

Olive

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Olive



Olea europaea, Dead Sea, Jordan

Scientific classification

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Lamiales
Family: Oleaceae
Genus: *Olea*
Species: ***O. europaea***

Binomial name

Olea europaea



19th century illustration

The **Olive** (*Olea europaea*) is a species of small tree in the family Oleaceae, native to coastal areas of the eastern Mediterranean region, from Lebanon and the maritime parts of Asia Minor and northern Iran at the south end of the Caspian Sea. Its use as a major agricultural product in preclassical Greece led to its wider distribution throughout the western Mediterranean. Olive trees show a marked preference for calcareous soils, flourishing best on limestone slopes and crags, and coastal climate conditions.

The fruit of this plant is initially inedible, and must be treated before it can be eaten. It may be processed either while unripe, to produce "green olives", as with the martini olives stuffed with pimento, or when ripe, to produce "black olives", as are used on pizza, some Mexican food, and Mediterranean-style salads.

The Wild Olive is a small, straggly tree or shrub which can grow to 8-15 m tall with thorny branches. The leaves are opposite, oblong pointed, 4-10 cm long and 1-3 cm broad, dark greyish-green above and pale with whitish scales below. The small white flowers, with four-cleft calyx and corolla, two stamens and bifid stigma, are borne generally on the last year's wood, in racemes springing from the axils of the leaves. The fruit is a small drupe 1-2.5 cm long, thinner-fleshed and smaller in wild plants than in orchard cultivars.

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History

The olive is one of the earliest plants cited in recorded literature. In Homer's Odyssey, Odysseus crawls beneath two shoots of olive that grow from a single stock^[1]. Horace mentions it in reference to his own diet, which he describes as very simple: "Me pascunt olivae, me cichorea, me malvae" ("As for me, olives, endives, and mallows provide sustenance.")^[2]. Pliny the Elder told of a sacred Greek olive tree that was 1600 years old, while others claim that some of the specimens in the Garden of Gethsemane date back to the time of Jesus^[3]. Some Italian olive trees have been credited with an antiquity reaching back to the Roman empire; but the age of such ancient trees is doubtful during growth, and their identity with old descriptions still more difficult to establish. Lord Monboddo comments on the olive in 1779 as one of the foods preferred by the ancients and as one of the most perfect foods^[4].

Cultivation and uses



The olive has been used since ancient times for the making of olive oil and for eating of the fruit, which, being bitter in its natural state, are typically subjected to fermentation or cured with lye or brine to be made more palatable. Green olives and black olives are soaked in a solution of sodium hydroxide and then washed thoroughly in water to remove oleuropein, a naturally bitter carbohydrate.

Then green olives may be allowed to ferment before they are packed in a brine solution. Black olives are not allowed to ferment before packaging, which is why they taste milder than most green olives. Green olives that do not ferment before packing taste as mild as black olives.

It is not known when olives were first cultivated for harvest. Among the earliest evidence for the domestication of olives comes from the Chalcolithic Period archaeological site of Teleilat Ghassul in what is today modern Jordan.

The plant and its products are frequently referred to in the Bible and by the earliest poets. The ancient agriculturists believed that olive trees would not succeed if planted more than a short distance from the sea; Theophrastus gives 300 stadia (55.6 km) as the limit. Modern experience does not always confirm this, and, though showing a preference for the coast, it has long been grown further inland in some areas with suitable climates, particularly in the southwestern Mediterranean (Iberia, northwest Africa) where winters are less severe.

Also, olive oil is recommended by Muhammad the Prophet of Islam. "Consume olive oil and anoint it upon your bodies since it is of the blessed tree". He also stated that it cures seventy diseases.

Olives are now cultivated in many regions of the world such as South Africa, Australia, New Zealand, Mediterranean Basin and California. Considerable research has been done to support the health benefits of eating olives and olive oil (see external links below for research results).

Subspecies

There are at least five natural subspecies distributed over a wide range:

- *Olea europaea* subsp. *europaea* (Europe)
- *Olea europaea* subsp. *cuspidata* (Iran to China)
- *Olea europaea* subsp. *guanchica* (Canaries)
- *Olea europaea* subsp. *maroccana* (Morocco)
- *Olea europaea* subsp. *laperrinei* (Algeria, Sudan, Niger)

Cultivars



Small Olive Tree



 Large Olive Tree



 Olive Tree Leaves



 Olive Tree Trunk





Olive Flowers



A young olive plant, germinated from a seed

There are thousands of cultivars of the olive. In Italy alone at least three hundred cultivars have been enumerated, but only a few are grown to a large extent. The main Italian cultivars are 'Leccino', 'Frantoio' and 'Carolea'. None of these can be safely identified with ancient descriptions, though it is not unlikely that some of the narrow-leaved cultivars that are most esteemed may be descendants of the Licinian olive. The Iberian olives are usually cured and eaten, often after being pitted, stuffed (with pickled pimento, onion, or other garnishes) and jarred in fresh brine.

Since many cultivars are self sterile or nearly so, they are generally planted in pairs with a single primary cultivar and a secondary cultivar selected for its ability to fertilize the primary one, for example, 'Frantoio' and 'Leccino'. In recent times, efforts have been directed at producing hybrid cultivars with qualities such as resistance to disease, quick growth and larger or more consistent crops.

Some particularly important cultivars of olive include:

- 'Frantoio' and 'Leccino'. These cultivars are the principal participants in Italian olive oils from Tuscany. Leccino has a mild sweet flavour while Frantoio is fruity with a stronger aftertaste. Due to their highly valued flavour, these cultivars have been migrated and are now grown in other countries.

- 'Arbequina' is a small, brown olive grown in Catalonia, Spain. As well as being used as a table olive, its oil is highly valued.
- 'Empeltre' is a medium sized, black olive grown in Spain. They are used both as a table olive and to produce a high quality olive oil.
- 'Fecundiat' is a large brown olive grown mostly in southern Turkey.
- 'Kalamata' is a large, black olive, named after the city of Kalamata, Greece, used as a table olive. These olives are of a smooth and meatlike taste.
- 'Koroneiki' originates from the southern Peloponese, around Kalamata and Mani in Greece. This small olive, though difficult to cultivate, has a high oil yield and produces oil of exceptional quality.
- 'Picholine' originated in the south of France. It is green, medium size, and elongated. Their flavour is mild and nutty.
- 'Lucques' originated in the south of France. They are green, of a large size, and elongated. The bone has an arcuated shape. Their flavour is mild and nutty.
- 'Souri' originated in Lebanon and is widespread in Israel and neighboring countries. It has a high oil yield and exceptionally aromatic flavour.
- 'Barnea' is a modern cultivar bred in Israel to be disease resistant and to produce a generous crop. It is used both for oil and for table olives. The oil has a strong flavour with a hint of green leaf. Barnea is widely grown in Israel and in the southern hemisphere, particularly in Australia and New Zealand.
- 'Maalot' is another modern, disease-resistant, Israeli cultivar derived from the North African 'Chemlali' cultivar. The olive is medium sized, round, has a fruity flavour and can be used for oil or for table olives.
- 'Vacaca' is an odiferous cultivar that is mostly found in the Southwest.

Growth and propagation

The olive tree grows very slowly, but over many years the trunk can attain a considerable diameter. A. P. de Candolle recorded one exceeding 10 m in girth. They can possibly reach great age and the trees rarely exceed 15 m in height, and are generally confined to much more limited dimensions by frequent pruning. The yellow or light greenish-brown wood is often finely veined with a darker tint; being very hard and close-grained, it is valued by woodworkers.

The olive is propagated in various ways, but cuttings or layers are generally preferred; the tree roots easily in favourable soil and throws up suckers from the stump when cut down. However, yields from trees grown from suckers or seeds are poor; it must be budded or grafted onto other specimens to do well (Lewington and Parker, 114). Branches of various thickness are cut into lengths of about 1 m and, planted deeply in manured ground, soon vegetate; shorter pieces are sometimes laid horizontally in shallow trenches, when, covered with a few centimetres of soil, they rapidly throw up sucker-like shoots. In Greece, grafting the cultivated tree on the wild form is a common practice. In Italy, embryonic buds, which form small swellings on the stems, are carefully excised and planted beneath the surface, where they grow readily, their buds soon forming a vigorous shoot.

Occasionally the larger boughs are marched, and young trees thus soon obtained. The olive is also sometimes raised from seed, the oily pericarp being first softened by slight rotting, or soaking in hot water or in an alkaline solution, to facilitate germination.

Where the olive is carefully cultivated, as in Languedoc and Provence, the trees are regularly pruned. The pruning preserves the flower-bearing shoots of the preceding year, while keeping the tree low enough to allow the easy gathering of the fruit. The spaces between the trees are regularly fertilized. The crop from old trees is sometimes enormous, but they seldom bear well two years in succession, and in many instances a large harvest can only be reckoned upon every sixth or seventh season.

A calcareous soil, however dry or poor, seems best adapted to its healthy development, though the tree will grow in any light soil, and even on clay if well drained; but, as remarked by Pliny, the plant is more liable to disease on rich soils, and the oil is inferior to the produce of the poorer and more rocky ground.

Fruit harvest and processing

Most olives today are harvested by shaking the boughs or the whole tree. Lax practices such as using olives lying on the ground can result in poor quality oil. In southern Europe the olive harvest is in the winter months, continuing for several weeks, but the time varies in each country, and also with the season and the kinds cultivated.

The amount of oil contained in the fruit differs much in the various sorts; the pericarp usually yields from 60 to 70%.

Traditional Fermentation of Table Olives

Olives freshly picked from the tree contain phenolic compounds and a unique glycoside, oleuropein, which makes the fruit unpalatable for immediate consumption. There are many ways of processing olives for table use. Traditional methods use the natural microflora on the fruit and procedures which select for those that bring about fermentation of the fruit. This fermentation leads to three important outcomes: the leaching out and breakdown of oleuropein and phenolic compounds; the creation of lactic acid, which is a natural preservative; and a complex of flavoursome fermentation products. The result is a product which will store with or without refrigeration. One basic fermentation method is to get food grade containers, which may include plastic containers from companies which trade in olives and preserved vine leaves. Many bakeries also recycle food grade plastic containers which are well sized for olive fermentation; they are 10 to 20 litres in capacity. Olives are often sold at markets in 10kg trays. Olives should be selected for their firmness if green and general good condition. Olives can be used green, ripe green (which is a yellower shade of green, or green with hints of colour), through to full purple black ripeness. The olives are soaked in water to wash them, and drained. About 7 litres of room temperature water is added to the fermentation container, and 800g of sea salt, and one cup (300g) of white vinegar (white wine or cider vinegar). The salt is dissolved to create a 10% solution (the 800g of salt is in a 8kg mixture of salt and water and vinegar). Each olive is given a single deep slit with a small knife if they are small, or up to three slits per fruit if they are large (eg 60 fruit per kg). If 10 kg of olives are added to the 10% salt solution, the ultimate salinity after some weeks will be around 5 to 6% once the water in the olives moves into solution and the salt moves into the olives. The olives are weighed down with an inert object such as a

plate so they are fully immersed and lightly sealed in their container. The light sealing is to allow the gases of fermentation to escape. It is also possible to make a plastic bag partially filled with water, and lay this over the top as a venting lid which also provides a good seal. The exclusion of oxygen is useful but not as critical as when grapes are fermented to produce wine. The olives can be tasted at any time as the bitter compounds are not poisonous. Oleuropein is a useful antioxidant in the human diet. The olives become reasonably acceptable after 2 weeks to a month, and may develop full maturity in three months. This is happening in winter as they are harvested in autumn. Green olives should be firm in texture once fermented and black olives will be softer. Olives produced in this way will normally be safe and delicious as is. Should you want to present your olives with other flavours they can be marinated in, or stuffed with, a great variety of herbs, spices, and flavours such as additional olive oil, fetta, capsicum (pimento), chili, lemon zest, lemon juice, garlic, wines, vinegars, and anchovies. This method has many variations and may include longer washes in water, up to a week, and multiple changes of salt solution.

Pests and diseases

A fungus *Cycloconium oleaginum* can infect the trees for several successive seasons, causing great damage to plantations. A species of bacterium, *Pseudomonas savastanoi* pv. *savastanoi* induces tumour growth in the shoots, and certain lepidopterous caterpillars feed on the leaves and flowers, while the main damage is made by the olive-fly attacks to the fruit. In France and north-central Italy olives suffer occasionally from frost. Gales and long-continued rains during the gathering season also cause damage.

Economy

Production

The first ten countries of production, all located in the mediterranean region, represent together 95 % of the world production of olives.

Main countries of production			
Year 2003	Production (in <u>tons</u>)	Cultivated area (in <u>hectares</u>)	Yield (q/Ha)
World	17 317 089	8 597 064	20,1
1. Spain	6 160 100	2 400 000	25,7
2. Italy	3 149 830	1 140 685	27,6
3. Greece	2 400 000	765 000	31,4
4. Turkey	1 800 000	594 000	30,3
5. Syria	998 988	498 981	20,0
6. Tunisia	500 000	1 500 000	3,3
7. Morocco	470 000	550 000	8,5
8. Egypt	318 339	49 888	63,8
9. Algeria	300 000	178 000	16,9
10. Portugal	280 000	430 000	6,5