

Environmental Footprints of Olive Cultivation**Authors:** Persefoni Maletsika**Affiliation:** *University of Thessaly, Department of Crop Production and Rural Environment, str. "Fytokou" 38446
Nea Ionia, Magnesia, Greece*
pmalets@uth.gr

The intensification of agriculture leads to a high environmental impact due to greenhouse gas emissions (mainly CO₂) and the unsustainable use of natural resources, such as water, and energy. The Life Cycle Analysis methodology plays an important role in quantifying these impacts, allowing the adoption of important measures for their mitigation. The purpose of this paper is to present the environmental footprint of olive cultivation, focusing on the carbon footprint associated with climate change, the water footprint associated with the depletion of water resources, and the energy analysis. The olive tree (*Olea europaea* L.) is the most important crop in our country and covers a large area from north to south and from east to west, with great diversity in the olive groves in terms of relief, climatic conditions, soil properties, cultivation method, intensification, area, the possibility or not of irrigation, productivity and the use of their fruits. This fact leads to great variability in the environmental footprint of olive cultivation. However, important data emerge through which the inputs (fuel, fertilizers, irrigation water, plant protection products, mechanical equipment) and the cultivation operations with the greatest impact on the environment emerge, while allowing the comparison of cultivation methods in terms of their environmental performance. The environmental footprints of an olive grove constitute an important tool through which producers or groups of producers can make improvements for the effective management of resources, the reduction of energy consumption or the increase of the efficiency of its use and the adoption of sustainable agricultural practices, to reduce the footprint of cultivation on the environment. At the same time, the olive tree emerges as an environmentally friendly crop on many levels. As a centuries-old and evergreen tree, it can bind CO₂ in its biomass for a long time and contribute to mitigating the effects of climate change. Furthermore, the olive tree, due to its low irrigation water requirements and its ability to tolerate deficit irrigation compared to other tree crops, can contribute to the reduction of the water footprint and the sustainable use of water. Categories of olive groves such as traditional, dry and organic or sloping with minimal use of mechanical equipment, fossil fuels, fertilizers and plant protection substances, prove to be more energy efficient per unit of land area, but usually with reduced productivity. Finally, the adoption of sustainable practices such as no-tillage, returning pruning residues to the soil, green manure, and/or the addition of organic matter also contribute to the storage of carbon in the soil, leading to the reduction of net CO₂ emissions. In conclusion, it is necessary to study and implement sustainable olive cultivation systems, aiming to reduce resource and energy use while maintaining the yield, quality and safety of olive products.

Keywords: Footprint of olive oil; olive cultivation; CO₂ emissions; climate change; footprint of cultivation.