



95% of all olive trees in the world are grown in the Mediterranean region. The EU consumes **50%** of the production.

Increasing climate change resilience

Sustainable management of olive groves in Spain



Prolonged **droughts and heatwaves** in the Mediterranean region **decreased olive production to 7.6 million tonnes in 2022**.



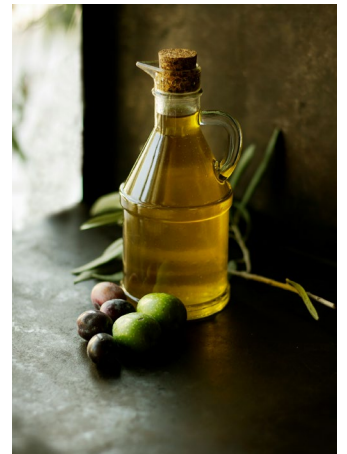
Sustainable cropping practices can deliver environmental benefits to mitigate the impacts of climate hazards.

Cover crops and mulching can help lower soil temperatures and reduce soil losses.

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Olive oil - Spain's liquid gold

In 2013, UNESCO recognised the Mediterranean Diet as an intangible cultural heritage of humanity which encompasses a range of skills, knowledge, practices, and traditions revolving around agriculture, food production, preparation, and consumption¹. The term was first coined over 40 years ago to describe the way of living and eating common to the countries around the Mediterranean Basin². And although it is recognised that the Mediterranean Basin encompasses many different cultures and regional cuisines, olive oil is at the centre of Mediterranean cooking.



Olives are an essential part of Spain's dishes, culture, and landscape. From sandwiches to dressings for salads and cooked vegetables, or to stir-fry vegetables and cook fish or meat, the versatility of olive oil makes Spanish citizens the largest consumers of this product within the EU. Each Spaniard consumes, on average, eight litres annually, compared to an EU average of less than three litres³. Spain is also the largest producer of olive oil globally, accounting for over 60% of the world's production⁴. There are close to 300 million olive trees in the country⁵, most of which are found in the region of Andalusia. Spain is able to meet its own demand and is a large exporter. The country has 32 Protected Designation of Origin (DOPs) olive oils, which ensure that those specific oils are produced, processed and prepared in the specific geographical region from which they take their name⁶. This is important not only to safeguard

¹<https://ich.unesco.org/en/RL/mediterranean-diet-00884>

²see <https://www.sevencountriesstudy.com/>

³ https://agridata.ec.europa.eu/extensions/DashboardSTO/STO_OliveOil.html

⁴https://agriculture.ec.europa.eu/news/producing-69-worlds-production-eu-largest-producer-olive-oil-2020-02-04_en

⁵https://www.mapa.gob.es/ministerio/pags/biblioteca/revistas/pdf_DYC/DYC_2013_130_38_47.pdf

⁶https://agriculture.ec.europa.eu/farming/geographical-indications-and-quality-schemes/geographical-indications-and-quality-schemes-explained_en#pdo

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the specific qualities and reputation of these products but also because some of the PDOs require sustainability standards to be met by the producers, such as the Estepa PDO⁷.

How climate change affects crop olive groves in Spain

Climate change is seriously threatening olive oil production in Spain. The drought of 2023 reduced the country's production of olive oil by more than 40% compared to previous years (2019-2023)⁸, with considerable economic losses for the sector. This also led to a 30%⁹ reduction in the consumption of olive oil in the country, compared to the previous year, motivated by its high prices. Droughts and high temperatures, driven by climate change, are responsible for the decline in production of this crop. However, the severity of the impact of climate change varies between regions. Andalusia, the largest olive-producing region within Spain, is at risk of severely reducing the area suitable for cultivating most varieties due to heat and water stress, which impact flowering at critical development stages (Lorite et al, 2019). The cultivation of some varieties is even predicted to disappear in the region due to unsuitable climatic conditions totally (Arenas-Castro et al, 2020).

From everyday staple to luxury item?

In recent years, olive oil has become less affordable for many consumers as it is literally turning into 'liquid gold'. Prices have nearly tripled in Spain over the past four years¹⁰. In 2021, Spanish Extra Virgin Olive Oil peaked at €2.50 per kilogram, and the Italian equivalent at €4.80 per kilogram. In January of 2024, the price of extra virgin olive oil was reported at €9.20 per kilogram in Spain, and as high as €9.60 per kilogram in Italy. This represents a price increase of 83% in Spain, and of 58.3% in Italy over the last 12 months¹¹.

Prices are driven up by olive oil shortages. Prolonged droughts and heatwaves have damaged harvests in much of the Mediterranean region in the last two years. Recognising the importance of olive oil in their national food culture, the Spanish government decided to exempt olive oil from the current 5% VAT to reduce the financial burden on households¹¹.

The price hike has prompted a drop in consumption in Spain and has generated other unwelcome side effects: according to recent reports, olive oil has become the most frequently stolen product in supermarkets across the country. Nowadays, instead of simply taking a bottle of olive oil from

⁷ <https://www.oleoestepa.com/aceite-de-calidad/dop-oleoestepa/>

⁸ <https://www.mapa.gob.es/fr/prensa/ultimas-noticias/las-previsiones-de-produccion-de-aceite-de-oliva-en-espa%C3%B1a-se-sit%C3%BAa-en-765.300-toneladas-para-la-campa%C3%B1a-2023/24-un-15--m%C3%A1s-que-la-anterior-y-u/tcm:36-661246>

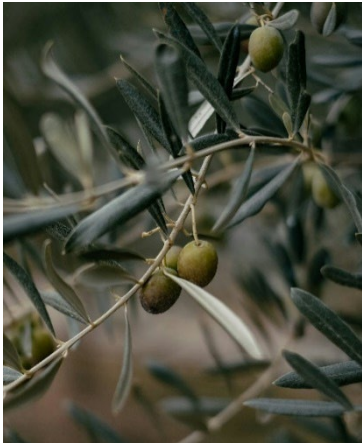
⁹ <https://www.mapa.gob.es/es/alimentacion/temas/consumo-tendencias/panel-de-consumo-alimentario/ultimos-datos/consumo-aceite.asp>

¹⁰ Olive oil becomes most wanted item for shoplifters in Spain, The Guardian, 09.03.2024, https://www.theguardian.com/world/2024/mar/09/olive-oil-becomes-most-wanted-item-for-shoplifters-in-spain?CMP=share_btn_url, accessed 22 March 2024.

¹¹ Certified Origins (2024) Olive oil market report – January 2024, <https://www.certifiedorigins.com/marketreport/>, accessed 22.03.2024.

a supermarket shelf, shoppers will have to ask a staff member to first unlock padlocks with which the bottles are attached to shelves or remove security tacks¹⁰.

Experiences from sustainably managed olive groves in Andalusia



In Andalusia, farmers, researchers and the public administration are conscious and worried about the impacts that climate change is already having on their production of table olives and olive oil (Lorite et al. 2019). Adaptation measures for olive trees, which are permanent woody crops and cannot be changed from one year to the next, can focus on breeding and cultivar selection or on the management practices and infrastructure (Lorite et al, 2022).

Research conducted over the years has shown that sustainable management of olive groves can increase their resilience to droughts and reduce yield losses, in particular for those cultivars that do not benefit from irrigation systems (Lietor et al, 2023; Michalopoulos et al, 2020). And many farmers are starting to see the advantages of switching their mode of operation, although they still represent a small percentage of the sector (i.e. as a proxy, less than 5% of the olive groves in Andalusia are managed organically).

Soil erosion is one of key threats for olive groves, which will be further enhanced by extreme rainfall events due to climate change (Lorite et al, 2019). Fortunately, sustainable management practices exist to reduce its impact, mainly consisting of maintaining covered soils and reducing tillage. Covering soils is important to reduce surface runoff and erosion given that most rainfall takes place in autumn or early spring, at a time in which the biological activity of olive trees is reduced (Gómez et al, 2009). If a vegetation cover is present, the roots of the plants retain the soil while the aerial part reduces the negative impact of raindrops. The SUSTANOLIVE project¹², which gathered data from 240 exploitations in Andalusia that had applied cover cropping for at least 8 years, found that erosion rates were four times higher in conventional olive groves (>15 Tn/ha annual soil loss) than in those that maintained herbaceous cover crops together with organic fertilisers and reduced tillage (<5 Tn/ha annual soil loss).

But there are other benefits too. SUSTANOLIVE showed that the nutrient retention capacity of soils was 51% higher in those plots with cover crops occupying the entire surface versus those where inter-row strips were applied. Higher amounts of organic carbon were also sequestered in fully covered soils, increasing the water retention capacity of the soils.

Despite these benefits, most Andalusian farmers face barriers preventing them from implementing new practices. Often these consist of a lack of training, which require time, resources and willingness to put in additional hours of work (Parra et al, 2022). There are also

¹²Data from the following factsheets: <https://sustainolive.eu/wp-content/uploads/2023/02/ENGLISH-DIGITAL-INTERACTIVE-VERSION.pdf>

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more practical difficulties, such as the need for seeds when planting cover crops, or access to new machinery¹³. Economic losses in the first years of the management transition can also happen, and some farmers opt to diversify their sources of revenues to reduce risks. Integrating livestock, often sheep or poultry, or intercropping that integrates other crops, such as aromatic plants for honey or essential oil production, are possibilities that have been explored in several regional and EU funded projects (i.e. Red Rural Nacional¹⁴, SUSTAINOLIVE, DIVERFARMING) and that some farmers already apply.

Transitioning to organic production in Jaen¹⁵

Era de Nava is a 100 ha family-owned rainfed olive grove managed by two brothers, Fermín and José. Situated 500 m above sea level and close to the Sierra de Cazorla in the province of Jaen (Andalusia). In 2019, changes in the management of the grove were introduced. Where they had previously applied synthetic fertilisers, herbicides and tillage, they switched to keeping a vegetation cover, integrating organic matter and other residues into soil and halted the use of agrochemicals. Biodiversity islands that provide habitats and corridors for the local fauna were also introduced.

As a result, soil organic matter, very low in the region (often below 0.5%), increased by 1%. Biodiversity also increased, and pests were reduced. There were no changes in productivity, although they acknowledged that the new management system required additional working hours. The droughts and poor soil quality in the region also made it more challenging, but the new practices increased the family's connection to nature.

New equipment and training were needed, resulting in an investment close to 30.000 EUR. The training was particularly important to them to gain knowledge on the way that the soil work, with some understanding of chemistry and biology. However, they report annual savings in oil and agrochemicals amounting to 12.000 EUR. They sell their olive directly to the consumer and through cooperatives to ensure a fairer return.

¹³<https://crea.ujaen.es/bitstream/10953.1/21106/1/Carrion%20Santos%2c%20Diana%20-%20TFM%20%28inv%29.pdf>

¹⁴<https://www.juntadeandalucia.es/organismos/agriculturapescaaguaydesarrollorural/areas/desarrollo-rural/marco-andaluz/paginas/lidera-coop-nacional-redrural-olivar.html#toc--conclusiones>

¹⁵<https://www.climatefarmers.org/es/blog/como-fermin-esta-haciendo-la-transicion-de-su-granja-a-la-agricultura-regenerativa-en-espana/>

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