

THE IMPORTANCE OF THE AGRICULTURAL SECTOR

According to the FAO, **857 million people worldwide work in the primary agricultural production** sector, representing 17% of the global workforce. In the EU, agriculture-related industries and services accounted for 9.5 million jobs in 2019, contributing 1.3% to the European Union's GDP. Agriculture is, and will continue to be, a driving force for humanity.

While traditional agriculture provides significant economic and cultural benefits and helps retain populations in rural areas, it unfortunately also contributes to **environmental impacts**, which have progressively increased due to the intensification of the sector to meet the growing demand for food. Some of these impacts are listed below.

Soil loss due to erosion, greenhouse gas emissions from the agricultural activities, eutrophication of water bodies from excessive fertilizer use, soil and water contamination from excessive pesticide use, depletion of aquifers, and loss of ecosystems and biodiversity.

AGRICULTURAL PRACTICES

The problems caused by agriculture are not an inevitable lesser evil. **How farmers manage their field operations is crucial** in determining whether the environmental impact of their activity is greater or lesser. Well-trained farmers, implementing environmentally friendly management practices, can minimize their ecological footprint without necessarily reducing production. On the contrary, their profits may increase due to the added value that sustainable practices bring to marketable products.

There is a set of agronomic practices that can be defined as **SUSTAINABLE**, capable of halting the current deterioration that many of the current agricultural systems inflict on the planet. The main ones are listed below:

SOIL and WATER: Reduced tillage, erosion control, efficient water use.
CHEMICALS: Integrated pest management, reduced chemical use, rational use of fertilizers.

ORGANIC FERTILIZATION and CIRCULAR ECONOMY: Composting, use of organic fertilizers, recycling of agricultural waste, mulching, implementation of cover crops.

DIVERSIFICATION: Crop rotation, intercropping, conservation of natural areas, landscape diversification (agroforestry).

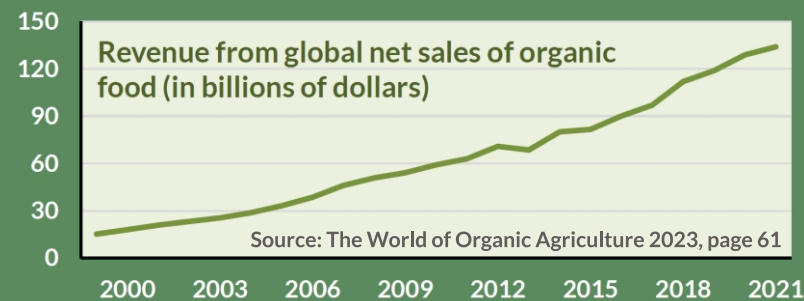
OTHERS: Use of renewable energy, installation of monitoring systems.



A GOOD EXAMPLE

In India, the adoption of an Integrated Pest Management system for cotton production has significantly reduced pesticide use and improved environmental outcomes. Between 2014 and 2022, farmers in the **Better Cotton program** reduced pesticide use by 53%, while the use of highly hazardous pesticides dropped drastically. For example, the use of Monocrotophos, an extremely toxic pesticide, fell from 41% to 2%. Additionally, irrigation water use decreased by 29%, and nitrogen application, which contributes to greenhouse gas emissions and water eutrophication, was reduced by 6%. These changes not only benefit the environment but also improve farmers' profitability by reducing costs per hectare by 15.6%, thanks to lower expenses on soil preparation and fertilizers.

Fortunately, things are changing, and more farmers and consumers are recognizing the importance of promoting sustainable agriculture. It is everyone's moral responsibility to ensure that this trend continues to grow.



A NOVEL APPROACH

Several tools allow us to estimate the environmental impact of agricultural practices. One that is becoming increasingly popular is **Life Cycle Assessment (LCA)**. Based on easily obtainable data from field operations at a farm, LCA provides a detailed assessment of the environmental impact through a wide range of categories. Some of the most relevant ones are the following:

- Climate change (CC)
- Ozone layer depletion (OL)
- Human toxicity (HT)
- Acidification (AC)
- Freshwater ecotoxicity (FE)
- Eutrophication (terrestrial + marine + freshwater) (EU)
- Use of resources (land use + water resource depletion + mineral, fossil, and renewable resource depletion) (UR)

A THOROUGH REVIEW OF THE LITERATURE

At ClimateCropping, a EJP project, **57 scientific articles published between 2009 and 2023 were reviewed**, all of which used the LCA methodology to evaluate the impact reduction achieved by applying sustainable agricultural practices. Various crops in different countries around the world were involved (corn, wheat, barley, cotton, potato, sugarbeet, soybean, pea, olive, etc.).

The results leave no doubt: implementing **environmentally friendly agricultural practices significantly reduces most impacts across all crops**. For example:

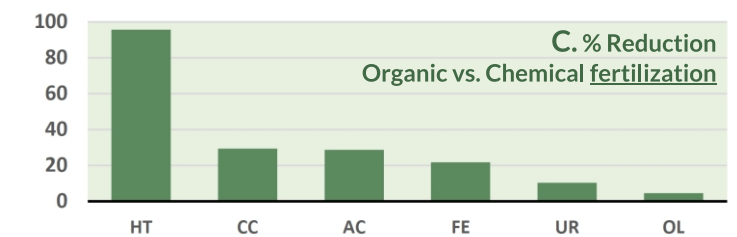
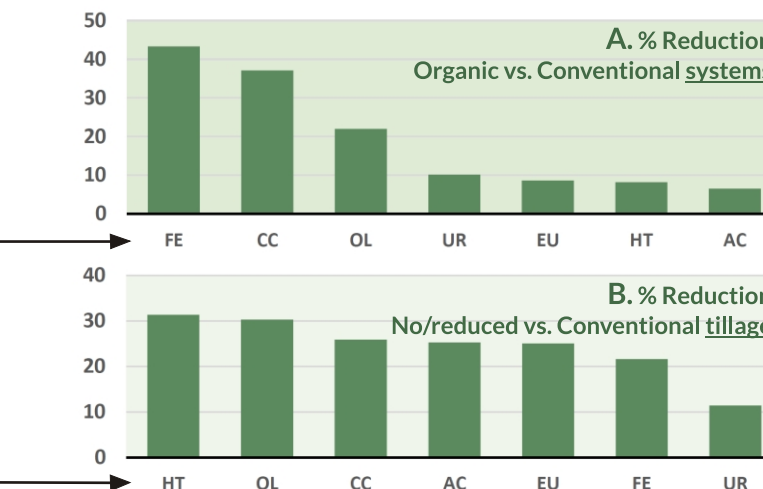


FIGURE A. The implementation of an organic model versus conventional methods led to a 43% reduction in FE and a 37% reduction in CC impacts. **FIGURE B.** The use of organic fertilizers instead of chemical ones reduced HT by an astonishing 96% and lowered acidification and CC impacts by around 30%. **FIGURE C.** Conservation agriculture, which minimizes tillage, resulted in approximately 30% reductions in HT and OL.

LOOKING TO THE IMMEDIATE FUTURE

Over the next 10 years, European farmers will be directly influenced by a series of political and economic measures, mainly derived from the new Common Agricultural Policy (CAP) 2023-2027, which emphasizes sustainability and the mitigation of environmental impacts.

Eco-schemes: At least 25% of the direct payment budget will be allocated to incentivize environmentally friendly farming practices. Additionally, each Eurozone country can offer additional incentives for these practices. Farmers will be required to maintain a minimum level of vegetation cover on their lands and reserve at least 3 % of their arable areas for creating biodiversity spots.

Investment in innovation and sustainability: The CAP also allocates significant funds for research and innovation, with €10 billion dedicated to sustainable agriculture and bioeconomy projects through the Horizon Europe program.

Emission reduction and carbon sequestration: The CAP mandates that at least 40% of the total budget must have positive climate implications. Farmers' participation in the voluntary CO₂ emissions market will be a strategic initiative, offering both environmental and economic benefits.



Farmers who anticipate this green transition will be more competitive and enjoy greater benefits.