© 'Organic alfalfa seeds sprouted' by Thesupermat

# Organic farming as a driver of climate-resilient and sustainable EU agriculture.

**Authors:**

*Felicity Addo*
*Raja Chakir*
*Petr Havlík*
*Tamas Krisztin*
*Klaus Mittenzwei*
*Sebastian Neuenfeld*
*Eleonora Tan*

## Key Messages

Climate pressures are increasing production risks and chemical input use across Europe. Evidence from the LAMASUS project shows that organic farming can strengthen resilience and sustainability when supported by well-targeted CAP measures.

1. **Environmental and regulatory conditions matter:** organic farming expands where ecological or policy constraints favour low-input systems, such as Natura 2000 and nitrate-vulnerable zones.
2. **Market access drives success in productive areas:** adoption rates are highest near cities and in regions with stable demand and processing capacity.
3. **Spatial clustering supports persistence:** organic farms are more likely to appear and remain active near other organic holdings, reflecting both local opportunity and structural stability.

These findings support the new CAP and the Vision for EU Agriculture and Food by linking environmental performance with economic resilience.

Organic farming continues to play a central role in the EU's transition toward sustainable food systems. The Vision for EU Agriculture and Food as well as the Strategic Dialogue on the Future of Agriculture both emphasise that economic, environmental, and social sustainability can reinforce each other (Guideline 6). These priorities build on the Farm to Fork Strategy aiming to reduce chemical inputs and nutrient losses while targeting 25 % of EU agricultural land to be organic by 2030. Together, these initiatives reflect a coherent, long-term policy shift toward climate-resilient, low-input agricultural systems that

LAMASUS
Land Management for Sustainability

balance productivity, environmental protection, and social wellbeing. Through the Common Agricultural Policy, the EU actively supports this shift by promoting organic farming practices that are environmentally friendly, socially equitable, and economically viable.

Yet, European agriculture faces mounting risks. Climate change is increasingly disrupting production, adversely affecting crop yields and livestock productivity, resulting in significant economic losses and undermining the livelihoods of farmers. According to the European Environment Agency, transitioning to organic practices is critical to building climate-resilient agricultural systems at the farm level (EEA, 2019). Farming systems that prioritise soil health, protect biodiversity, minimise chemical inputs, and use resources efficiently, such as agroforestry, organic farming, crop diversification and precision agriculture, contribute to both climate change **mitigation** and **adaptation** measures.

The LAMASUS project provides new evidence to support the transition to organic farming. It examined i) the impact of weather shocks on pesticide use, ii) the drivers behind conversion to organic farming, and iii) how organic systems compare to conventional ones in terms of farm resilience and structural change. Based on these analyses, the project presents the following **key findings** for fostering more resilient and organic farm systems:

1. **Organic farming is more common in areas with natural or regulatory constraints.** High-resolution analysis shows greater organic uptake in regions with steeper slopes (21% more likely), lower soil fertility, and within Natura 2000 (12% more likely) and nitrate-vulnerable zones (4% more likely), where CAP and agri-environmental payments improve viability.
2. **Market access determines success in productive regions.** Conversion rates are higher near densely populated areas and where travel time to urban centres is short, underscoring the role of demand stability and local value chains for organic viability.
3. **Spatial clustering supports persistence and resilience.** Across Europe, Germany, and Norway, organic farms are more likely to be located near other organic farms, indicating strong spatial dependence in adoption patterns. In Norway, these clusters are also more stable: organic farms were 3% less likely to exit between 2013 and 2022.

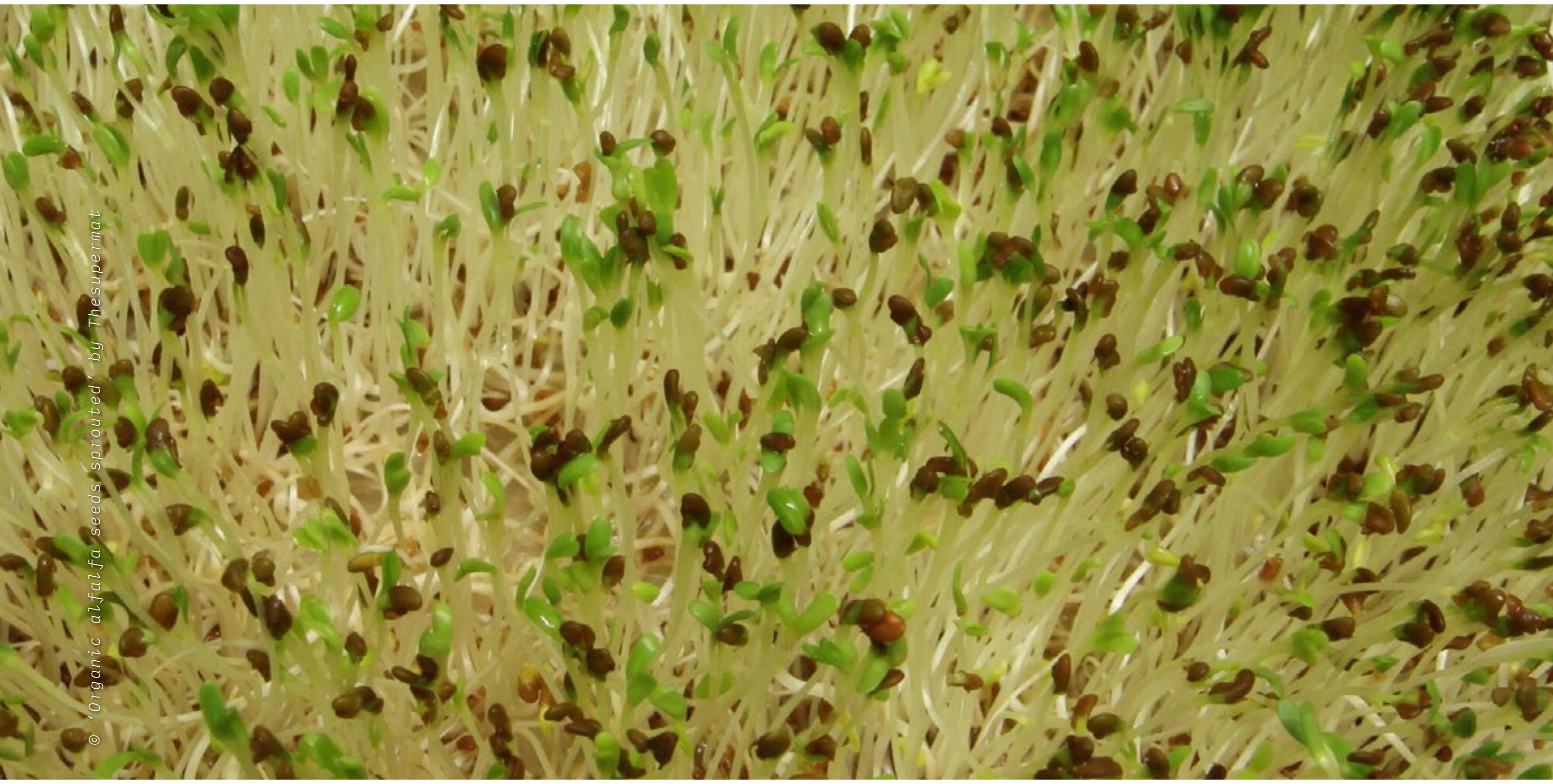
## The challenges ahead for adopting organic agricultural practices

Organic farming continues to play a central role in the EU's transition toward sustainable food systems. The Vision for EU Agriculture and Food and the Strategic Dialogue on the Future of Agriculture both stress that economic, environmental, and social sustainability can reinforce each other. These priorities build on the Farm to Fork Strategy, which aims to reduce chemical inputs and nutrient losses while reaching 25 percent organic farmland by 2030. Together, they mark a long-term policy shift toward climate-resilient, low-input agricultural systems that balance productivity, environmental protection, and social wellbeing.

Despite this clear direction, adoption of organic and other sustainable practices remains uneven across Europe. Climate change is raising pest and disease pressures, leading to greater pesticide dependence in some regions, while in others, structural and market constraints limit conversion. Many farms in productive areas face high opportunity costs and limited access to stable organic markets. These regional disparities challenge the CAP's objective to combine competitiveness with environmental ambition.

A better understanding of where and under what conditions organic farming is viable can help fine-tune CAP eco-schemes, agri-environmental measures, and rural development investments. Strengthening the link between spatial realities, market conditions, and policy support is key to scaling organic farming as a pathway to a more resilient and sustainable EU agriculture.

Despite ongoing support through the CAP, EU farmers continue to face mounting pressure from climate change. Rising temperatures and changing weather patterns are intensifying pest and disease pressures, resulting in an increased reliance on pesticides. While pesticides remain essential for crop protection, this growing dependence poses serious environmental and health risks. Building climate-resilient farming systems is therefore urgent, as farmers face economic uncertainties and must weigh trade-offs between short-term productivity gains and long-term sustainability.

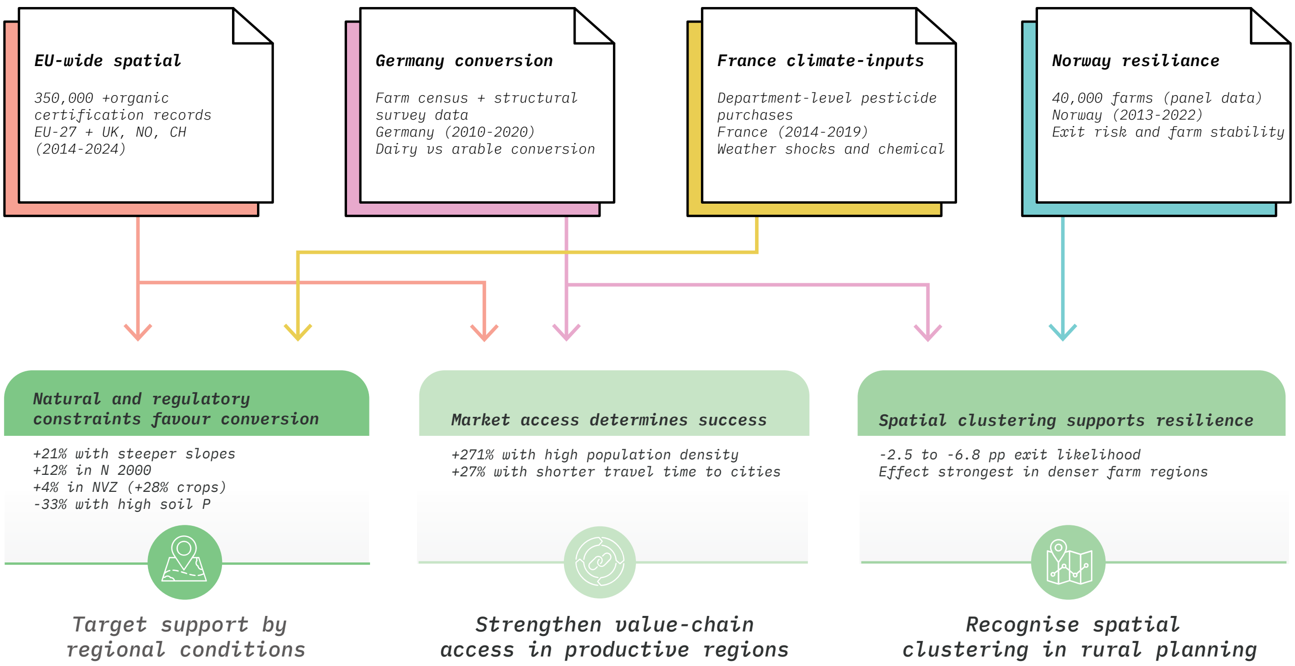


However, the challenge extends well beyond production. As the European Consumer Organisation (BEUC) notes, demand for sustainably produced food remains inconsistent, largely due to higher prices, limited consumer awareness, difficulties in identifying organic options, and their limited availability (BEUC, 2020). At the same time, value chain structures often fail to adequately reward environmentally responsible practices, leading farmers to prioritise short-term profitability over ecological outcomes. Regulatory frameworks and certification processes add further pressure, as they are often complex and costly, particularly for small and medium-sized farms, creating additional barriers to the widespread adoption of sustainable practices.

Understanding what drives farmers to adopt sustainable practices is crucial for developing effective agri-food policies. Yet, comprehensive EU-wide farm-level data on these practices and their impacts on farm profitability, income, and resilience are largely unavailable. Organic farming provides a valuable entry point, as it is the only sustainable practice systematically recorded at the farm level in the FADN, enabling the analysis of the key drivers, incentives, and barriers to adoption.

Using organic farming adoption as a lens, this policy brief aims to uncover broader insights into the motivation, barriers, and enabling conditions for sustainable farming. These lessons help identify policy leverage points to support transitions across a range of sustainable farming approaches.

Figure 1. Organic farming



## Deep dive into key findings

The evidence presented in this brief draws on four complementary studies carried out within the LAMASUS project.

An **EU-wide spatial analysis** covering the EU-27, the United Kingdom, Norway, and Switzerland used more than 350 000 organic certification records (2014–2024) linked with biophysical, climatic, and socio-economic data at one-kilometre and NUTS-2 scales. Organic farms are 21 percent more likely on steeper slopes, 12 percent more likely within Natura 2000 zones, and 4 percent more likely in nitrate-vulnerable areas, confirming that organic systems expand where natural or regulatory limits reduce the payoff from intensification **(Key Result 1)**. In productive regions, conversion depends on markets: organic adoption increases by 271 percent with higher population density and by 27 percent with shorter travel time to urban centres, while high soil phosphorus lowers the likelihood by 33 percent **(Key Result 2)**.

The **German analysis** used farm census and structural data from 2010–2020 to estimate conversion probabilities for dairy and arable farms. Dairy farms show higher nutrient-use efficiency and lower transition costs than arable farms, which depend more on nutrient-cycling infrastructure such as biogas systems. A one-percentage-point increase in the organic share within a 5 × 5 km area raises the probability of conversion by 0.5–0.7 percentage points, especially for arable farms. Distances to processors or advisory services have no effect. These results link **Key Result 2** (market proximity) with **Key Result 3** (spatial clustering) as drivers of adoption and persistence.

The **Norwegian study** tracked nearly 40 000 farms (2013–2022) using longitudinal logit models. Organic farms were 2.5–6.8 percentage points less likely to exit than conventional ones. The effect was strongest in central areas with denser farm networks, and exit risk further declined with higher direct payments and stronger contribution margins. These findings provide strong evidence for **Key Result 3**, showing that clustering and supportive policy incentives enhance farm resilience and structural stability.

The **French analysis** linked departmental-level pesticide purchase data (2014–2019) with weather observations. A 1 percent temperature increase led to a 1.7 percent rise in pesticide purchases, with national use projected to grow by 7–15 percent by 2050 under moderate warming. This confirms that climate change is intensifying chemical input dependence and underlines the importance of low-input systems such as organic farming **(Key Result 1)**.

## Policy relevances

The results highlight where policy instruments could most effectively support viable organic and low-input systems.

- Target support by regional conditions. Organic farming is more viable in constrained or protected areas; tailoring CAP eco-schemes and agri-environmental measures to these zones can enhance cost-effectiveness.
- Strengthen value-chain access in productive regions: where adoption depends on demand and processing capacity, coordinated investment through CAP Strategic Plans, the European Competitiveness Fund, or regional Partnership Plans could strengthen local markets and advisory systems.
- Recognise spatial clustering in rural planning. Organic clustering often reflects shared biophysical and market conditions; integrating such patterns into territorial and cooperation initiatives can support viable, area-based innovation.

## References


- **European Commission (2020)**, *A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system,* COM(2020) 381 final, Brussels.

- **European Commission (2024),** *A Vision for EU Agriculture and Food: Sustainable, Resilient and Competitive Systems for Europe's Future,* Brussels.

- **European Commission (2024a),** *Strategic Dialogue on the Future of Agriculture: Final Report,* Brussels.

- **Sandström, E., Boere, E., Krisztin, T. & Verburg, P.H. (2025).** *Enabling and constraining factors for organic agriculture in Europe: a spatial analysis. Environmental Research: Food Systems,* 2, 035006.

- **Bareille, F., Chakir, R., & Keles, D. (2024).** *Weather shocks and pesticide purchases. European Review of Agricultural Economics,* 51(2), 309-353.

LAMASUS
Land Management for Sustainability

## About

The LAMASUS consortium is built to deliver its overall ambition, and features world-leading interdisciplinary expertise in all domains necessary for the successful delivery of the project's objectives, including expertise in integrating knowledge across disciplines. The consortium harnesses the decades of experience in policy maker support on the science policy interface and has key expertise in econometrics, social sciences, and modelling of land-use, earth and climate systems, biodiversity, sectorial economics, and land management.

**The LAMASUS consortium consists of 17 partners from 9 countries in Europe (Austria, Belgium, Germany, the Netherlands, France, Spain, Norway and Switzerland).**

→ **GET IN TOUCH: CONTACT US**

→ **SUBSCRIBE OUR NEWSLETTER**

→ **FOLLOW:**

---

Co-funded by
the European Union

**This project is co-funded by the European Union's Horizon Europe Research and Innovation programme and the State Secretariat for Education, Research and Innovation from Switzerland under Grant Agreement No 101060423.**