard cider in North America), [ciderkin](#), and [vinegar](#). Through [distillation](#), various alcoholic beverages can be produced, such as [applejack](#), [Calvados](#),^[61] and [apfelwein](#). [Apple seed oil](#)^[62] and [pectin](#) may also be produced.

Popular uses

Apples are an important ingredient in many desserts, such as [apple pie](#), apple [crumble](#), [apple crisp](#) and [apple cake](#). They are often eaten [baked](#) or [stewed](#), and they can also be dried and eaten or reconstituted (soaked in water, alcohol or some other liquid) for later use. When cooked, some apple cultivars easily form a puree known as [apple sauce](#). Apples are also made into [apple butter](#) and apple jelly. They are also used (cooked) in meat dishes.

- In the UK, a [toffee apple](#) is a traditional confection made by coating an apple in hot [toffee](#) and allowing it to cool. Similar treats in the U.S. are [candy apples](#) (coated in a hard shell of crystallized sugar syrup), and [caramel apples](#), coated with cooled [caramel](#).
- Apples are eaten with honey at the Jewish New Year of [Rosh Hashanah](#) to symbolize a sweet new year^[61]
- Farms with apple orchards may open them to the public, so consumers may themselves pick the apples they will purchase.^[61]

Sliced apples turn brown with exposure to air due to the conversion of natural phenolic substances into [melanin](#) upon exposure to [oxygen](#).^[63] Different cultivars vary in their propensity to brown after slicing^[64] and the [genetically engineered Arctic Apples](#) do not brown. Sliced fruit can be treated with [acidulated water](#) to prevent this effect.^[63] Sliced apple consumption tripled in the US from 2004 to 2014 to 500 million apples annually due to its convenience.^[65]

Organic production

[Organic](#) apples are commonly produced in the United States^[66] Due to infestations by key insects and diseases, organic production is difficult in Europe.^[67] The use of pesticides containing chemicals, such as sulfur, copper, microorganisms, viruses, clay powders, or plant extracts ([pyrethrum](#), [neem](#)) has been approved by the EU Organic Standing Committee to improve organic yield and quality.^[67] A light coating of [kaolin](#), which forms a physical barrier to some pests, also may help prevent apple sun scalding.^[50]

Phytochemicals

Apples are a rich source of various [phytochemicals](#) including [flavonoids](#) (e.g., [catechins](#), [flavanols](#), and [quercetin](#)) and other [phenolic compounds](#) (e.g., [epicatechin](#) and [procyanidins](#))^[68] found in the skin, core, and pulp of the apple^[68] they have unknown health value in humans.^[63]

[Ideaain](#) (cyanidin 3-O-galactoside) is an [anthocyanin](#), a type of pigment, which is found in some red apple cultivars^[69]

[Phlorizin](#) is a flavonoid that is found in apple trees, particularly in the leaves, and in only small amounts if at all in other plants, even other species of the *Malus* genus or related plants such as pear trees^[70]

Health effects

Preliminary research is investigating whether nutrients and/or phytochemicals in apples may affect the risk of some types of [cancer](#).^{[68][71]}

Allergy

One form of apple allergy, often found in northern Europe, is called birch-apple syndrome, and is found in people who are also allergic to [birch pollen](#).^[72] Allergic reactions are triggered by a protein in apples that is similar to birch pollen, and people affected by this protein can also develop allergies to other fruits, nuts, and vegetables. Reactions, which entail [oral allergy syndrome](#) (OAS), generally involve itching and inflammation of the mouth and throat^[72] but in rare cases can also include life-threatening [anaphylaxis](#).^[73] This reaction only occurs when raw fruit is consumed—the allergen is neutralized in the cooking process. The variety of apple, maturity and storage conditions can change the amount of allergen present in individual fruits. Long storage times can increase the amount of proteins that cause birch-apple syndrome.^[72]



Different kinds of apple [cultivars](#) in a wholesale food market

In other areas, such as the Mediterranean, some individuals have adverse reactions to apples because of their similarity to peaches.^[72] This form of apple allergy also includes OAS, but often has more severe symptoms, such as vomiting, abdominal pain and [urticaria](#), and can be life-threatening. Individuals with this form of allergy can also develop reactions to other fruits and nuts. Cooking does not break down the protein causing this particular reaction, so affected individuals can eat neither raw nor cooked apples. Freshly harvested, over-ripe fruits tend to have the highest levels of the protein that causes this reaction.^[72]

Breeding efforts have yet to produce a [hypoallergenic](#) fruit suitable for either of the two forms of apple allergy^[72]

Toxicity of seeds

The seeds of apples contain small amounts of [amygdalin](#), a sugar and [cyanide](#) compound known as a [cyanogenic glycoside](#). Ingesting small amounts of apple seeds will cause no ill effects, but consumption of extremely large doses can cause [adverse reactions](#). It may take several hours before the poison takes effect, as cyanogenic glycosides must be [hydrolyzed](#) before the cyanide ion is released.^[74] There are no [case reports](#) of amygdalin poisoning from consuming apple seeds as recorded in the [Hazardous Substances Data Bank](#) of the United States [National Library of Medicine](#).^[75]

Proverbs



An apple's side, stem end, and interior

The [proverb](#) "[An apple a day keeps the doctor away](#)", addressing the health effects of the fruit, dates from 19th century Wales, according to Caroline Taggart, author of "An Apple a Day: Old-Fashioned Proverbs and Why They Still Work". The original phrase, Taggart said, was: "Eat an apple on going to bed, and you'll keep the doctor from earning his bread". In the 19th century and early 20th, the phrase evolved to "an apple a day, no doctor to pay" and "an apple a days sends the doctor away", while the phrasing now commonly used was first recorded in 1922.^[76]

See also

- [Apple chips](#)
- [Applecrab](#), apple–crabapple hybrids with the good eating qualities of the apple parents
- [Cooking apple](#)
- [List of apple dishes](#)
- [Welsh Apples](#)
- [List of apple cultivars](#)

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- [Grand Valley State University digital collections](#)- diary of Ohio fruit farmer Theodore Peticolas, 1863

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Species

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**Table
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- [Dufflin](#)
- [Ellis Bitter](#)
- [Foxwhelp](#)
- [Golden Russet](#)
- [Golden Spire](#)
- [Hangdown](#)
- [Harrison Cider](#)
- [Kingston Black](#)
- [Michelin](#)
- [Redstreak](#)
- [Slack-ma-Girdle](#)
- [Styre](#)
- [Tom Putt](#)
- [Woodcock](#)

Cider apples

Ornamental
apple

- [Flamenco](#)
- [Goldspur](#)
- [Wijcik McIntosh](#)

Apple
products

- [Apfelwein](#)
- [Apple butter](#)
- [Apple cake](#)
- [Apple chips](#)
- [Apple cider](#)
- [Apple cider vinegar](#)
- [Apple crisp](#)
- [Apple dishes](#)
- [Apple juice](#)
- [Apple pie](#)
- [Apple sauce](#)
- [Apple seed oil](#)
- [Apple strudel](#)
- [Applejack](#)
- [Calvados](#)
- [Candy apple](#)
- [Caramel apple](#)
- [Cider](#)
- [Ice cider](#)
- [Jewish apple cake](#)
- [Pectin](#)
- [Pommeau](#)

Agriculture

- [Apple diseases](#)
- [Apple picking](#)
- [Apple scab](#)
- [Applecrab](#)
- [Countries by apple production](#)
- [Fruit tree pruning](#)
- [Gymnosporangium juniperi-virginianae](#)
- [Johnny Appleseed](#)
- [Lepidoptera that feed on Malus](#)
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- [Pearmain](#)
- [Pollination](#)
- [Pome](#)
- [PRI disease resistant apple breeding program](#)
- [Reinette](#)
- [Russeting](#)
- [US Apple Association](#)

- [Cultivars](#)
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"[Crabapple](#)" or "Wild apple" (of the [genus Malus](#))

- [Malus angustifolia](#) (Southern)
- [Malus asiatica](#) (Chinese pearleaf)
- [Malus baccata](#) (Siberian)

**Species,
varieties
and
cultivars**

- [Malus bracteata](#)
- [Malus brevipes](#)
- [Malus coronaria](#) (Sweet)
- [Malus doumeri](#)
- [Malus 'Evereste'](#)
- [Malus florentina](#)
- [Malus floribunda](#) (Japanese)
- [Malus fusca](#) (Oregon/Pacific)
- [Malus glabrata](#)
- [Malus glaucescens](#)
- [Malus halliana](#)
- [Malus honanensis](#)
- [Malus hupehensis](#) (Tea)
- [Malus ioensis](#) (Prairie)
- [Malus kansuensis](#)
- [Malus lancifolia](#)
- [Malus × micromalus](#) (Midget)
- [Malus niedzwetskyana](#)
- [Malus prattii](#)
- [Malus prunifolia](#)
- [Malus pumila](#) (Orchard)
- [Malus rockii](#)
- [Malus sargentii](#)
- [Malus sieboldii](#)
- [Malus sieversii](#) (Asian wild/Almaty)
- [Malus sikkimensis](#)
- [Malus spectabilis](#)
- [Malus sublobata](#)
- [Malus sylvestris](#) (European wild)
- [Malus toringoides](#)
- [Malus transitoria](#)
- [Malus trilobata](#)
- [Malus tschonoskii](#)
- [Malus yunnanensis](#)

Topics

- [Apple](#)
- [Applecrab](#)
- [Malling series](#)

- [Category](#)
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**Authority
control**

- [NDL: 00569482](#)



"Pear tree" and "Pyrus" redirect here. For other uses, see [Pear \(disambiguation\)](#), [Pear Tree \(disambiguation\)](#), and [Pyrus \(disambiguation\)](#).

The **pear** is any of several tree and shrub [species](#) of [genus](#) ***Pyrus*** /ˈpaɪrəs/, in the [family](#) *Rosaceae*.

It is also the name of the [pomaceous](#) fruit of the trees. Several species of pear are valued for their edible fruit and juices, while others are cultivated as ornamental trees.

Etymology

The word "pear" is probably from Germanic *pera* as a [loanword](#) of [Vulgar Latin](#) *pira*, the plural of *pirum*, akin to Greek *apios* (from Mycenaean *ápisos*),^[2] of Semitic origin ("pirâ"), meaning "fruit". The term "pyriform" is used to describe something pear-shaped.

Description



Pear blossoms

The pear is [native](#) to coastal and mildly temperate regions of the [Old World](#), from western Europe and north Africa east right across Asia. It is a medium-sized tree, reaching 10–17 metres (33–56 ft) tall, often with a tall, narrow crown; a few species are [shrubby](#).

The [leaves](#) are alternately arranged, simple, 2–12 centimetres (0.79–4.72 in) long, glossy green on some species, densely silvery-hairy in some others; leaf shape varies from broad oval to narrow lanceolate. Most pears are [deciduous](#), but one or two species in southeast Asia are [evergreen](#). Most are cold-hardy, withstanding temperatures between −25 °C (−13 °F) and −40 °C (−40 °F) in winter, except for the evergreen species, which only tolerate temperatures down to about −15 °C (5 °F).

The [flowers](#) are white, rarely tinted yellow or pink, 2–4 centimetres (0.79–1.57 in) diameter, and have five petals.^[3] Like that of the related [apple](#), the pear fruit is a [pome](#), in most wild species 1–4 centimetres (0.39–1.57 in) diameter, but in some cultivated forms up to 18 centimetres (7.1 in) long and 8 centimetres (3.1 in) broad; the shape varies in most species from oblate or globose, to the classic pyriform '[pear-shape](#)' of the [European pear](#) with an elongated basal portion and a bulbous end.

The fruit is composed of the receptacle or upper end of the flower-stalk (the so-called [calyx](#) tube) greatly dilated. Enclosed



[European Pear](#) branch with two pears



Pear fruit cross section

Scientific classification

Kingdom: [Plantae](#)
(unranked): [Angiosperms](#)
(unranked): [Eudicots](#)
(unranked): [Rosids](#)
Order: [Rosales](#)
Family: [Rosaceae](#)
Subfamily: [Amygdaloideae](#)^[1]
Tribe: [Maleae](#)
Subtribe: [Malinae](#)
Genus: ***Pyrus***
[L.](#)

Species

About 30 species; see text.



Many varieties, such as the [Nashi pear](#), are not "[pear-shaped](#)"

within its cellular flesh is the true fruit: five [cartilaginous carpels](#), known colloquially as the "core". From the upper rim of the receptacle are given off the five [sepals](#)^[*vague*], the five [petals](#), and the very numerous [stamens](#).

Pears and apples cannot always be distinguished by the form of the fruit; some pears look very much like some apples, e.g. the [nashi pear](#). One major difference is that the flesh of pear fruit contains [stone cells](#) (also called "grit").

History

[Pear cultivation](#) in cool [temperate climates](#) extends to the remotest antiquity, and there is evidence of its use as a food since prehistoric times. Many traces of it have been found in [prehistoric pile dwellings around Lake Zurich](#). The word "pear", or its equivalent, occurs in all the Celtic languages, while in Slavic and other dialects, differing appellations, still referring to the same thing, are found—a diversity and multiplicity of [nomenclature](#) which led [Alphonse Pyramus de Candolle](#) to infer a very ancient cultivation of the tree from the shores of the Caspian to those of the Atlantic.

The pear was also cultivated by the Romans, who ate the fruits raw or cooked, just like apples.^[4] [Pliny's Natural History](#) recommended stewing them with honey and noted three dozen varieties. The Roman cookbook [De re coquinaria](#) has a recipe for a spiced, stewed-pear *patina*, or [soufflé](#).^[5]

A certain race of pears, with white down on the [undersurface](#) of their leaves, is supposed to have originated from *P. nivalis*, and their fruit is chiefly used in France in the manufacture of [perry](#) (see also [cider](#)). Other small-fruited pears, distinguished by their early ripening and apple-like fruit, may be referred to as *P. cordata*, a species found wild in western France and southwestern England. Pears have been cultivated in China for approximately 3000 years.



[Pyrus calleryana](#) in flower

The [genus](#) is thought to have originated in present-day [Western China](#) in the foothills of the [Tian Shan](#), a mountain range of Central Asia, and to have spread to the north and south along mountain chains, evolving into a diverse group of over 20 widely recognized primary species.^[*citation needed*] The enormous number of varieties of the cultivated European pear (*Pyrus communis* subsp. *communis*), are without doubt derived from one or two wild [subspecies](#) (*P. communis* subsp. *pyraster* and *P. communis* subsp. *caucasica*), widely distributed throughout Europe, and sometimes forming part of the natural vegetation of the forests. Court accounts of Henry III of England record pears shipped from La Rochelle-Normande and presented to the King by the Sheriffs of the City of London. The French names of pears grown in English medieval gardens suggest that their reputation, at the least, was French; a favored variety in the accounts was named for Saint Rule or Regul', Bishop of Senlis.^[6]

Asian species with medium to large edible fruit include *P. pyrifolia*, *P. ussuriensis*, *P. × bretschneideri*, *P. × sinkiangensis*, and *P. pashia*. Other small-fruited species are frequently used as [rootstocks](#) for the cultivated forms.

Major recognized taxa

- [Pyrus amygdaliformis](#)—Almond-leaved pear
- [Pyrus armeniacaifolia](#)—Apricot-leaved pear
- [Pyrus boissieriana](#)
- [Pyrus bourgaeana](#)—Iberian pear
- [Pyrus × bretschneideri](#)—Chinese white pear; also classified as a subspecies of *Pyrus pyrifolia*
- [Pyrus calleryana](#)—Callery pear
- [Pyrus communis](#)—European pear
 - [Pyrus communis](#) subsp. *communis*—European pear (cultivars include [Beurre d'Anjou](#), [Bartlett](#) and [Beurre Bosc](#))
 - *Pyrus communis* subsp. *caucasica* (*syn.* *P. caucasica*)
 - [Pyrus communis](#) subsp. *pyraster*—Wild European Pear (*syn.* (*Pyrus pyraster*))
- [Pyrus cordata](#)—Plymouth pear
- [Pyrus cossonii](#)—Algerian pear

- [Pyrus dimorphophylla](#)
- [Pyrus elaeagrifolia](#)—Oleaster-leaved pear
- [Pyrus fauriei](#)
- [Pyrus gharbiana](#)
- [Pyrus glabra](#)
- [Pyrus hondoensis](#)
- [Pyrus kawakamii](#)
- [Pyrus koehnei](#)—Evergreen pear of southern China and Taiwan
- [Pyrus korshinskyi](#)
- [Pyrus mamorensis](#)
- [Pyrus nivalis](#)—Snow pear
- [Pyrus pashia](#)—Afghan pear
- [Pyrus × phaeocarpa](#)
- [Pyrus pseudopashia](#)
- [Pyrus pyrifolia](#)—Nashi pear, *Sha Li*, tree species native to China, Japan, and Korea, also known as the Asian pear
- [Pyrus regelii](#)
- [Pyrus salicifolia](#)—Willow-leaved pear
- [Pyrus × serrulata](#)
- [Pyrus × sinkiangensis](#)—thought to be an interspecific hybrid between *P. × bretschnideri* and *Pyrus communis*
- [Pyrus syriaca](#)—Syrian pear
- [Pyrus ussuriensis](#)—Siberian pear (also known as the **Ussurian pear**, **Harbin pear**, and **Manchurian pear**)
- [Pyrus xerophila](#)

Cultivation



Pear tree in [Hamedan, Iran](#)



Vicar of Winkfield pear, a heritage variety, no longer commonly found, [British Columbia, Canada](#)

According to Pear Bureau Northwest, about 3000 known varieties of pears are grown worldwide^[7] The pear is normally propagated by [grafting](#) a selected variety onto a [rootstock](#), which may be of a pear variety or [quince](#). Quince rootstocks produce smaller trees, which is often desirable in commercial orchards or domestic gardens. For new varieties the flowers can be [cross-bred](#) to preserve or combine desirable traits. The fruit of the pear is produced on spurs, which appear on shoots more than one year old.^[8]

Three species account for the vast majority of edible fruit production, the [European pear](#) *Pyrus communis* subsp. *communis* cultivated mainly in Europe and North America, the Chinese white pear (*bai li*) *Pyrus × bretschnideri*, and the [Nashi pear](#) *Pyrus pyrifolia* (also known as Asian pear or apple pear), both grown mainly in eastern Asia. There are thousands of [cultivars](#) of these three species. A species grown in western China, *P. sinkiangensis*, and *P. pashia*, grown in southern China and south Asia, are also produced to a lesser degree.

Other species are used as [rootstocks](#) for European and Asian pears and as [ornamental trees](#). Pear wood is close-grained and at least in the past was used as a specialized timber for fine furniture and making the blocks for [woodcuts](#). The Manchurian or Ussurian Pear, *Pyrus ussuriensis* (which produces [unpalatable](#) fruit) has been crossed with *Pyrus communis* to breed hardier pear cultivars. The Bradford pear (*Pyrus calleryana* 'Bradford') in particular has become widespread in North

America, and is used only as an ornamental tree, as well as a blight-resistant rootstock for *Pyrus communis* fruit orchards. The Willow-leaved pear (*Pyrus salicifolia*) is grown for its attractive, slender, densely silvery-hairy leaves.

The following [cultivars](#) have gained the [Royal Horticultural Society's Award of Garden Merit](#):-

- 'Beth'[\[9\]](#)
- 'Concorde'[\[10\]](#)
- 'Conference'[\[11\]](#)
- 'Joséphine de Malines'[\[12\]](#)
- 'Louise Bonne of Jersey'[\[13\]](#)
- 'Onward'[\[14\]](#)
- 'Williams' Bon Chrétien'[\[15\]](#)

Harvest

Summer and autumn [cultivars](#) of *Pyrus communis*, being [climacteric fruits](#), are gathered before they are fully ripe, while they are still green, but snap off when lifted. In the case of the 'Passe Crassane', long the favored winter pear in France, the crop is traditionally gathered at three different times: the first a fortnight or more before it is ripe, the second a week or ten days after that, and the third when fully ripe. The first gathering will come into eating last, and thus the season of the fruit may be considerably prolonged.

Nashi pears are allowed to ripen on the tree.

Diseases and pests

Main articles: [List of pear diseases](#) and [List of Lepidoptera that feed on pear trees](#)

Production



Pear output in 2012

Top pear producers in 2013

Rank	Country	Metric tons
1	 China	17,300,751
2	 United States	795,557
3	 Italy	743,029
4	 Argentina	722,324
5	 Turkey	461,826
—	<i>World</i>	25,203,754

Source: [UN Food & Agriculture Organization, Statistics Division](#) [\[16\]](#)

Storage



[Gieser Wildeman](#) ^(nl) simmered in red wine.

Pears may be stored at room temperature until ripe^[17] Pears are ripe when the flesh around the stem gives to gentle pressure.^[17] Ripe pears are optimally stored refrigerated, uncovered in a single layer, where they have a shelf life of 2 to 3 days.^[17]

Uses

Pears are consumed fresh, canned, as [juice](#), and [dried](#). The juice can also be used in [jellies](#) and [jams](#), usually in combination with other fruits, including berries. Fermented pear juice is called [perry](#) or pear cider and is made in a way that is similar to how [cider](#) is made from apples.

Pears ripen at room temperature. They will [ripen faster](#) if placed next to [bananas](#) in a fruit bowl.^[18] Refrigeration will slow further ripening. Pear Bureau Northwest offers tips on ripening and judging ripeness: Although the skin on Bartlett pears changes from green to yellow as they ripen, most varieties show little color change as they ripen. Because pears ripen from the inside out, the best way to judge ripeness is to "Check the Neck": apply gentle thumb pressure to the neck or stem end of the pear. If it yields to gentle pressure, then the pear is ripe, sweet, and juicy. If it is firm, leave the pear at room temperature and check the neck daily for ripeness.^[19]

The culinary or cooking pear is green but dry and hard, and only edible after several hours of cooking. Two Dutch cultivars are "[Gieser Wildeman \(nl\)](#)" (a sweet variety) and "[Saint Remy \(pear\) \(nl\)](#)" (slightly sour).^[20]

Pear wood is one of the preferred materials in the manufacture of high-quality [woodwind](#) instruments and [furniture](#), and was used for making the carved blocks for [woodcuts](#). It is also used for wood carving, and as a [firewood](#) to produce aromatic smoke for smoking meat or [tobacco](#). Pear wood is valued for kitchen spoons, scoops and stirrers, as it does not contaminate food with color, flavor or smell, and resists warping and splintering despite repeated soaking and drying cycles. Lincoln^[21] describes it as "a fairly tough, very stable wood... (used for) carving... brushbacks, umbrella handles, measuring instruments such as set squares and T-squares... recorders... violin and guitar fingerboards and piano keys... decorative veneering." Pearwood is the favored wood for architect's rulers because it does not warp. It is similar to the wood of its relative, the apple tree (*Malus domestica*) and used for many of the same purposes.^[21]

Nutrition

A pear in a 100 g serving (small pear) is a good source of [dietary fiber](#) but otherwise provides no [essential nutrients](#) in significant amounts (table, [USDA National Nutrient Database](#)).

Cultural references

Pears grow in the sublime [orchard](#) of [Alcinous](#), in *Odyssey* vii: "Therein grow trees, tall and luxuriant, pears and [pomegranates](#) and [apple](#)-trees with their bright fruit, and sweet [figs](#), and luxuriant [olives](#). Of these the fruit perishes not nor fails in [winter](#) or in summer, but lasts throughout the year."

'A [Partridge](#) in a Pear Tree' is the first gift in "[The Twelve Days of Christmas](#)" [cumulative song](#), this verse is repeated twelve times in the song.

The pear tree was an object of particular veneration (as was the [Walnut](#)) in the [Tree worship](#) of the [Nakh peoples](#) of the [North Caucasus](#) – see [Vainakh mythology](#) and see also [Ingushetia](#) – the best-known of the

Pears, raw	
Nutritional value per 100 g (3.5 oz)	
Energy	239 kJ (57 kcal)
Carbohydrates	15.23 g
Sugars	9.75 g
Dietary fiber	3.1 g
Fat	0.14 g
Protein	0.36 g
Vitamins	
Thiamine (B₁)	0.012 mg (1%)
Riboflavin (B₂)	0.026 mg (2%)
Niacin (B₃)	0.161 mg (1%)
Pantothenic acid (B₅)	0.049 mg (1%)
Vitamin B₆	0.029 mg (2%)
Folate (B₉)	7 µg (2%)
Choline	5.1 mg (1%)
Vitamin C	4.3 mg (5%)
Vitamin E	0.12 mg (1%)
Vitamin K	4.4 µg (4%)
Minerals	
Calcium	9 mg (1%)
Iron	0.18 mg (1%)
Magnesium	7 mg (2%)
Manganese	0.048 mg (2%)
Phosphorus	12 mg (2%)
Potassium	116 mg (2%)

Vainakh peoples today being the [Chechens](#) of [Chechnya](#) in the [Russian Federation](#). Pear and walnut trees were held to be the sacred abodes of beneficent spirits in pre-Islamic Chechen religion and, for this reason, it was forbidden to fell them.^[22]

Sodium	1 mg	(0%)
Zinc	0.1 mg	(1%)

See also

- [List of pear cultivars](#)
- [List of culinary fruits](#)
- [List of Lepidoptera that feed on pear trees](#)

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[Link to USDA Database entry](#)

- Units
- μg = [micrograms](#) • mg = [milligrams](#)
- IU = [International units](#)

Percentages are roughly approximated using [US recommendations](#) for adults.

Source: [USDA Nutrient Database](#)

External links

Find more about
Pear
at Wikipedia's [sister projects](#)

-  [Definitions](#) from Wiktionary
-  [Media](#) from Commons
-  [Quotations](#) from Wikiquote
-  [Texts](#) from Wikisource
-  [Textbooks](#) from Wikibooks
-  [Taxonomy](#) from Wikispecies

-  [Pear](#) at Wikibook Cookbooks
- [European pear varieties cultivated in Australia](#)

- [v](#)
- [t](#)
- [e](#)

Pyrus

Cultivars

- [Abate Fetel](#)
- [Bosc pear](#)
- [Choke pear](#)
- [Churchland pear](#)
- [Conference pear](#)
- [D'Anjou](#)
- [Harovin Sundown](#)
- [Huntington pear](#)
- [Le Conte pear](#)
- [Parsonage pear](#)
- [Pêra Rocha](#)
- [Stinking Bishop pear](#)
- [Taylor's gold](#)
- [Warden pear](#)
- [Williams pear](#)

Species

- [P. amygdaliformis](#)
- [P. anatolica](#)
- [P. armeniacifolia](#)
- [P. boissieriana](#)
- [P. bourgaeana](#)
- [P. calleryana](#)
- [P. communis](#)
- [P. cordata](#)
- [P. elaeagrifolia](#)
- [P. hakkiarica](#)
- [P. nivalis](#)
- [P. oxyprion](#)
- [P. pashia](#)



Pear

- [P. pyraeter](#)
- [P. pyrifolia](#)
- [P. salicifolia](#)
- [P. serikensis](#)
- [P. syriaca](#)
- [P. ussuriensis](#)

Natural hybrids

- [Pyrus × bretschnederi](#)
- [Pyrus × sinkiangensis](#)

Related topics

- [Herefordshire Pomona](#)
- [List of pear diseases](#)
- [Perry](#)
- [Tottori Nijisseiki Pear Museum](#)
- [World Apple and Pear Association](#)

-  [Category](#)
-  [Commons](#)

Taxon identifiers

- [EoL: 29920](#)
- [GBIF: 2986532](#)
- [Tropicos: 40021515](#)
- [ITIS: 25294](#)
- [NCBI: 3766](#)
- [IPNI: 34002-1](#)
- [GRIN: 10194](#)
- [FOC: 127801](#)
- [PLANTS: PYRUS](#)
- [AFPD: 194247](#)

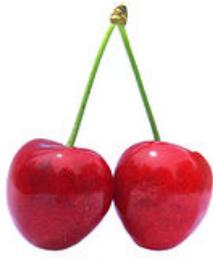
Authority control

- [LCCN: sh85099008](#)
- [GND: 4006940-0](#)

This article is about the fruit. For other uses, see [Cherry \(disambiguation\)](#).

For the species called "wild cherry" in the British Isles, see [Prunus avium](#). For other uses, see [Wild cherry](#).

"Cherry tree" redirects here. For other uses of "Cherry tree" or "Cherrytree", see [Cherry tree \(disambiguation\)](#).



Prunus avium, sweet cherry, also called wild cherry

A **cherry** is the [fruit](#) of many plants of the genus [Prunus](#), and is a fleshy [drupe](#) (stone fruit).

The cherry fruits of commerce usually are obtained from a limited number of species such as [cultivars](#) of the sweet cherry, [Prunus avium](#). The name 'cherry' also refers to the cherry tree, and is sometimes applied to [almonds](#) and visually similar flowering trees in the genus *Prunus*, as in "ornamental cherry", "[cherry blossom](#)", etc. **Wild cherry** may refer to any of the cherry species growing outside of cultivation, although *Prunus avium* is often referred to specifically by the name "wild cherry" in the British Isles.

Botany



Prunus cerasus

Many cherries are members of the subgenus **Cerasus**, which is distinguished by having the [flowers](#) in small [corymbs](#) of several together (not singly, nor in [racemes](#)), and by having smooth fruit with only a weak groove along one side, or no groove. The subgenus is [native](#) to the [temperate](#) regions of the [Northern Hemisphere](#), with two species in America, three in Europe, and the remainder in Asia. Other cherry fruits are members of [subgenus Padus](#).

Most eating cherries are derived from either [Prunus avium](#), the **sweet cherry** (also called the **wild cherry**), or from [Prunus cerasus](#), the **sour cherry**.

History

Etymology and antiquity

The English word cherry derives from French *cerise*, Spanish *cereza*, all originating from the Latin *cerasum*,^[1] referring to an ancient Greek region near [Giresun](#), Turkey, from which cherries were first thought to be exported to Europe.^[2]

The indigenous range of the [sweet cherry](#) extends through most of Europe, western Asia, and parts of northern Africa, and the fruit has been consumed throughout its range since prehistoric times. A cultivated cherry is recorded as having been brought to Rome by [Lucius Licinius Lucullus](#) from northeastern [Anatolia](#), also known as the [Pontus](#) region, in 72 BC.^[3]

Cherries were introduced into England at [Teynham](#), near [Sittingbourne](#) in [Kent](#), by order of [Henry VIII](#), who had tasted them in [Flanders](#).^{[4][5][6]}

Cherries arrived in North America early in the settlement of Brooklyn, New York (then called "New Netherland") when the region was under Dutch sovereignty. Trades people leased or purchased land to plant orchards and produce gardens, "Certificate of Corielis van Tienloven that he had found 12 apple, 40 peach, 73 cherry trees, 26 sage plants..., behind the house sold by Anthony Jansen from Salee [Morocco, Africa] to Barent Dirksen [Dutchmen],... ANNO 18th of June 1639."

Cultivation

The cultivated forms are of the species [sweet cherry](#) (*P. avium*) to which most cherry [cultivars](#) belong, and the [sour cherry](#) (*P. cerasus*), which is used mainly for cooking. Both species originate in Europe and western Asia; they do not [cross-pollinate](#). Some other species, although having edible fruit, are not grown extensively for consumption, except in northern regions where the two main species will not grow. Irrigation, spraying, labor, and their propensity to damage from rain and hail make cherries relatively expensive. Nonetheless, demand is high for the fruit. In commercial production, cherries are harvested by using a mechanized 'shaker'.^[8] Hand picking is also widely used to harvest the fruit to avoid damage to both fruit and trees.

Common rootstocks include Mazzard, Mahaleb, Colt, and Gisela Series, a dwarfing rootstock that produces trees significantly smaller than others, only 8 to 10 feet (2.5 to 3 meters) tall.^[9] Sour cherries require no [pollenizer](#), while few sweet varieties are self-fertile.^[9]

Growing season



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Ripe cherries of [Tehran](#) in the middle of June.

Like most temperate-latitude trees, cherry seeds require exposure to cold to germinate (an adaptation which prevents germination during the autumn, which would then result in the seedling being killed by winter temperatures). The [pits](#) are planted in the autumn (after first being chilled) and seedlings emerge in the spring.^[10] A cherry tree will take three to four years in the field to produce its first crop of fruit, and seven years to attain full maturity.^[10] Because of the cold-weather requirement, none of the *Prunus* genus can grow in tropical climates.

Cherries have a short growing season and can grow in most [temperate](#) latitudes.^[10] Cherries blossom in April (in the Northern Hemisphere) and the peak season for the cherry harvest is in the summer. In [southern Europe](#) in June, in [North America](#) in June, in [England](#) in mid-July, and in southern [British Columbia \(Canada\)](#) in June to mid-August. In many parts of North America, they are among the first tree fruits to flower and ripen in mid-Spring.

In the Southern Hemisphere, cherries are usually at their peak in late December and are widely associated with [Christmas](#). 'Kordia' is an early variety which ripens during the beginning of December, 'Lapins peak' ripens near the end of December, and 'Sweethearts' finish slightly later.

Pests and diseases



Cherries

Generally, the cherry can be a difficult fruit tree to grow and keep alive^[9] In Europe, the first visible pest in the growing season soon after blossom (in April in western Europe) usually is the [black cherry aphid](#) ("cherry blackfly", *Myzus cerasi*),

which causes leaves at the tips of branches to curl, with the blackfly colonies exuding a sticky secretion which promotes fungal growth on the leaves and fruit. At the fruiting stage in June/July (Europe), the [cherry fruit fly](#) (*Rhagoletis cingulata* and *Rhagoletis cerasi*) lays its eggs in the immature fruit, whereafter its larvae feed on the cherry flesh and exit through a small hole (about 1 mm diameter), which in turn is the entry point for fungal infection of the cherry fruit after rainfall.^[11] In addition, cherry trees are susceptible to bacterial [canker](#), [cytospora](#) canker, [brown rot of the fruit](#), [root rot](#) from overly wet soil, crown rot, and several viruses.^[9]

Cultivars

The following cultivars have gained the [Royal Horticultural Society's Award of Garden Merit](#):

Name	Height	Spread	Ref.	Name	Height	Spread	Ref.
Accolade	8m	8m	[12]	Pendula Rubra	4m	4m	[24]
Amanogawa	8m	4m	[13]	Pink Perfection	8m	8m	[25]
Autumnalis (<i>P. × subhirtella</i>)	8m	8m	[14]	Plena (Grandiflora)	12m	8m+	[26]
Autumnalis Rosea (<i>P. × subhirtella</i>)	8m	4m	[15]	Praecox (<i>P. incisa</i>)	8m	8m	[27]
Avium Grandiflora <i>see</i> Plena				<i>Prunus avium</i> (wild cherry)	12m+	8m+	[12]
Colorata (<i>P. padus</i>)	12m	8m	[16]	<i>Prunus × cistena</i>	1.5m	1.5m	[28]
Grandiflora <i>see</i> Plena				<i>Prunus sargentii</i> (Sargent's cherry)	12m+	8m+	[29]
Kanzan	12m	12m+	[17]	<i>Prunus serrula</i> (Tibetan cherry)	12m	8m+	[30]
Kiku-shidare-zakura	4m	4m	[18]	Shirofugen	8m	8m	[31]
Kursar	8m	8m	[19]	Shirotai	8m	8m	[32]
Morello (<i>P. cerasus</i>)	4m	4m	[20]	Shōgetsu	8m	8m	[33]
Okamé (<i>P. × incam</i>)	12m	8m	[21]	Spire	12m	8m	[34]
Pandora	12m	8m	[22]	Stella	4m	4m	[27]
Pendula Rosea	4m	4m	[23]	Ukon	8m	8m+	[35]

See [cherry blossom](#) and [Prunus](#) for ornamental trees.

Production

In 2014, world production of sweet cherries was 2.25 million tonnes, with [Turkey](#) producing 20% of this total. Other major producers of sweet cherries were the United States and [Iran](#). World production of sour cherries in 2014 was 1.36 million tonnes, led by [Russia](#), [Ukraine](#) and Turkey.

Middle East

Major commercial cherry orchards in West Asia are in [Turkey](#) (mainly [Anatolia](#)), [Iran](#), Syria, [Uzbekistan](#), [Lebanon](#) (Bekaa Valley), and [Israel](#) (Golan Heights, Gush Eztion and Northern Galilee).

Europe

Major commercial cherry orchards in Europe are in [Turkey](#), [Italy](#), [Spain](#) and other Mediterranean regions, and to a smaller extent in the [Baltic States](#) and southern [Scandinavia](#).

In [France](#) since the 1920s, the first cherries of the season come in April/May from the region of [Céret \(Pyrénées-Orientales\)](#),^[37] where the local producers send, as a tradition since 1932, the first crate of cherries to the [president of the Republic](#).^[38]

North America

Top (sweet) cherry producing nations in 2014 (tonnes)

Rank	Country	Production
1	Turkey	445,556
2	United States	329,852
3	Iran	172,000
4	Spain	118,220
5	Italy	110,766
	World	2,245,826

Source: [UN Food & Agriculture Organization](#) [36]

Top sour cherry producing nations in 2014 (tonnes)

Rank	Country	Production
1	Russia	198,000
2	Ukraine	182,880
3	Turkey	182,577
4	Poland	176,545
5	United States	137,983
	World	1,362,231



Rainier cherries from the state of Washington, USA

In the United States, most sweet cherries are grown in [Washington](#), [California](#), [Oregon](#), [Wisconsin](#), and [Michigan](#).^[39] Important sweet cherry cultivars include [Bing](#), [Ulster](#), [Rainier](#), Brooks, Tulare, King, and Sweetheart.^[40] Both Oregon and Michigan provide light-colored 'Royal Ann' ('Napoleon'; alternately 'Queen Anne') cherries for the [maraschino cherry](#) process. Most sour (also called tart) cherries are grown in Michigan, followed by [Utah](#), [New York](#), and Washington.^[39] Sour cherries include 'Nanking' and '[Evans](#)'. [Traverse City, Michigan](#) claims to be the "Cherry Capital of the World", hosting a [National Cherry Festival](#) and making the world's largest [cherry pie](#). The specific region of northern Michigan known for tart cherry production is referred to as the "Traverse Bay" region.

Native and non-native sweet cherries grow well in Canada's [provinces](#) of [Ontario](#) and [British Columbia](#) where an annual cherry fiesta has been celebrated for seven consecutive decades in the [Okanagan Valley](#) town of [Osoyoos](#).^[41] In addition to the Okanagan, other British Columbia cherry growing regions are the [Similkameen Valley](#) and [Kootenay Valley](#), all three regions together producing 5.5 million kg annually or 60% of total Canadian output.^[42] Sweet cherry varieties in British Columbia include Rainier, Van, Chelan, Lapin, Sweetheart, Skeena, Staccato, Christalina and Bing.

Australia

In Australia, cherries are grown in all the states except for the Northern Territory. The major producing regions are located in the temperate areas within New South Wales, Victoria, South Australia and Tasmania. Western Australia has limited production in the elevated parts in the southwest of the state. Key production areas include [Young](#), [Orange](#) and [Bathurst](#) in [New South Wales](#), [Wandin](#), the Goulburn and Murray valley areas in [Victoria](#), the [Adelaide Hills](#) region in [South Australia](#), and the Huon and Derwent Valleys in [Tasmania](#).

Key commercial varieties in order of seasonality include 'Empress', 'Merchant', 'Supreme', 'Ron's seedling', 'Chelan', 'Ulster', 'Van', 'Bing', 'Stella', 'Nordwunder', 'Lapins', 'Simone', 'Regina', 'Kordia' and 'Sweetheart'. New varieties are being introduced, including the late season 'Staccato' and early season 'Sequoia'. The Australian Cherry Breeding program is developing a series of new varieties which are under testing evaluation.^[43]

The New South Wales town of [Young](#) is called the "Cherry Capital of Australia" and hosts the National Cherry Festival.

Nutritional value

As raw fruit, sweet cherries provide little nutrient content per 100 g serving (nutrient table). [Dietary fiber](#) and [vitamin C](#) are present in moderate content while other [vitamins](#) and [dietary minerals](#) each supply less than 10% of the [Daily Value](#) (DV) per serving, respectively (table).^[44]

Compared to sweet cherries, raw [sour cherries](#) contain slightly higher content per 100 g of vitamin C (12% DV) and vitamin A (8% DV) (table).^[45]

	Cherries, sweet, red, raw		Cherries, sour, red, raw		
	Nutritional value per 100 g (3.5 oz)		Nutritional value per 100 g (3.5 oz)		
Energy	263 kJ (63 kcal)		Energy	209 kJ (50 kcal)	
Carbohydrates	16 g		Carbohydrates	12.2 g	
Sugars	12.8 g		Sugars	8.5 g	
Dietary fiber	2.1 g		Dietary fiber	1.6 g	
Fat	0.2 g		Fat	0.3 g	
Protein	1.1 g		Protein	1 g	
Vitamins			Vitamins		
Vitamin A equiv. beta-carotene	3 µg	(0%)	Vitamin A equiv. beta-carotene	64 µg	(8%)
lutein zeaxanthin	38 µg	(0%)	lutein zeaxanthin	770 µg	(7%)
	85 µg	(2%)		85 µg	(3%)
Thiamine (B₁)	0.027 mg	(3%)	Thiamine (B₁)	0.03 mg	(3%)
Riboflavin (B₂)	0.033 mg	(1%)	Riboflavin (B₂)	0.04 mg	(3%)

Other uses

Cherry wood is valued for its rich color and straight grain in manufacturing fine furniture, particularly desks, tables and chairs. [\[46\]\[47\]](#)

Species

The list below contains many *Prunus* species that bear the common name cherry, but they are not necessarily members of the subgenus *Cerasus*, or bear edible fruit. For a complete list of species, see *Prunus*. Some common names listed here have historically been used for more than one species, e.g. "rock cherry" is used as an alternative common name for both *P. prostrata* and *P. mahaleb* and "wild cherry" is used for several species.

- [Prunus apetala](#) (Siebold & Zucc.) Franch. & Sav. – clove cherry
- [Prunus avium](#) (L.) L. – sweet cherry, wild cherry, mazzard or gean
- [Prunus campanulata](#) Maxim. – Taiwan cherry, Formosan cherry or bell-flowered cherry
- [Prunus canescens](#) Bois. – grey-leaf cherry
- [Prunus caroliniana](#) Aiton – Carolina laurel cherry or laurel cherry
- [Prunus cerasoides](#) D. Don. – wild Himalayan cherry
- [Prunus cerasus](#) L. – sour cherry
- [Prunus cistena](#) Koehne – purple-leaf sand cherry
- [Prunus cornuta](#) (Wall. ex Royle) Steud. – Himalayan bird cherry
- [Prunus cuthbertii](#) Small – Cuthbert cherry
- [Prunus cyclamina](#) Koehne – cyclamen cherry or Chinese flowering cherry
- [Prunus dawyckensis](#) Sealy – Dawyck cherry
- [Prunus dielsiana](#) C.K. Schneid. – tailed-leaf cherry
- [Prunus emarginata](#) (Douglas ex Hook.) Walp. – Oregon cherry or bitter cherry
- [Prunus eminens](#) Beck – [German](#): *mittlere Weichsel* (semisour cherry)

Niacin (B₃)	0.154 mg		Niacin (B₃)	0.4 mg	
		(4%)			(3%)
Pantothenic acid (B₅)	0.199 mg		Pantothenic acid (B₅)	0.143 mg	
		(4%)			(3%)
Vitamin B₆	0.049 mg		Vitamin B₆	0.044 mg	
		(1%)			(2%)
Folate (B₉)	4 µg		Folate (B₉)	8 µg	
		(1%)			(1%)
Choline	6.1 mg		Choline	6.1 mg	
		(8%)			(12%)
Vitamin C	7 mg		Vitamin C	10 mg	
		(2%)			(2%)
Vitamin K	2.1 µg		Vitamin K	2.1 µg	
		(1%)			(2%)
Minerals			Minerals		
Calcium	13 mg		Calcium	16 mg	
		(3%)			(2%)
Iron	0.36 mg		Iron	0.32 mg	
		(3%)			(3%)
Magnesium	11 mg		Magnesium	9 mg	
		(3%)			(5%)
Manganese	0.07 mg		Manganese	0.112 mg	
		(3%)			(2%)
Phosphorus	21 mg		Phosphorus	15 mg	
		(5%)			(4%)
Potassium	222 mg		Potassium	173 mg	
		(0%)			(0%)
Sodium	0 mg		Sodium	3 mg	
		(1%)			(1%)
Zinc	0.07 mg		Zinc	0.1 mg	

[Link to USDA Database entry](#)

- Units
- µg = [micrograms](#) • mg = [milligrams](#)
- IU = [International units](#)

Percentages are roughly approximated using [US recommendations](#) for adults.
Source: [USDA Nutrient Database](#)

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Percentages are roughly approximated using [US recommendations](#) for adults.
Source: [USDA Nutrient Database](#)

- [Prunus fruticosa](#) Pall. – European dwarf cherry, dwarf cherry, Mongolian cherry or steppe cherry
- [Prunus gondouinii](#) (Poit. & Turpin) Rehder – duke cherry
- [Prunus grayana](#) Maxim. – Japanese bird cherry or Gray's bird cherry
- [Prunus humilis](#) Bunge – Chinese plum-cherry or humble bush cherry
- [Prunus ilicifolia](#) (Nutt. ex Hook. & Arn.) Walp. – hollyleaf cherry, evergreen cherry, holly-leaved cherry or islay
- [Prunus incisa](#) Thunb. – Fuji cherry
- [Prunus jamasakura](#) Siebold ex Koidz. – Japanese mountain cherry or Japanese hill cherry
- [Prunus japonica](#) Thunb. – Korean cherry
- [Prunus laurocerasus](#) L. – cherry laurel
- [Prunus lyonii](#) (Eastw.) Sarg. – Catalina Island cherry
- [Prunus maackii](#) Rupr. – Manchurian cherry or Amur chokecherry
- [Prunus mahaleb](#) L. – Saint Lucie cherry, rock cherry, perfumed cherry or mahaleb cherry
- [Prunus maximowiczii](#) Rupr. – Miyama cherry or Korean cherry
- [Prunus mume](#) (Siebold & Zucc.) – Chinese plum or Japanese apricot
- [Prunus myrtifolia](#) (L.) Urb. – West Indian cherry
- [Prunus nepaulensis](#) (Ser.) Steud. – Nepal bird cherry
- [Prunus nipponica](#) Matsum. – Takane cherry, peak cherry or Japanese alpine cherry
- [Prunus occidentalis](#) Sw. – western cherry laurel
- [Prunus padus](#) L. – bird cherry or European bird cherry
- [Prunus pennsylvanica](#) L.f. – pin cherry, fire cherry, or wild red cherry
- [Prunus pleuradenia](#) Griseb. – Antilles cherry
- [Prunus prostrata](#) Labill. – mountain cherry, rock cherry, spreading cherry or prostrate cherry
- [Prunus pseudocerasus](#) Lindl. – Chinese sour cherry or false cherry
- [Prunus pumila](#) L. – sand cherry
- [Prunus rufa](#) Wall ex Hook.f. – Himalayan cherry
- [Prunus salicifolia](#) Kunth. (= *P. serotina*) – capulin, Singapore cherry or tropic cherry
- [Prunus sargentii](#) Rehder – Sargent's cherry
- [Prunus serotina](#) Ehrh. – black cherry, wild cherry
- [Prunus serrula](#) Franch. – paperbark cherry, birch bark cherry or Tibetan cherry
- [Prunus serrulata](#) Lindl. – Japanese cherry, hill cherry, Oriental cherry or East Asian cherry
- [Prunus speciosa](#) (Koidz.) Ingram – Oshima cherry
- [Prunus ssiori](#) Schmidt- Hokkaido bird cherry
- [Prunus stipulacea](#) Maxim.
- [Prunus subhirtella](#) Miq. – Higan cherry or spring cherry
- [Prunus takesimensis](#) Nakai – Takeshima flowering cherry
- [Prunus tomentosa](#) Thunb. – Nanking cherry, Manchu cherry, downy cherry, Shanghai cherry, Ando cherry, mountain cherry, Chinese dwarf cherry, Chinese bush cherry
- [Prunus verecunda](#) (Koidz.) Koehne – Korean mountain cherry
- [Prunus virginiana](#) L. – chokecherry
- [Prunus x yedoensis](#) Matsum. – Yoshino cherry or Tokyo cherry

See also

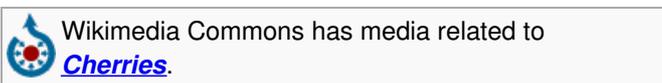
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External links



- ["Cherry". *The American Cyclopædia*. 1879.](#)

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Cherry cultivars

Sweet (Bigaroon, Mazzard)	<ul style="list-style-type: none">• Angela• Bing• Chelan• Chinook• Emperor Francis• Hudson• Lambert• Lapins• Rainier• Regina• Royal Ann (Napoleon)• Sam• Schmidt• Skeena• Stella• Sweetheart• Tieton• Ulster• Van	
Sour (Amarelle, Morello)	<ul style="list-style-type: none">• Amarena• Balaton• Evans• Griotte de Kleparow• Marasca• Montmorency• North Star	
Other edible	<ul style="list-style-type: none">• Nanking	

Bing cherries

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This article is about the fruits of the genus *Vitis*. For the European grapevine, see [Vitis vinifera](#). For other uses, see [Grape \(disambiguation\)](#).



Grapes



"White" [table grapes](#)

A **grape** is a fruit, botanically a [berry](#), of the [deciduous](#) woody [vines](#) of the [flowering plant genus](#) *Vitis*.

Grapes can be eaten fresh as [table grapes](#) or they can be used for making [wine](#), [jam](#), [juice](#), [jelly](#), [grape seed extract](#), [raisins](#), [vinegar](#), and [grape seed oil](#). Grapes are a non-[climacteric](#) type of [fruit](#), generally occurring in clusters.

Grapes, red or green

Nutritional value per 100 g (3.5 oz)

Energy 288 kJ (69 kcal)

Carbohydrates 18.1 g

[Sugars](#) 15.48 g

[Dietary fiber](#) 0.9 g

Fat 0.16 g

Protein 0.72 g

[Vitamins](#)

[Thiamine \(B₁\)](#) 0.069 mg (6%)

[Riboflavin \(B₂\)](#) 0.07 mg (6%)

[Niacin \(B₃\)](#) 0.188 mg (1%)

[Pantothenic acid \(B₅\)](#) 0.05 mg (1%)

[Vitamin B₆](#) 0.086 mg (7%)

[Folate \(B₉\)](#) 2 µg (1%)

[Choline](#) 5.6 mg (1%)

[Vitamin C](#) 3.2 mg (4%)

[Vitamin E](#) 0.19 mg (1%)

[Vitamin K](#) 14.6 µg (14%)

Minerals

[Calcium](#) 10 mg (1%)

[Iron](#) 0.36 mg (3%)

[Magnesium](#) 7 mg (2%)

[Manganese](#) 0.071 mg (3%)

[Phosphorus](#) 20 mg (3%)

[Potassium](#) 191 mg (4%)

[Sodium](#) 2 mg (0%)

[Zinc](#) 0.07 mg (1%)

Other constituents

[Fluoride](#) 7.8 µg

[Link to USDA Database entry](#)

- Units
- µg = [micrograms](#) • mg = [milligrams](#)
- IU = [International units](#)

Percentages are roughly approximated using

[US recommendations](#) for adults.

Source: [USDA Nutrient Database](#)

History

The cultivation of the domesticated grape began 6,000–8,000 years ago in the [Near East](#).^[1] [Yeast](#), one of the earliest domesticated [microorganisms](#), occurs naturally on the skins of grapes, leading to the discovery of alcoholic drinks such as wine. The earliest archeological evidence for a dominant position of wine-making in human culture dates from 8,000 years ago in [Georgia](#).^{[2][3][4]} The [oldest known winery](#) was found in [Armenia](#), dating to around 4000 BC.^[citation needed] By the 9th century AD the city of [Shiraz](#) was known to produce some of the finest wines in the Middle East. Thus it has been proposed that [Syrah](#) red wine is named after [Shiraz](#), a city in Persia where the grape was used to make [Shirazi wine](#).^[5] [Ancient Egyptian hieroglyphics](#) record the cultivation of purple grapes,^[citation needed] and history attests to the ancient [Greeks](#), [Phoenicians](#), and [Romans](#) growing purple grapes for both eating and wine production^[citation needed]. The growing of grapes would later spread to other regions in [Europe](#), as well as [North Africa](#), and eventually in [North America](#).

In North America, native grapes belonging to various species of the *Vitis* genus proliferate in the wild across the continent, and were a part of the diet of many [Native Americans](#), but were considered by European colonists to be unsuitable for wine. *Vitis vinifera* cultivars were imported for that purpose.

Description

Grapes are a type of [fruit](#) that grow in clusters of 15 to 300, and can be crimson, black, dark blue, yellow, green, orange, and pink. "White" grapes are actually green in color, and are evolutionarily derived from the purple grape. [Mutations](#) in two regulatory genes of white grapes turn off production of [anthocyanins](#), which are responsible for the color of purple grapes^[6] Anthocyanins and other [pigment](#) chemicals of the larger family of [polyphenols](#) in purple grapes are responsible for the varying shades of purple in red wines.^{[7][8]} Grapes are typically an ellipsoid shape resembling a [prolate spheroid](#).

Grapevines

Main article: [Vitis](#)



Concord is a variety of North American *labrusca* grape

Most grapes come from [cultivars](#) of *Vitis vinifera*, the European grapevine native to the Mediterranean and Central Asia. Minor amounts of fruit and wine come from American and Asian species such as:

- *Vitis labrusca*, the North American table and grape juice grapevines (including the [Concord cultivar](#)), sometimes used for wine, are native to the [Eastern United States](#) and [Canada](#).
- *Vitis riparia*, a wild vine of [North America](#), is sometimes used for winemaking and for jam. It is native to the entire [Eastern U.S.](#) and north to [Quebec](#).
- *Vitis rotundifolia*, the [muscadines](#), used for jams and wine, are native to the [Southeastern United States](#) from [Delaware](#) to the [Gulf of Mexico](#).
- *Vitis amurensis* is the most important Asian species.

Distribution and production



Top 20 grape producing countries in 2012.[\[9\]](#)

According to the [Food and Agriculture Organization](#) (FAO), 75,866 square kilometers of the world are dedicated to grapes. Approximately 71% of world grape production is used for wine, 27% as fresh fruit, and 2% as [dried fruit](#). A portion of grape production goes to producing grape juice to be reconstituted for fruits canned "with no added sugar" and "100% natural". The area dedicated to vineyards is increasing by about 2% per year.

There are no reliable statistics that break down grape production by variety. It is believed that the most widely planted variety is [Sultana](#), also known as Thompson Seedless, with at least 3,600km² (880,000 acres) dedicated to it. The second most common variety is [Airen](#). Other popular varieties include [Cabernet Sauvignon](#), [Sauvignon blanc](#), [Cabernet Franc](#), [Merlot](#), [Grenache](#), [Tempranillo](#), [Riesling](#), and [Chardonnay](#).[\[10\]](#)

Top producers of grapes for [wine making](#), by area planted

Country	Area (km ²)
Spain	11,750
France	8,640
Italy	8,270

Top grape producing countries by years (in metric tons)

Rank	Country	2009	2010	2011	2012
1	China	8,038,703	8,651,831	9,174,280	9,600,000 F
2	United States	6,629,198	6,777,731	6,756,449	6,661,820
3	Italy	8,242,500	7,787,800	7,115,500	5,819,010

 Turkey	8,120	4	 France	6,101,525	5,794,433	6,588,904	5,338,512
 United States	4,150	5	 Spain	5,535,333	6,107,617	5,809,315	5,238,300
 Iran	2,860	6	 Turkey	4,264,720	4,255,000	4,296,351	4,275,659
 Romania	2,480	7	 Chile	2,600,000	2,903,000	3,149,380	3,200,000 F
 Portugal	2,160	8	 Argentina	2,181,567	2,616,613	2,750,000	2,800,000 F
 Argentina	2,080	9	 Iran	2,305,000	2,225,000	2,240,000	2,150,000 F
 Chile	1,840	10	 South Africa	1,748,590	1,743,496	1,683,927	1,839,030
 Australia	1,642	—	World	58,521,410	58,292,101	58,500,118	67,067,128
 Armenia	1,459						

Source: [UN Food & Agriculture Organization](#)[11] (F=FAO estimate)

Table and wine grapes



Wine grapes on the vine

Commercially cultivated grapes can usually be classified as either [table](#) or wine grapes, based on their intended method of consumption: eaten raw (table grapes) or used to make [wine](#) (wine grapes). While almost all of them belong to the same species, *Vitis vinifera*, table and wine grapes have significant differences, brought about through [selective breeding](#). Table grape cultivars tend to have large, seedless fruit (see below) with relatively thin skin. Wine grapes are smaller, usually seeded, and have relatively thick skins (a desirable characteristic in winemaking, since much of the aroma in wine comes from the skin). Wine grapes also tend to be very sweet: they are harvested at the time when their juice is approximately 24% sugar by weight. By comparison, commercially produced "100% grape juice", made from table grapes, is usually around 15% sugar by weight.[12]

Seedless grapes

Seedless cultivars now make up the overwhelming majority of table grape plantings. Because grapevines are [vegetatively propagated](#) by cuttings, the lack of seeds does not present a problem for reproduction. It is an issue for breeders, who must either use a seeded variety as the female parent or rescue embryos early in development using [tissue culture](#) techniques.

There are several sources of the seedlessness trait, and essentially all commercial cultivators get it from one of three sources: [Thompson Seedless](#), [Russian Seedless](#), and [Black Monukka](#), all being cultivars of *Vitis vinifera*. There are currently more than a dozen varieties of seedless grapes. Several, such as Einset Seedless, Benjamin Gunnels's Prime seedless grapes, Reliance, and Venus, have been specifically cultivated for hardiness and quality in the relatively cold climates of northeastern United States and southern [Ontario](#). [13]

An offset to the improved eating quality of seedlessness is the loss of potential health benefits provided by the enriched [phytochemical](#) content of grape seeds (see [Health claims](#), below). [14][15]

Raisins, currants and sultanas

Main article: [Raisin](#)



Raisins

In most of Europe and North America, dried grapes are referred to as "raisins" or the local equivalent. In the UK, three different varieties are recognized, forcing the EU to use the term "dried vine fruit" in official documents.

A *raisin* is any dried grape. While *raisin* is a French [loanword](#), the word in French refers to the fresh fruit; *grappe* (from which the English *grape* is derived) refers to the bunch (as in *une grappe de raisins*).

A *currant* is a dried [Zante Black Corinth](#) grape, the name being a corruption of the French *raisin de Corinthe* ([Corinth](#) grape). *Currant* has also come to refer to the [blackcurrant](#) and [redcurrant](#), two berries unrelated to grapes.

A *sultana* was originally a raisin made from [Sultana](#) grapes of Turkish origin (known as Thompson Seedless in the United States), but the word is now applied to raisins made from either white grapes or red grapes that are bleached to resemble the traditional sultana.

Juice



Grape juice

Grape juice is obtained from crushing and blending grapes into a liquid. The juice is often sold in stores [fermented](#) and made into [wine](#), [brandy](#), or [vinegar](#). Grape juice that has been pasteurized, removing any naturally occurring yeast, will not ferment if kept sterile, and thus contains no alcohol. In the [wine](#) industry, grape juice that contains 7–23% of pulp, skins, stems and seeds is often referred to as "[must](#)". In North America, the most common grape juice is purple and made from [Concord grapes](#), while white grape juice is commonly made from [Niagara grapes](#), both of which are varieties of native American grapes, a different species from European wine grapes. In California, Sultana (known there as Thompson Seedless) grapes are sometimes diverted from the raisin or table market to produce white juice.^[16]

Health claims

Main articles: [Health effects of wine](#), [Grape therapy](#), and [Grape and raisin toxicity in dogs](#)

French paradox

Main article: [French paradox](#)

Comparing diets among Western countries, researchers have discovered that although the French tend to eat higher levels of animal fat, the incidence of [heart disease](#) remains low in France. This phenomenon has been termed the French paradox, and is thought to occur from protective benefits of regularly consuming red wine. Apart from potential benefits of alcohol itself, including reduced [platelet](#) aggregation and [vasodilation](#),^[17] [polyphenols](#) (e.g., [resveratrol](#)) mainly in the grape skin provide other suspected health benefits, such as:^[18]

- Alteration of molecular mechanisms in blood vessels, reducing susceptibility to vascular damage
- Decreased activity of [angiotensin](#), a systemic hormone causing blood vessel constriction that would elevate blood pressure
- Increased production of the [vasodilator](#) hormone, [nitric oxide](#) ([endothelium-derived relaxing factor](#))



Using grape leaves in cuisine ([Dolma](#))

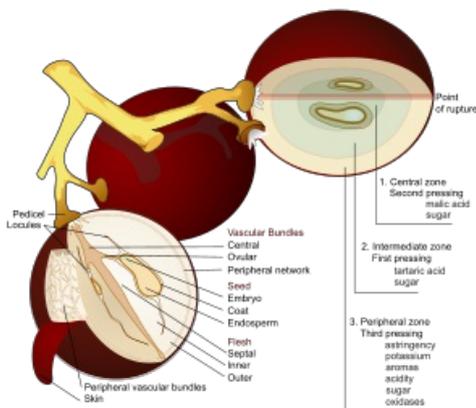
Although adoption of wine consumption is not recommended by some health authorities[19] a significant volume of research indicates moderate consumption, such as one glass of red wine a day for women and two for men, may confer health benefits.[20][21][22] Emerging evidence is that wine [polyphenols](#) such as resveratrol[23] provide physiological benefit, whereas alcohol itself may have protective effects on the cardiovascular system.[24] More may be seen in the article [Long-term effects of alcohol](#).

Resveratrol

Main article: [Resveratrol](#)

Resveratrol is found in widely varying amounts among grape varieties, primarily in their skins and seeds, which, in [muscadine](#) grapes, have about one hundred times higher concentration than pulp[25] Fresh grape skin contains about 50 to 100 micrograms of resveratrol per gram.[26]

Anthocyanins and other phenolics



Grape cross-section

Anthocyanins tend to be the main [polyphenolics](#) in purple grapes whereas [flavan-3-ols](#) (i.e. catechins) are the more abundant phenolic in white varieties.[27] Total phenolic content, a laboratory index of antioxidant strength, is higher in purple varieties due almost entirely to anthocyanin density in purple grape skin compared to absence of anthocyanins in white grape skin.[27] It is these anthocyanins that are attracting the efforts of scientists to define their properties for human health.[28] Phenolic content of grape skin varies with [cultivar](#), soil composition, climate, geographic origin, and cultivation practices or exposure to diseases, such as fungal infections.

Red [wine](#) may offer health benefits more so than white because potentially beneficial compounds are present in grape skin, and only red wine is fermented with skins. The amount of fermentation time a wine spends in contact with grape skins is an important determinant of its resveratrol content.[29] Ordinary non-[muscadine red wine](#) contains between 0.2 and 5.8 mg/L,[30] depending on the grape variety, because it is [fermented](#) with the skins, allowing the wine to absorb the resveratrol. By contrast, a [white wine](#) contains lower phenolic contents because it is fermented after removal of skins.

Wines produced from [muscadine](#) grapes may contain more than 40mg/L, an exceptional phenolic content.[25][31] In muscadine skins, [ellagic acid](#), [myricetin](#), [quercetin](#), [kaempferol](#), and trans-resveratrol are major phenolics[32] Contrary to previous results, ellagic acid and not resveratrol is the major phenolic in muscadine grapes.

The flavonols [syringetin](#), syringetin 3-O-galactoside, [laricitrin](#) and laricitrin 3-O-galactoside are also found in purple grape but

absent in white grape.[33]

Seed constituents

Main articles: [Grape seed extract](#) and [Grape seed oil](#)

Biochemical and preliminary [clinical](#) studies have demonstrated potential biological properties of grape seed oligomeric [procyanidins](#).^[34] For example, laboratory tests indicated a potential anticancer effect from grape seed extract.^[35] According to the [American Cancer Society](#), "there is very little reliable scientific evidence available at this time that drinking red wine, eating grapes, or following the grape diet can prevent or treat cancer in people".^[36]

[Grape seed oil](#) from crushed seeds is used in [cosmeceuticals](#) and [skincare](#) products for perceived health benefits. Grape seed oil contains [tocopherols](#) (vitamin E) and high contents of [phytosterols](#) and [polyunsaturated fatty acids](#) such as [linoleic acid](#), [oleic acid](#), and [alpha-linolenic acid](#).^{[37][38][39]}

Grape and raisin toxicity in dogs

Main article: [Grape and raisin toxicity in dogs](#)

The consumption of grapes and raisins presents a potential health threat to dogs. Their toxicity to dogs can cause the animal to develop [acute renal failure](#) (the sudden development of [kidney failure](#)) with [anuria](#) (a lack of urine production) and may be fatal.^[40]

Grape therapy

Main article: [Grape therapy](#)

Grape therapy, also known as ampelotherapy (from [Ancient Greek](#) ἄμπελος (*ampelos*), meaning 'vine'), is a form of [naturopathic medicine](#) or [alternative medicine](#) that involves heavy consumption of grapes, including seeds, and parts of the vine, including leaves. Although there is some limited evidence of positive benefits from the consumption of grapes for health purposes, extreme claims, such as its ability to cure cancer, have been widely derided as "quackery".^[*medical citation needed*]

Religious significance

See also: [Wine § Religious significance](#)



Grapes embroidered on a 17th-century [chasuble](#), Antwerp

In the [Bible](#), grapes are first mentioned when [Noah](#) grows them on his farm ([Genesis 9:20–21](#)). Instructions concerning wine are given in the [book of Proverbs](#) and in the [book of Isaiah](#), such as in [Proverbs 20:1](#) and [Isaiah 5:20–25](#). [Deuteronomy 18:3–5, 14:22–27, 16:13–15](#) tell of the use of [wine](#) during [Jewish](#) feasts. Grapes were also significant to both the [Greeks](#) and [Romans](#), and their god of [agriculture](#), [Dionysus](#), was linked to grapes and [wine](#), being frequently portrayed with grape leaves on his head.^[41] Grapes are especially significant for [Christians](#), who since the [Early Church](#) have used wine in their celebration of the [Eucharist](#).^[42] Views on the significance of the wine vary between [denominations](#). In [Christian art](#), grapes often represent the [blood of Christ](#), such as the grape leaves in [Caravaggio's John the Baptist](#).

Use in religion

See also: [Christian views on alcohol](#)

Christians have traditionally used wine during worship services as a means of remembering the blood of Jesus Christ which was [shed for the remission of sins](#). Christians who oppose the partaking of alcoholic beverages sometimes use grape juice or water as the "cup" or "wine" in the [Lord's Supper](#).^[43]

The [Catholic Church](#) continues to use wine in the celebration of the Eucharist because it is part of the tradition passed down through the ages starting with Jesus Christ at the Last Supper, where Catholics believe the consecrated bread and wine *literally* become the body and blood of Jesus Christ, a dogma known as [transubstantiation](#).^[44] Wine is used (not grape juice) both due to its strong Scriptural roots, and also to follow the tradition set by the early Christian Church.^[45] The Code of Canon Law of the Catholic Church (1983), Canon 924 says that the wine used must be natural, made from grapes of the vine, and not corrupt.^[46] In some circumstances, a priest may obtain special permission to use grape juice for the consecration; however, this is extremely rare and typically requires sufficient impetus to warrant such a dispensation, such as personal health of the priest.

Although alcohol is permitted in [Judaism](#), grape juice is sometimes used as an alternative for [kiddush](#) on [Shabbat](#) and [Jewish holidays](#), and has the same blessing as wine. Many authorities maintain that grape juice must be capable of turning into wine naturally in order to be used for kiddush. Common practice, however, is to use any [kosher](#) grape juice for kiddush.

Gallery



Flower buds



Flowers



Immature fruit



Grapes in Iran



Wine grapes



Vineyard in the
[Troodos Mountains](#)

See also



- [Annual growth cycle of grapevines](#)
- [Drakshasava](#), a traditional Ayurvedic tonic made from grapes
- [Grape syrup](#)
- [List of grape varieties](#)
- [Propagation of grapevines](#)

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Further reading

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External links

-  Quotations related to [Grapes](#) at Wikiquote
-  The dictionary definition of [grape](#) at Wiktionary
-  Media related to [Grapes](#) at Wikimedia Commons

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Biology and horticulture	<ul style="list-style-type: none">• Ampelography• Annual growth cycle of grapevines• Grape varieties• Grapes• Hybrid grapes• International Grape Genome Program• Ripening (<i>Veraison</i>)• Rootstock• Vineyard• Vitis• Vitis vinifera
Environmental variation	<ul style="list-style-type: none">• Climate categories• Diurnal temperature variation• Drainage• Microclimate• Regional climate levels• Soil types• Terroir• Topography<ul style="list-style-type: none">◦ aspect◦ elevation◦ slope
Vineyard planting	<ul style="list-style-type: none">• Grapevine planting• Propagation• Row orientation• Trellis design• Vine training• Yield
Vineyard management	<ul style="list-style-type: none">• Canopy• Clos• Coulure• Erosion control• Fertilizer• Frost damage prevention• Green harvest (<i>Vendange verte</i>)• Integrated pest management• Irrigation• Klopotec• Millerandage

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- [Great French Wine Blight](#)
- [Lepidoptera](#)
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- [Effects of climate change on wine production](#)
- [Environmental stewardship](#)
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- [Sustainable agriculture](#)

See also

- [Glossary of viticulture terms](#)
- [Glossary of wine terms](#)
- [Glossary of winemaking terms](#)
- [Oenology](#)
- [Wine](#)
- [Winemaking](#)

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Juice

[List of juices](#)

Fruit juice

- [Apple](#)
- [Coconut](#)
- [Cranberry](#)
- [Cucumber](#)
- [Grape](#)
- [Grapefruit](#)
- [Lemon \(Lemonade\)](#)
- [Orange](#)
- [Pineapple](#)
- [Pomegranate](#)



Orange
juice

**Vegetable
juice**

- [Raspberry](#)
- [Tomato](#)

- [Carrot](#)
- [Turnip](#)
- [Turmeric](#)
- [V8 \(brand\)](#)
- [Vegetable](#)

See also

- [Cucumber juice](#)
- [Wheatgrass](#)

- [Category:Fruit juice](#)
- [Category:Vegetable juice](#)

- [v](#)
- [t](#)
- [e](#)

Sources of [tannins](#)

**Sources of
[condensed
tannins](#)**

- [Areca catechu](#) seed
 - [arecatannins](#)
- Broad bean
 - [Vicia faba](#)
- [Grape](#)
 - [Vitis vinifera](#)
- Mimosa bark
 - [Acacia mollissima](#)
- Myrtan or black marlock
 - [Eucalyptus redunca](#)
- [Quebracho](#) wood

**Sources of
[hydrolysable
tannins](#)**

- [Chestnut](#) wood
- Dhawa
 - [Anogeissus latifolia](#)
- Myrobalan fruit
 - [Terminalia chebula](#)
- [Oak bark](#)
- [Oak](#) wood
- Valonia oak
 - [Quercus macrolepis](#)
- [Sumac](#)
 - Tanner's sumach leaves - [Rhus coriaria](#) or Chinese gall on [Rhus chinensis](#)
- Tara pod
 - [Caesalpinia spinosa](#)

- General : [Tanbark](#)
- [Acacias](#) (most notably [Acacia pycnantha](#) and [Acacia decurrens](#))
- [Alder](#)
 - [Alnus sp](#)
- Avaram
 - [Senna auriculata](#)
- Babul
 - [Acacia nilotica](#)
- [Birch](#)
 - [Betula sp](#)
- Button mangrove

Other sources by organ

Barks	<ul style="list-style-type: none">◦ Conocarpus erectus• Hemlock<ul style="list-style-type: none">◦ Tsuga sp• Larch<ul style="list-style-type: none">◦ Larix sp• Mangrove• Pine<ul style="list-style-type: none">◦ Pinus sp• Spruce<ul style="list-style-type: none">◦ Picea sp• Urunday<ul style="list-style-type: none">◦ Myracrodruon urundeuva• Willow<ul style="list-style-type: none">◦ Salix caprea
Leaves	<ul style="list-style-type: none">• Badan<ul style="list-style-type: none">◦ Bergenia crassifolia• Gambier<ul style="list-style-type: none">◦ Uncaria gambir• Redoul<ul style="list-style-type: none">◦ Coriaria myrtifolia
Roots	<ul style="list-style-type: none">• Canaigre<ul style="list-style-type: none">◦ Rumex hymenosepalus• Garouille<ul style="list-style-type: none">◦ Quercus coccifera• Sea lavender<ul style="list-style-type: none">◦ Limonium sp
Woods	<ul style="list-style-type: none">• Cutch<ul style="list-style-type: none">◦ Senegalia catechu
Fruit	<ul style="list-style-type: none">• Divi-divi pod<ul style="list-style-type: none">◦ Caesalpinia coriaria• Sant pod<ul style="list-style-type: none">◦ Acacia nilotica• Teri pod<ul style="list-style-type: none">◦ Caesalpinia digyna
Galls	<ul style="list-style-type: none">• Gall oak<ul style="list-style-type: none">◦ Quercus lusitanica◦ Quercus infectoria
Whole plant	<ul style="list-style-type: none">• Prosopis sp. bark and wood<ul style="list-style-type: none">◦ Prosopis humilis◦ Prosopis nigra• Tanoak<ul style="list-style-type: none">◦ Notholithocarpus• Tizra heartwood and root<ul style="list-style-type: none">◦ Rhus pentaphylla
Undetermined organ	<ul style="list-style-type: none">• Anadenanthera colubrina (vilca)

•
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Bioenergy

Biofuels	<ul style="list-style-type: none">• Alcohol• Algae fuel• Bagasse• Babassu oil• Biobutanol• Biodiesel• Biogas• Biogasoline• Corn stover• Ethanol<ul style="list-style-type: none">◦ cellulosic◦ mixtures• Methanol• Stover<ul style="list-style-type: none">◦ Corn stover• Straw• Cooking oil<ul style="list-style-type: none">◦ Vegetable oil• Water hyacinth• Wood gas
Energy from foodstock	<ul style="list-style-type: none">• Barley• Cassava• Grape• Hemp• Maize• Oat• Palm oil• Potato• Rapeseed• Rice• Sorghum bicolor• Soybean• Sugarcane• Sugar beet• Sunflower• Wheat• Yam• Camelina sativa
Non-food energy crops	<ul style="list-style-type: none">• Arundo• Big bluestem• Camelina• Chinese tallow• Duckweed• Jatropha curcas• Milletia pinnata• Miscanthus giganteus• Switchgrass• Wood fuel
Technology	<ul style="list-style-type: none">• BECCS• Bioconversion• Biomass heating systems• Biorefinery• Fischer–Tropsch process• Industrial biotechnology• Pellets



Concepts

- [mill](#)
- [stove](#)
- [Thermal depolymerization](#)

- [Cellulosic ethanol commercialization](#)
- [Energy content of biofuel](#)
- [Energy crop](#)
- [Energy forestry](#)
- [EROEI](#)
- [Food vs. fuel](#)
- [Issues](#)
- [Sustainable biofuel](#)

[Authority control](#)

- [GND: 4117614-5](#)
- [NDL: 00560926](#)

This article is about the edible fruit. For other uses, see [Persimmon \(disambiguation\)](#).

Persimmon



Persimmon flower

Scientific classification

Kingdom: [Plantae](#)
(unranked): [Angiosperms](#)
(unranked): [Eudicots](#)
(unranked): [Asterids](#)
Order: [Ericales](#)
Family: [Ebenaceae](#)
Genus: [Diospyros](#)

Species

See text

The **persimmon** /pərˈsɪmən/ (sometimes spelled **persimon**) is the edible [fruit](#) of a number of species of trees in the genus [Diospyros](#). *Diospyros* is in the family [Ebenaceae](#), and other members of the genus are grown for [ebony](#) timber. The most widely cultivated species is the Oriental or Japanese persimmon, [Diospyros kaki](#).^[1]

Names and etymology

The word *Diospyros* comes from the ancient Greek words "dios" (δῖος) and "pyron" (πύρον). A popular etymology construed this as "divine fruit", or as meaning "wheat of Zeus"^[2] or "God's pear" and "Jove's fire". The dio-, as shown by the short vowel 'i' has nothing to do with 'divine' (δῖος), *dio-* being an affix attached to plant names, and in classical Greek the compound referred to 'the fruit of the [nettle tree](#)'. The Modern Greek name for the fruit is λωτός (lotos), which leads modern Greeks to the assumption that this is the lotus referred to in [Homer's *Odyssey*](#).

The word *persimmon* itself is derived from *putchamin*, *pasiminan*, or *pessamin*, from [Powhatan](#), an [Algonquian language](#) of the [eastern United States](#), meaning "a dry fruit"^[3]

Description



Persimmon leaves



Persimmon leaves in Autumn

The tree *Diospyros kaki* is the most widely cultivated species of persimmon. Typically the [tree](#) reaches 4.5 to 18 metres (15 to 59 ft) in height and is round-topped.^[1] It stands erect, but sometimes can be crooked or have a [willowy](#) appearance.^[1]

The [leaves](#) alternate, are oblong with brown-hairy [petioles](#) that are 2 centimetres (0.8 in) in length.^[1] They are leathery and glossy on the upper surface, brown and silky underneath.^[1] The leaves are [deciduous](#) and bluish-green in color. In the [fall](#), they turn to yellow, orange, or red.^[1]

Persimmon trees are typically [dioecious](#).^[4] meaning male and female flowers are produced on separate trees^[1] Some trees have both male and female flowers and in rare cases also bear the 'perfect' flower.^[4] Male flowers are pink^[4] and appear in groups of 3.^[1] They have a 4-parted [calyx](#), a [corolla](#), and 24 [stamens](#) in 2 rows.^[1] Female flowers are creamy-white^[4] and appear solitary.^[1] They have a large calyx, a 4-parted, yellow corolla, 8 undeveloped stamens, and a rounded [ovary](#) bearing the style and stigma.^[1] 'Perfect' flowers are a cross between the two^[1] and contain both male and female reproductive organs.^[4]

Persimmon [fruit](#) matures late in the fall and can stay on the tree until [winter](#).^[4] In color, the ripe fruit of the cultivated strains range from glossy light [yellow-orange](#) to dark [red-orange](#) depending on the species and variety.^[1] They similarly vary in size from 1.5 to 9 cm (0.59 to 3.54 in) in diameter, and in shape the varieties may be spherical, acorn-, or pumpkin-shaped^[5] The flesh is astringent until fully ripe and is yellow, orange, or dark-brown in color.^[1] The [calyx](#) generally remains attached to the fruit after harvesting, but becomes easy to remove once the fruit is ripe. The ripe fruit has a high [glucose](#) content and is sweet in taste. Like the [tomato](#), persimmons are not typically considered to be [berries](#), but in terms of [botanical morphology](#), the fruit is in fact a berry.

Select species

Main article: [Diospyros](#)

While there are many species of *Diospyros* that bear fruit inedible to humans, the following are those that bear edible fruit:

Diospyros kaki (Asian persimmon, Japanese persimmon)

Asian or Japanese persimmon (*Diospyros kaki*) is native to [Japan](#), [China](#), [Korea](#), [Burma](#) and [Nepal](#).^{[1][6]} It is [deciduous](#), with broad, stiff leaves, and is known as the *shizi* (柿子 in Chinese), and also as the [Japanese Persimmon](#) or kaki (柿) in Japanese. It is the most widely cultivated species. Its fruits are sweet and slightly tangy with a soft to occasionally fibrous texture. Cultivation of the fruit extended first to other parts of east [Asia](#), [India](#) and [Nepal](#) and was later introduced to [California](#) and southern [Europe](#) in the 1800s and to [Brazil](#) in the 1890s.^[7] and numerous [cultivars](#) have been selected. It is edible in its crisp, firm state but has its best flavor when allowed to rest and soften slightly after harvest. The [Japanese](#) cultivar 'Hachiya' is widely grown. The fruit has a high [tannin](#) content, which makes the unripe fruit [astringent](#) and bitter. The tannin levels are reduced as the fruit matures. Persimmons like 'Hachiya' must be completely ripened before consumption. When ripe, this fruit comprises thick, pulpy jelly encased in a waxy thin-skinned shell.

"Sharon fruit" (named after the [Sharon plain](#) in [Israel](#)) is the marketing name for the Israeli-bred cultivar 'Triumph'^[8] As with all pollination-variant-astringent persimmons, the fruit are ripened off the tree by exposing them to [carbon dioxide](#). The "sharon fruit" has no core, is seedless and particularly sweet, and can be eaten whole.^[8]



[Nanyo City, Yamagata](#), Japan. October 2005.

In the [Valencia](#) region of [Spain](#), there is a [variegated](#) form of kaki called the "Ribera del Xuquer", "Spanish persimmon" (with one 'm') or "Rojo Brillante" ("bright red").^[9]

Diospyros lotus (date-plum)

Date-plum (*Diospyros lotus*), also known as lotus persimmon, is native to southwest Asia and southeast Europe. It was known to the ancient [Greeks](#) as "the fruit of the gods" and often referred to as "nature's candy". Its English name probably derives from Persian *Khormaloo* خرمالو literally "date-plum", referring to the taste of this fruit, which is reminiscent of both [plums](#) and [dates](#).

***Diospyros virginiana* (American persimmon)**

American persimmon (*Diospyros virginiana*) is native to the eastern [United States](#). Its fruit is traditionally eaten in a special steamed pudding in the Midwest, and sometimes its timber is used as a substitute for ebony (e.g., in instruments).

***Diospyros digyna* (black persimmon)**

Black persimmon or black sapote (*Diospyros digyna*) is native to [Mexico](#). Its fruit has green skin and white flesh that turns black when ripe.

Diospyros discolor

The [Mabolo](#) or Velvet-apple (*Diospyros discolor*) is native to the [Philippines](#). It is bright red when ripe. It is also native to China, where it is known as *shizi*. It is also known as Korean mango.

***Diospyros peregrina* (Indian persimmon)**

Indian persimmon (*Diospyros peregrina*) is a slow-growing tree, native to coastal West Bengal. The fruit is green and turns yellow when ripe. It is relatively small with an unremarkable flavor and is better known for uses in [folk medicine](#) rather than culinary applications.

***Diospyros texana* (Texas persimmon)**

Texas persimmon (*Diospyros texana*) is native to central and west Texas and southwest Oklahoma in the United States, and eastern Chihuahua, Coahuila, Nuevo León, and Tamaulipas in northeastern Mexico. The fruit of *D. texana* are black on the outside (as opposed to just on the inside as with the Mexican persimmon) subglobose berries with a diameter of 1.5–2.5 cm (0.59–0.98 in) ripen in August. The fleshy berries become edible when they turn dark purple or black, at which point they are sweet and can be eaten from the hand or made into pudding or custard.

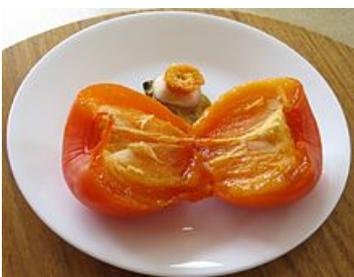
Fruit



A ripe hachiya persimmon fruit

Commercially and in general, there are two types of persimmon fruit: [astringent](#) and non-astringent.

The heart-shaped Hachiya is the most common variety of astringent persimmon. Astringent persimmons contain very high levels of soluble [tannins](#) and are unpalatable if eaten before completely softened. However, the sweet, delicate flavor of fully ripened persimmons of varieties that are astringent when unripe is particularly relished. The astringency of tannins is removed in various ways. Examples include ripening by exposure to light for several days and wrapping the fruit in paper (probably because this increases the [ethylene](#) concentration of the surrounding air). Ethylene ripening can be increased in reliability and evenness, and the process can be greatly accelerated by adding ethylene gas to the atmosphere in which the fruit is stored. For domestic purposes, the most convenient and effective process is to store the ripening persimmons in a clean, dry container together with other varieties of fruit that give off particularly large quantities of ethylene while they are ripening; apples and related fruits such as pears are effective, and so are bananas and several others. Other chemicals are used commercially in artificially ripening persimmons or delaying their ripening. Examples include [alcohol](#) and [carbon dioxide](#), which change tannin into the insoluble form. Such [bletting](#) processes sometimes are jump-started by exposing the fruit to cold or frost. The resultant cell damage stimulates the release of ethylene, which promotes cellular wall breakdown.



This is a sound, ripe kaki, soft enough for one to lift the calyx out cleanly and split the fruit for eating



A whole Jiro persimmon fruit and a cross-section of one.

Astringent varieties of persimmons also can be prepared for commercial purposes by drying. Tanenashi fruit will occasionally contain a seed or two, which can be planted and will yield a larger, more vertical tree than when merely grafted onto the *D. virginiana* rootstock most commonly used in the U.S. Such seedling trees may produce fruit that bears more seeds, usually 6 to 8 per fruit, and the fruit itself may vary slightly from the parent tree. Seedlings are said to be more susceptible to root nematodes.

The non-astringent persimmon is squat like a tomato and is most commonly sold as *fuyu*. Non-astringent persimmons are not actually free of tannins as the term suggests but rather are far less astringent before ripening and lose more of their tannic quality sooner. Non-astringent persimmons may be consumed when still very firm and remain edible when very soft.

There is a third type, less commonly available, the pollination-variant non-astringent persimmons. When fully pollinated, the flesh of these fruit is brown inside—known as *goma* in [Japan](#)—and the fruit can be eaten when firm. These varieties are highly sought after. Tsurunoko, sold as "chocolate persimmon" for its dark brown flesh, Maru, sold as "cinnamon persimmon" for its spicy flavor, and Hyakume, sold as "brown sugar", are the three best known.

Before ripening, persimmons usually have a "chalky" or bitter taste.

- Astringent
 - 'Dōjō hachiya' (ja: 堂上蜂屋)
 - 'Gionbō'
 - 'Hachiya' (ja: 蜂屋), 'Kōshū hyakume' (ja: 甲州百目), 'Fuji' (ja: 富士)
 - Hongsī (Korean: 홍시)
 - Ormond
 - 'Saijō' (ja: 西条)
 - Sheng
 - Tanenashi
 - 'Hiratanenashi' (ja: 平核無)
 - 'Tone wase' (ja: 刀根早生)
 - Tamopan
 - Maru
 - Tipo
 - Cioccolato
- Nonastringent
 - Dan gam (Korean, 단감)
 - 'Fuyū' (ja: 富有)
 - 'Hanagosho' (ja: 花御所)
 - 'Izu' (ja: 伊豆)
 - 'Jirō' (ja: 次郎柿)
 - 'Sōshū' (ja: 早秋)
 - 'Taishū' (ja: 太秋)
 - Vainiglia

Production

In 2013, world production of persimmons was 4.6 million [tonnes](#), with [China](#) accounting for 43% of this total (table). Other major producers include the [Republic of Korea](#), [Japan](#), [Brazil](#) and [Azerbaijan](#) (table).

Culinary uses

Persimmons are eaten fresh, dried, [raw](#), or cooked. When eaten fresh, they are usually eaten whole like an apple in bite-size slices, and may be peeled. One way to consume ripe persimmons, which may have soft texture, is to remove the top leaf with a paring knife and scoop out the flesh with a spoon. Riper persimmons can also be eaten by removing the top leaf, breaking the fruit in half, and eating from the inside out. The flesh ranges from firm to mushy, and the texture is unique. The flesh is sweet and, when firm owing to being unripe, possesses an apple-like crunch.^{[[citation needed](#)]} American persimmons (*Diospyros virginiana*) and *Diospyros digyna* are completely inedible until they are fully ripe.^{[[citation needed](#)]}

Persimmon production – 2013

Country	Production (millions of tonnes)
China	2.0
Republic of Korea	0.3
Japan	0.26
Brazil	0.12
Azerbaijan	0.08
World	4.6

Source: [FAOSTAT](#) of the [United Nations](#)^[10]

In [China](#), [Korea](#), [Japan](#), and [Vietnam](#), 'Hachiya' persimmons after harvesting are prepared using traditional hand-drying techniques outdoors for two to three weeks. The fruit is then further dried by exposure to heat over several days before being shipped to market. In Japan, the [dried fruit](#) is called *hoshigaki*, in China "shìbǐng", in Korea *gotgam* (hangul), and in Vietnam *hồng khô*. It is eaten as a snack or dessert and used for other culinary purposes.

In Korea, dried persimmon fruits are used to make the traditional Korean spicy [punch](#) *sujeonggwa*, while the matured, fermented fruit is used to make a [persimmon vinegar](#) called *gamsikcho*.

In [Taiwan](#), fruits of astringent varieties are sealed in jars filled with [limewater](#) to get rid of bitterness. Slightly hardened in the process, they are sold under the name "crisp persimmon" (*cuishi*) or "water persimmon" (*shuishizi*). Preparation time is dependent upon temperature (5 to 7 days at 25–28 °C (77–82 °F)).

For centuries, Japanese have consumed persimmon leaf tea (Kaki-No-Ha Cha) made from the dried leaves of "kaki" persimmons (*Diospyros kaki*).^[11] In some areas of [Manchuria](#) and Korea, the dried leaves of the fruit are used for making [tea](#). The Korean name for this tea is *ghamnip cha*.

In the [Old Northwest](#) of the United States, persimmons are harvested and used in a variety of dessert dishes, most notably pies. They can be used in cookies, cakes, puddings, salads, curries and as a topping for breakfast cereal. [Persimmon pudding](#) is a baked dessert made with fresh persimmons that has the consistency of [pumpkin pie](#) but resembles a [brownie](#) and is almost always topped with [whipped cream](#). An annual persimmon festival, featuring a persimmon pudding contest, is held every September in [Mitchell, Indiana](#).

Persimmons may be stored at room temperature 20 °C (68 °F) where they will continue to ripen. In northern China, unripe persimmons are frozen outside during winter to speed up the ripening process.



- Peeled, flattened, and dried persimmons (shibǐng) in a [Xi'an](#) market



- Kaki preserved in limewater



- *Hoshigaki*, Japanese dried persimmon



- *gotgam*, Korean dried persimmon



dangam [kkakdugi](#)

Nutrient and phytochemical content

Compared to [apples](#), persimmons have higher levels of [dietary fiber](#) and some [dietary minerals](#),^[12] but overall are not a significant source of [nutrients](#) except for [manganese](#) (17% of the [Daily Value](#), DV) and [provitamin A beta-carotene](#) (10% DV, table for raw Japanese persimmons per 100 gram amount). In a 100 gram amount, raw American persimmons are a rich source of [vitamin C](#) (80% DV) and [iron](#) (19% DV, table).

Persimmon fruits contain [phytochemicals](#), such as [catechin](#), [galloocatechin](#)^[13] and [betulinic acid](#).^[14]

Unripened persimmons and bezoars

Unripened persimmons contain the soluble [tannin](#) shibuol, which, upon contact with a weak acid, polymerizes in the [stomach](#) and forms a gluey coagulum, a "foodball" or [phytobezoar](#), that can affix with other stomach matter.^[15] These phytobezoars are often very hard and almost woody in consistency. More than 85% of phytobezoars are caused by ingestion of unripened persimmons.^[16]

Persimmon [bezoars](#) (diospyrobezoars) often occur in epidemics in regions where the fruit is grown.^{[17][18]} Diospyrobezoars should not be of concern when consuming moderate quantities of

persimmons. One case in medical literature from 2004 revealed a 51-year-old patient who had eaten a kilogram (2.2 pounds) of unpeeled persimmons each day for 40 years.^{[19][20]} Surgery is sometimes employed, but [Coca-Cola also has been used](#) successfully to chemically shrink or eliminate persimmon-related bezoars.^[21]

It is often advised that persimmons should not be eaten on an empty stomach.^[22]

American persimmons, raw
Diospyros virginiana

Nutritional value per 100 g (3.5 oz)

Energy	531 kJ (127 kcal)	
Carbohydrates	33.5 g	
Sugars	n/a	
Dietary fiber	n/a	
Fat	0.4 g	
Protein	0.8 g	
Vitamins		
Vitamin C	66 mg	(80%)
Minerals		
Calcium	27 mg	(3%)
Iron	2.5 mg	(19%)
Phosphorus	26 mg	(4%)
Potassium	310 mg	(7%)
Sodium	1 mg	(0%)

[Link to USDA Database entry](#)

- Units
- μg = [micrograms](#) • mg = [milligrams](#)
- IU = [International units](#)

Percentages are roughly approximated using [US recommendations](#) for adults.

Source: [USDA Nutrient Database](#)

Japanese persimmons, raw
Diospyros kaki

Nutritional value per 100 g (3.5 oz)

Energy	293 kJ (70 kcal)	
Carbohydrates	18.59 g	
Sugars	12.53 g	
Dietary fiber	3.6 g	
Fat	0.19 g	
Protein	0.58 g	
Vitamins		
Vitamin A equiv. beta-carotene	81 μg	(10%)
lutein zeaxanthin	253 μg	(2%)
	834 μg	(3%)
Thiamine (B₁)	0.03 mg	(3%)
Riboflavin (B₂)	0.02 mg	(2%)
Niacin (B₃)	0.1 mg	(1%)
Vitamin B₆	0.1 mg	(8%)
Folate (B₉)	8 μg	(2%)
		(2%)
Choline	7.6 mg	(9%)
Vitamin C	7.5 mg	(5%)
Vitamin E	0.73 mg	(2%)
Vitamin K	2.6 μg	(2%)
Minerals		
Calcium	8 mg	(1%)
		(1%)
Iron	0.15 mg	(3%)
		(3%)
Magnesium	9 mg	(3%)

Horses may develop a taste for the fruit growing on a tree in their [pasture](#) and overindulge also, making them quite ill. [\[23\]](#)

Wood



An example of persimmon wood furniture

Though persimmon trees belong to the same genus as [ebony](#) trees, persimmon tree wood has a limited use in the manufacture of objects requiring hard wood. It is hard, but cracks easily and is somewhat difficult to process. Persimmon wood is used for paneling in traditional Korean and Japanese furniture.

In [North America](#), the lightly colored, fine-grained wood of *D. virginiana* is used to manufacture [billiard](#) cues and textile shuttles. It is also used in the [percussion](#) field to produce the shaft of some mallets and drumsticks.

Persimmon wood was also heavily used in making the highest-quality heads of the [golf clubs](#) known as "[woods](#)" until the golf industry moved primarily to metal woods in the last years of the 20th century. In fact, the first metal woods made by [TaylorMade](#), an early pioneer of that club type, were branded as "Pittsburgh Persimmons". Persimmon woods are still made, but in far lower numbers than in past decades. Over the last few decades persimmon wood has become popular among bow craftsmen, especially in the making of traditional [longbows](#). Persimmon wood is used in making a small number of wooden flutes and eating utensils such as wooden spoons and cornbread knives (wooden knives that may cut through the bread without scarring the dish).

Like some other plants of the genus *Diospyros*, older persimmon heartwood is black or dark brown in color, in stark contrast to the sapwood and younger heartwood, which is pale in color.

Trees



Persimmon tree

The trees of all species have stiff, tumescent leaves, but the female of the *D. virginiana* can look less turgid than the male because the leaves droop when fruiting, perhaps because of the heavier nutrient requirements. They grow swiftly, and are resilient to the stresses of unpredictable climates. Persimmons can tolerate and adapt to a wide range of climates. Persimmons are also known for their resistance to diseases and pests. They are one of the last trees to leaf out in the spring, and do not flower until well after the leaves have formed, bypassing the threat of blossom loss to frosts. The fruit hangs on the branches long into the winter. Because they grow swiftly and colonize off their root systems, they are ideal for helping recover habitat. A persimmon tree will be mature enough to bear fruit within 7–8 years. They hold their own against flooding riverbanks quite well and are listed in Stormwater Journal's list of water-holding trees. [\[24\]](#)

Manganese	0.355 mg	(17%)
Phosphorus	17 mg	(2%)
Potassium	161 mg	(3%)
Sodium	1 mg	(0%)
Zinc	0.11 mg	(1%)

[Link to USDA Database entry](#)

- Units
- $\mu\text{g} = \text{micrograms}$ • $\text{mg} = \text{milligrams}$
- IU = [International units](#)

Percentages are roughly approximated using [US recommendations](#) for adults.

Source: [USDA Nutrient Database](#)

Folklore



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- In [Ozark folklore](#), the severity of the upcoming winter is said to be predictable by slicing a persimmon seed and observing the [cutlery](#)-shaped formation within it.^[25]
- In [Korean folklore](#) the dried persimmon (gotgam, Korean: 곱감) has a reputation for scaring away tigers^[26]

Gallery



Persimmon orchard northern [Kansai region](#), Japan.



Hachiya persimmons in December



Japanese persimmons hung to dry after fall harvest



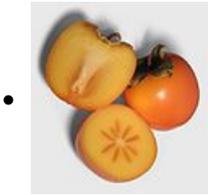
Their red color and cracking skins show which persimmons are ripe. The yellow fruit are nearly ripe and will ripen, especially if exposed to ethylene.



Comparison of hachiya cultivar and jiro cultivar kaki persimmon size.



Peeled, hanging Hachiya Persimmons in Southern California.



Persimmon cut open.



Japanese persimmon (cultivar 'Hachiya') - watercolor 1887



Kaki fruit (Japanese persimmon)



A branch heavily laden with persimmons

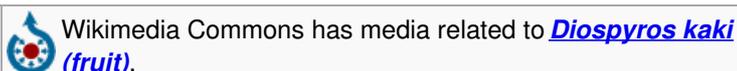
See also

- [Persimmon regiment](#)

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External links



-  "[Persimmon](#)". *Encyclopædia Britannica* (11th ed.). 1911.