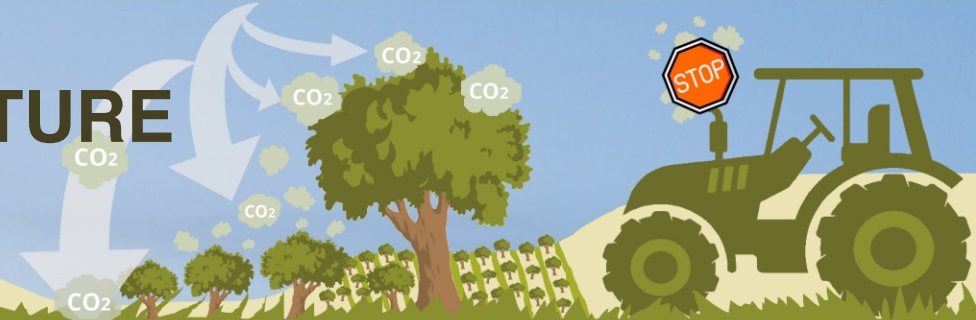




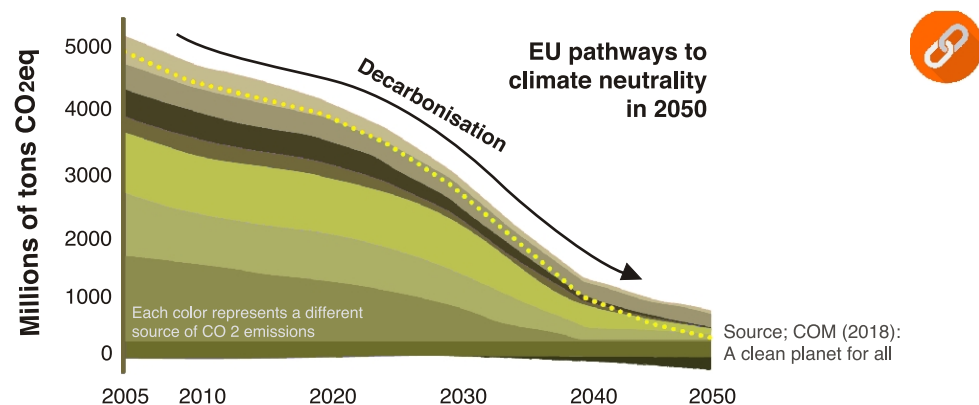
TOWARD A DECARBONISED AGRICULTURE

Practical Abstract #1 on the carbon footprint of olive groves



ONE OF THE BIGGEST CHALLENGES OF THE EU: BECAME CLIMATE-NEUTRAL

The EU aims to achieve climate neutrality by 2050, meaning that the EU's economy should reach net-zero greenhouse gas (GHG) emissions. Consequently, the EU has made GHG emission reduction a cornerstone of all its policies.



'Net zero' ideally refers to the progressive reduction of GHG emissions across all sectors, including agriculture, until they reach zero. However, as energy demand is expected to rise by 2025 and some sectors will continue emitting GHGs, any unavoidable emissions must be balanced by an equivalent removal.

DECARBONISATION. A CONCEPT YOU SHOULD GET FAMILIAR WITH.

Decarbonization in agriculture has **two main approaches**: (i) substituting fossil fuels with near-zero-carbon renewable energy sources (such as wind, solar, and biomass) as well as improving energy efficiency, and (ii) capturing carbon from the atmosphere through permanent biomass and soil sequestration, thereby increasing carbon storage in agricultural lands.

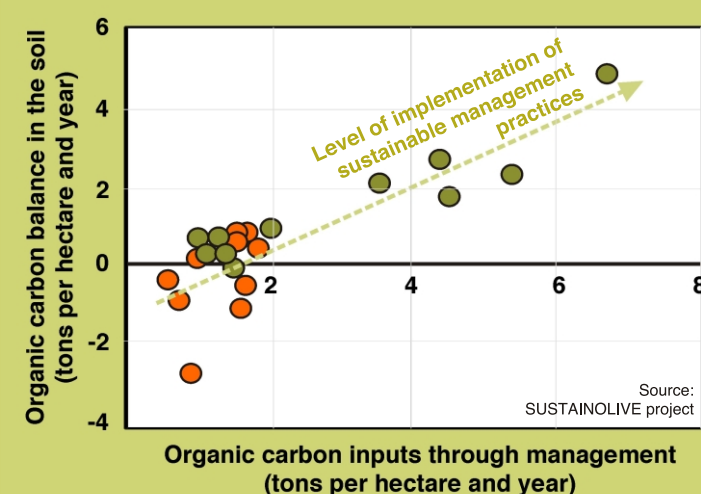
Agriculture plays a crucial role here. HOW?

The EU has set a target of **at least 55% less net GHG emissions by 2030** compared to 1990. Although very simplified and conservative, our estimate is that if we consider Spanish agricultural emissions in 2021 as a baseline, each Spanish farmer should reduce their net GHG emissions to below 700 kg CO₂ eq/ha, compared to the about 1,500 kg CO₂ eq/ha produced under a business-as-usual scenario.

Olive groves might represent a vast carbon storage. Just an example: considering that an olive tree captures an average of 20 kg of CO₂ per year (storing it as organic carbon in the trunk and branches), a 5-hectare farm with 110 trees per hectare could remove 11 tons of CO₂ from the atmosphere annually. This is equivalent to the CO₂ emissions of approximately 60 medium-sized cars driving simultaneously from Paris to Madrid.

NUMBERS DON'T LIE

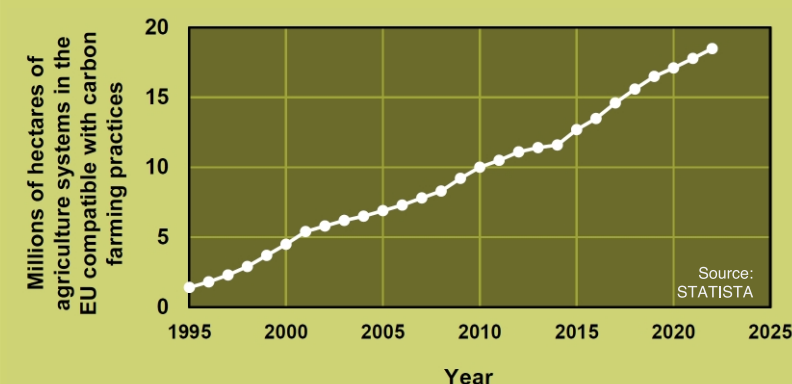
One of the most comprehensive studies to date estimating the organic carbon balance in olive grove soils was conducted on a representative set of farms in Andalusia, the world's largest olive oil-producing region. Some farms implemented conventional management practices (indicated by orange points in the figure on the right), while others adopted sustainable practices (green points on the right). The greater the implementation of practices that enhance the transfer of atmospheric CO₂ into biomass, which eventually reaches the soil (e.g., cover crops), the more positive the soil organic carbon balance was, thereby contributing to decarbonisation. Note that some conventional olive groves are situated on the negative side of the graph, meaning that, although the olive trees continue to sequester atmospheric carbon, the lack of management practices that fix carbon in the soil, ultimately results in a **negative net balance**.



EASIER THAN YOU THINK

Soil is one of the **largest carbon reservoirs** in terrestrial ecosystems. In olive groves, maintaining a cover crop, applying organic fertilizers (such as composted olive mill pomace and manure), shredding pruning residues, and reducing tillage are practices that significantly enhance soil carbon sequestration in the form of organic matter. If all Andalusian olive groves adopted these practices, an additional 1.7 million tons of CO₂ could be retained in the soil, equivalent to the CO₂ emitted if all cars in Europe drove 40 kilometers.

As illustrated in the figure on the right, the role of carbon farming in agriculture is far from utopian; instead, it is an unstoppable trend.



Improving the management of olive groves does not necessarily imply adopting an ecological model; the combination of sustainable practices, not yet framed in a certified organic model, is a great step towards the gradual decarbonisation of olive grove cultivation.

It is true that change is not without obstacles, but keep in mind that the main one is the willingness and commitment of farmers.



Co-funded by the European Union