

## Olea europaea in Europe: distribution, habitat, usage and threats

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The olive (*Olea europaea* L.) is a small evergreen tree which grows slowly and is able to live over 1000 years. It has been cultivated for millennia throughout the Mediterranean basin probably domesticating the oleaster, its wild form. This species is a typical tree of the Mediterranean vegetation, well adapted to drought and poor soils, and also resistant to salinity. It is principally distributed along the coasts, although its cultivations are nowadays to be found in all Mediterranean climate areas of the world. This species is one of the most important trees for the agricultural economy of the Mediterranean region with more than 70% of world olive oil production. Like other cultivated trees, the olive is affected by many pests and diseases, which require direct human control.

The olive tree (*Olea europaea* L.) is a small evergreen tree that grows between 8-15m tall. It is a slow-growing and extremely long-lived species, with a life expectancy up to 1000 years<sup>1, 2</sup>. The short and large trunk develops multiple branches with cascading twigs<sup>3</sup>. The silvery green leaves are thick, leathery and oppositely arranged, growing over a 2-3 year period before shedding. Flower bud **inflorescences** develop in the **axil** of each leaf with buds that may remain dormant for over a year. Each **inflorescence** contains 15-30 small, inconspicuous, fragrant flowers, yellow-white in colour. This species is **monoecious** with **hermaphrodite** flowers, formed by a short 4-segmented **calyx** and a short-tubed **corolla** containing 4 lobes<sup>3, 4</sup>. The fruit is a **drupe** 2-2.5 cm long, black when ripe, possessing a central pit which encloses the seed surrounded by the edible fleshy **mesocarp**<sup>2-4</sup>. It is dispersed principally by birds<sup>5, 6</sup>.

### Distribution

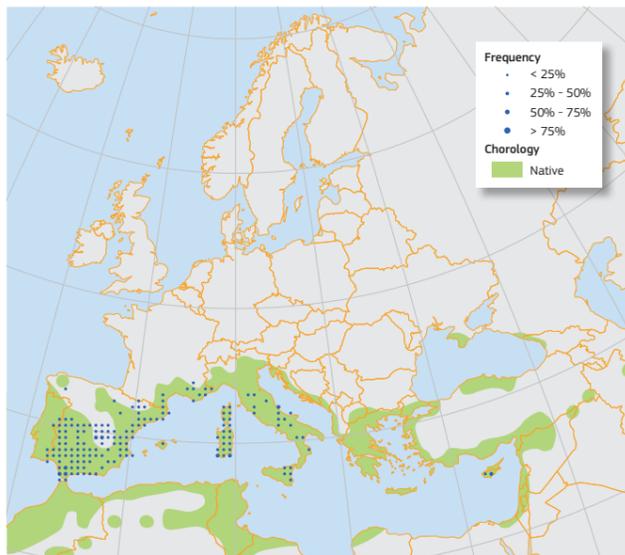
In spite of the controversy generated on its origin, most authors agree that wild olives are native to Minor Asia<sup>7</sup>. From the eastern parts of the Mediterranean basin, olive trees spread west through Greece, Italy, France Spain and Portugal following the coasts<sup>8, 9</sup>. Nowadays olive cultivations and selection of cultivars are expanding in many areas outside its natural ranges, and even in other continents, such as Australia, South and North America (Argentina, Chile, United States), South Africa and even in exotic places like Hawaii<sup>8</sup>. Of its six subspecies, only three are naturally distributed in Europe: subsp. *europaea* in the Mediterranean basin (Greece, Italy, Spain, Portugal, France, Cyprus, Slovenia and Malta) and some Atlantic enclaves in South-West Europe; subsp. *guanchica* in the Canary Islands; and subsp. *cerasiformis* in the Madeira archipelago. Of the other three, subsp. *maroccana* occurs in Morocco, subsp. *laperrinei* in Algeria, Sudan and Niger, and subsp. *cuspidata* from South Africa throughout East Africa, Arabia to South West China. The Mediterranean subspecies includes the oleaster (*Olea europaea* subsp. *europaea* var. *sylvestris*), the wild form, and cultivated olive (*Olea europaea* subsp. *europaea* var. *europaea*)<sup>4, 8, 10, 11</sup>.

### Habitat and Ecology

This species is a typical component of the thermo-Mediterranean climate, characterised by warm, dry summers and rainy, cool winters, which corresponds generally to the coasts of the Mediterranean Sea up to 200m in elevation<sup>12</sup>. The olive tree is a **thermophile** species and is adapted to tolerate drought and salinity stress<sup>1, 8, 13</sup>. It grows on a wide range of soils<sup>4</sup>, but prefers sandy loam soils of moderate depth<sup>14</sup>. The wild form frequently thrives as one of the common constituents of **maquis** and **garrigue** scrub formations on poor soils and slopes. It colonises secondary habitats, such as the edges of cultivation or abandoned orchards, spread by bird-dispersed seed, but also propagating vegetatively by root suckers<sup>3, 15, 16</sup>. It can be found in the **sclerophyllous** evergreen vegetation, along with carob (*Ceratonia siliqua*) mastic (*Pistacia lentiscus*), myrtle (*Myrtus communis*), junipers (*Juniperus* spp.), etc.<sup>17</sup>.

### Importance and Usage

The olive is one of the most emblematic and economically important crop trees of the Mediterranean regions<sup>15</sup>. The



Map 1: Plot distribution and simplified chorology map for *Olea europaea*. Frequency of *Olea europaea* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for *O. europaea* is derived after Meusel and Jäger<sup>38</sup>.

domestication of the oleaster seems to have occurred in the Near-East during the early Neolithic period, and then it was successively propagated to western areas of Mediterranean basin<sup>18</sup>. Historically this species has always been appreciated first for its fruits and the wood, and then for the oil. The fruit is edible and all parts contain non-drying oil. Pickled, canned or otherwise prepared table olives are eaten as relish or used in bread, soups, salads, etc.<sup>19</sup>. The olive wood is heavy and very tough, used for high-end furniture, inlays, turned objects, and handcraft<sup>20</sup>. It is also appreciated as firewood because it burns even when wet<sup>21</sup>. The olive oil has several uses, for eating and cooking, as well as for ointment, lighting (burning without smoke), and medical uses<sup>15, 20, 21</sup>. Virgin olive oil is an important component of the Mediterranean diet, valued for its beneficial properties for human health thanks to the high amounts of unsaturated fatty acids<sup>22, 23</sup>. Mediterranean countries produce more than 70% of the total world supply of olive oil. About 95% of the European production



Old cultivated olive tree for fruit production near Galatas (Peloponnese peninsula, Greece). (Copyright Miltos Gikas, www.flickr.com: CC-BY)

is concentrated in Spain, Italy and Greece<sup>24</sup>. The leaves are used in medicine as a herbal tea, due to mainly their high phenolic compound content<sup>25</sup>. Occasionally it is cultivated in gardens as an ornamental tree<sup>26</sup>. The oleaster is a source of rootstock for propagating new improved cultivated varieties<sup>27</sup>.

### Threats and Diseases

The olive tree is affected by many pests and diseases<sup>28</sup>. One of the major constraints for olive cultivations is Verticillium wilt, a disease caused by the soil-borne fungus *Verticillium dahliae*<sup>29</sup>. Olive scab, caused by the mitosporic fungus *Spilocaea oleagina*, is the most important foliar disease of olive<sup>30</sup>. Olive knot disease results in tubercles formed on branches and stems, produced by the bacterium *Pseudomonas savastanoi*<sup>31</sup>. Among pests, the most harmful are the olive fruit fly (*Bactrocera olea*), the olive moth (*Prays oleae*) and black scale (*Saissetia oleae*)<sup>32, 33</sup>. In Australia and Pacific islands the oleaster is considered as an invasive species, introduced in the 19th century<sup>34</sup>. *Xylella fastidiosa* is a pathogen of American origin. In recent years, its subsp. *pauca* has been associated with the olive quick decline syndrome (OQDS) in Southern Italy<sup>35-37</sup>.



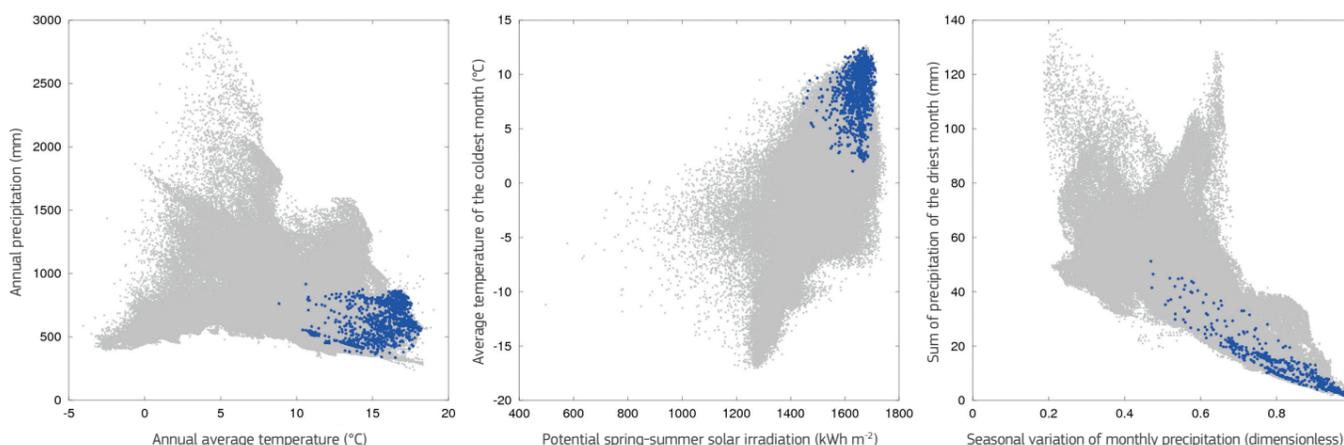
Maturing fruits: these fleshy drupes become black when ripening. (Copyright Michael Wunderli, www.flickr.com: CC-BY)

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Field data in Europe (including absences) ● Observed presences in Europe ●

Autoecology diagrams based on harmonised field observations from forest plots.



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