

Transitioning away from pesticide dependency: EU policy recommendations

- **SPRINT research shows that pesticide use remains structurally embedded in European agriculture:** routine use across crops and systems ([Mark et al, 2024](#)), limited differentiation in chemical impacts between IPM and conventional practices ([Soheilifard et al., 2025](#)), and persistent pesticide residue mixtures in agricultural soils ([Knuth et al, 2024](#)).
- **This dependency is driven by systemic lock-ins**, not individual farmer choices: input-linked advisory systems, market incentives favouring short-term yields, and fragmented governance reinforce chemical reliance.
- **Incremental innovations (e.g. precision spraying or input substitution) are insufficient**, because they optimise the current model rather than shifting simplified, input-driven cropping systems.
- **A credible transition requires system-level change:** aligned governance, fair value chains, independent advisory systems, transparent data, and incentives that reward ecosystem services and cover transition risks and costs—supporting EU climate, biodiversity, health and food security goals.

Further reading

Riedel, A., Hendricks-Franco, L., Bibu, T., Meier, J., Rouillard, J., et al. (2025). Transition pathways and policy recommendations (Deliverable D7.3). SPRINT Project, Horizon 2020, Grant Agreement No. 862568.

This briefing draws on research funded by EU-funded H2020 SPRINT (Grant Agreement No. 862568).

Contact: Contact: Antonia Riedel (Ecologic Institute)
Antonia.riedel@ecologic.eu

Policy brief authors: Antonia Riedel and Teodora Bibu

<https://sprint-h2020.eu>



Why pesticide free?

Europe's food system remains structurally dependent on synthetic pesticides.

Despite decades of promoting Integrated Pest Management (IPM), overall applications and toxicity continue to rise. SPRINT data across 10 European countries and Argentina recorded more than 1,700 pesticide treatments involving over 170 active substances in a single growing season, with application rates deviating up to 20-fold from recommendations (Mark et al., 2024). This reflects **routine, normalised pesticide use**, rather than carefully targeted last-resort application.

This dependency is shaped by systemic lock-ins, not individual farmer choices. Advisory services remain tied to input sales, market incentives reward short-term yields, and policy frameworks still prioritise productivity over long-term resilience. After sixty years of effort, IPM has reached its limits because institutions, incentives and knowledge structures continue to reproduce pesticide reliance (Deguine et al., 2021). Incremental measures such as precision spraying or substitution may reduce some risks, but they leave the underlying model unchanged: simplified cropping systems sustained by continued inputs of plant protection products (PPPs).

The external costs of this dependency are significant. A European-wide life-cycle assessment shows human toxicity and ecotoxicity are major contributors to environmental harm, driven largely by a small number of substances. Beyond the field, pesticide manufacturing and diesel use for spraying are important sources of climate change impacts and fossil resource depletion (Soheilifard et al., 2025). These costs (health risks, biodiversity loss, environmental contamination) are carried by society, not reflected in pesticide prices, and not addressed by minor optimisation measures.



Why pesticide free?

Meaningful change requires moving beyond efficiency and substitution.

Sustainability transition research warns that incremental innovation can create the illusion of progress while delaying deeper transformation. In Gliessman's (2016) framework of change, genuine transformation begins at Level 3, where farms are redesigned around ecological processes. SPRINT supports this direction by shifting focus away from just improving existing pest control (level 1) and replacing them with less harmful alternatives (level 2), towards pesticide-free agriculture as a long-term direction centred on biodiversity, soil health, knowledge exchange and social innovation.

Success stories across Europe demonstrate what is possible: progressive certification schemes, comprehensive personalised transition support structures and research on suited local varieties are just examples of efforts aiming to drastically cut pesticide use while maintaining yields. Scaling these successes requires redesigning how knowledge systems, markets and policies work together. A pesticide-free trajectory is therefore both a normative goal, aligned with Europe's commitment to healthy people and ecosystems, and a strategic pathway to a more resilient, fair and future-proof agricultural system.

Relevant success story factsheets from SPRINT include:

- [Progressive certification schemes](#)
- [Comprehensive personalised transition support structures](#)
- [Research on suited local varieties](#)



Turn over for recommendations

Policy recommendations for transitioning to pesticide free

1: Boost on-farm innovation and biodiversity

Agroecological practices, i.e. diversified rotations, cover crops, agroforestry and ecological infrastructure, can reduce pesticide dependence while sustaining yields. Uptake remains constrained by fragmented support, limited access to adapted equipment, and insufficient technical guidance. Existing EU instruments (e.g. CAP payments, the Nature Restoration Law, LIFE funding) should be better aligned to make ecological practices economically viable and scalable.

Key recommendations for on-farm innovation and increased diversity:

- **Restore biodiversity infrastructure:** Incentivise the integration of hedgerows, field margins, flower strips, and habitat corridors as essential elements of farming systems, recognising their role in natural pest control.
- **Support participatory breeding [1]:** Expand funding for pest-resistant and locally adapted crop varieties, ensuring farmers play a central role in breeding priorities.
- **Improve equipment access:** Provide subsidies, leasing schemes, or cooperative access models for e.g. mechanical weeding machinery, with special support for smallholders and farms in marginal regions.

[1] E.g. the Farmers' seed network "[Le Réseau Semences Paysannes](#)" in France



Policy recommendations for transitioning to pesticide free

2: Support fair value chains and markets

Fair and transparent value chains are essential to make ecological farming economically viable. SPRINT case studies show that current markets often favour input-intensive production, while ecological producers face higher risks and weaker returns despite delivering public benefits. EU entry points include the forthcoming Sustainable Food Systems Framework, Farm to Fork Strategy, EU Green Public Procurement criteria, and the Organic Action Plan. Coordinating these instruments can stabilise demand and reward ecological performance.

Key recommendations for fair value chains and markets:

- **Mandate sustainability requirements in public food contracts** (climate, biodiversity, social fairness).
- **Fund shared infrastructure:** Invest in group logistics, mobile processing units, and regional storage centres to reduce transaction costs and create resilient, decentralised supply chains
- **Strengthen retailer accountability:** introduce mandatory transparency and due diligence requirements for retailers and large buyers, ensuring fair trading relations and discouraging imports of pesticide-intensive products.



Policy recommendations for transitioning to pesticide free

3: Reform governance for systemic change

The effectiveness of pesticide reduction strategies depends on coherent and predictable governance. Evidence from the SPRINT case studies shows that fragmented regulations, administrative complexity, and lengthy approval procedures can discourage innovation and delay the uptake of ecological alternatives. The Sustainable Use of Pesticides Directive (2009/128/EC) has been widely recognised as limited in enforceability ([Helepciuc & Todor, 2022](#)) and ambition ([Hamlyn, 2015](#)), while its proposed replacement—the Regulation on the Sustainable Use of Plant Protection Products—was withdrawn in 2024, leaving an important policy gap. A revised EU framework with binding reduction targets, clear national responsibilities, and robust monitoring would represent a decisive step toward systemic change.

Streamlining authorisation processes under Regulation (EC) No 1107/2009, particularly for low-risk and biocontrol products, could further enable transition. Beyond regulation, initiatives such as the CAP's LEADER/CLLD programme and the proposed European Land Observatory can strengthen territorial governance, participation, and equity—key conditions for a coherent, long-term transformation.

Key recommendations to reform governance

- **Ensure legally binding EU-wide pesticide reduction targets** with clear enforcement mechanisms and regionally adapted national action plans, providing a robust regulatory framework for systemic change.
- **Make ecological and low-pesticide practices the baseline standard** for farming systems, allowing exceptions only under strict agronomic or environmental justification.
- **Establish and scale up participatory governance structures** such as food policy councils, territorial transition platforms, and strengthened LEADER-type initiatives, ensuring that diverse actors co-design and oversee pesticide transition strategies.
- **Create agricultural transition hubs and one-stop offices** to provide farmers with integrated access to information, funding, and administrative support, reducing bureaucratic complexity.

Policy recommendations for transitioning to pesticide free farming

4: Transparency and public engagement

A credible transition requires transparency and participation. Reliable, accessible and regionally disaggregated data on pesticide use, residues and exposure remain limited, constraining evidence-based policymaking and public trust. SPRINT highlights that consultation processes can be polarised, underlining the need for more inclusive deliberative participation (Frelih-Larsen et al., 2023a). EU instruments such as the Farm Sustainability Data Network (FSDN), the Farm to Fork Strategy and the forthcoming Sustainable Food Systems Framework provide opportunities to strengthen open data, accountability and engagement.

Strengthening open data systems, participatory governance, and democratic oversight, such as through local food councils or reformed European Citizens' Initiatives (e.g. "[Save Bees and Farmers](#)"), will be key to building legitimacy and shared ownership of pesticide-free transitions.

Key recommendations for transparency and public engagement

- **Embed pesticide reduction as a cross-cutting objective** in the Sustainable Food Systems Law, the Biodiversity Strategy, and relevant climate policy instruments to ensure coherence and long-term legitimacy.
- **Institutionalise deliberative mechanisms in policy processes** to reduce polarisation, build mutual trust, and ensure that diverse perspectives are integrated into decision-making.
- **Mandate timely public disclosure of pesticide use**, residue levels, and exposure data at farm, regional, and EU scales, ensuring accessibility through open data platforms and maps.



Policy recommendations for transitioning to pesticide free

5: Strengthen knowledge and advisory systems

Reducing pesticide dependences requires new learning infrastructures that enable experimentation, co-creation and navigate uncertainties. SPRINT shows that this is not yet the norm: farmers often rely on information that is scattered, commercially driven, or disconnected from agroecological practice, which makes experimentation feel risky and unsupported ([Frelth-Larsen et al. 2023b](#)).

While Living Labs, demonstration farms and participatory R&D create spaces for farmer-led innovation, they are often underfunded and project-based, preventing long-term scaling. Education and training systems also lag behind: curricula still prioritise technical efficiency over agroecology, IPM and systems thinking, and often neglect soft skills needed for transition leadership. Digital decision-support tools and pest forecasting can strengthen ecological pest management, but only if developed in ways that enhance farmer autonomy rather than reinforcing new forms of dependency.

Key recommendations for strengthened knowledge and advisory systems

- **Rebuild independent, publicly funded advisory systems** through CAP cooperation instruments and national programmes, ensuring they have a clear mandate to support agroecological transition and are not tied to commercial input sales.
- **Institutionalise agroecological knowledge** as a public good by integrating advisory services, research, and education into coherent Agricultural Knowledge and Innovation Systems, strengthening their role in systemic transformation.
- **Expand and secure long-term funding for Living Labs**, demonstration farms, and farmer-led networks so that collaborative experimentation and knowledge exchange become permanent features of agricultural innovation.
- **Modernise agricultural and veterinary curricula** across Member States to align with EU-level “fit-for-practice” frameworks, prioritising agroecological methods, IPM, and system-level approaches.



Policy recommendations for transitioning to pesticide free

6: Align financial and economic incentives with agroecology

Moving beyond pesticide dependency requires economic signals that favour ecological resilience rather than the continued use of synthetic inputs. Tight margins, volatile markets and transition risks often make non-chemical strategies appear financially precarious, even when agronomically viable. Many farmers remain locked into pesticide use because transition costs (labour, time, equipment, uncertain yields) are not sufficiently compensated or shared. CAP, rural development funds, and emerging sustainability frameworks offer openings to reward ecosystem services and support diversified cropping systems. Yet their potential often remains underused due to scattered national implementation, uneven uptake and insufficient coordination across programmes and sectors. Better alignment of public payments, procurement standards, and risk-sharing mechanisms is needed to make agroecological pathways economically credible.

Key recommendations for aligned financial and economic incentives

- **Ring-fence CAP budgets for pesticide reduction** and agroecological diversification, including ecosystem service remuneration.
- **Link public procurement policies to agroecological objectives**, creating reliable demand and stable markets for ecological producers.
- **Develop flexible financial tools**, such as transition payments, revenue-sharing contracts, and pest-loss insurance, to accommodate diverse farmer needs and reduce the risks of adopting low-input practices.
- **Expand results-based payment schemes** that reward ecosystem services (e.g. biodiversity, soil health, reduced pesticide use), ensuring that ecological benefits are properly valued and incentivised.



About the research

This brief draws on findings from the SPRINT project, which combined analytical work and stakeholder participation to explore pathways toward pesticide-free agriculture.. The process used systemic visioning and backcasting approach grounded in sustainability transition theory (Markard et al., 2012) across ten EU case-study regions. Each region conducted three waves of national workshops engaging more than 700 participants(farmers, advisors, policymakers, NGOs, and agri-industry actors.) Further insights were collected through interviews with EU-level stakeholder, farmer surveys, and a policy event. Findings were refined and validated iteratively through subsequent workshop rounds to, ensureg both depth of input and a high degree of stakeholder ownership.

Further reading

A dedicated policy brief on the Common Agricultural Policy (CAP) provides further recommendations on how CAP instruments can be realigned to deliver the financial and structural incentives required for pesticide-free farming.

Riedel, A., Hendricks-Franco, L., Bibu, T., Meier, J., Rouillard, J., et al. (2025). Transition pathways and policy recommendations (Deliverable D7.3). SPRINT Project, Horizon 2020, Grant Agreement No. 862568.

Acknowledgements

This briefing draws on research funded by H2020 SPRINT (Grant Agreement No. 862568).

Contact: Antonia Riedel (Ecologic Institute) Antonia.riedel@ecologic.eu

Policy brief authors: Antonia Riedel and Teodora Bibu

About SPRINT

SPRINT is a 5-year international research project. It investigates pesticides' risks to health and the environment, and aims to accelerate the transition towards more sustainable plant protection.

The SPRINT project is funded by the EU under Horizon Europe. Project number: 862568.



<https://sprint-h2020.eu>



Literature

Deguine, J.-P., Aubertot, J.-N., Flor, R. J., Lescourret, F., Wyckhuys, K. A. G., & Ratnadass, A. (2021). Integrated pest management: Good intentions, hard realities. A review. *Agronomy for Sustainable Development*, 41(3), 38. <https://doi.org/10.1007/s13593-021-00689-w>

Frelih-Larsen, A., Chivers, C.-A., Herb, I., Mills, J., & Reed, M. (2023a). The role of public consultations in decision-making on future agricultural pesticide use: Insights from European Union's Farm to Fork Strategy public consultation. *Journal of Environmental Policy & Planning*, 25(4), 476–492. <https://doi.org/10.1080/1523908X.2023.2212369>

Frelih-Larsen, A., Rouillard, J., Mills, J., Chivers, C., Hobeika, M., Riedel, A., et al. (2023b). Pesticide lock-in and barriers to transition towards sustainable plant protection (Deliverable 7.1, SPRINT Project). Horizon 2020 SPRINT. <https://sprint-h2020.eu>

Gliessman, S. (2016). Transforming food systems with agroecology. *Agroecology and Sustainable Food Systems*, 40(3), 187–189. <https://doi.org/10.1080/21683565.2015.1130765>

Knuth, D., Gai, L., Silva, V., Harkes, P., Hofman, J., Šudoma, M., Bílková, Z., Alaoui, A., Mandrioli, D., Pasković, I., Pasković, M. P., Baldi, I., Bureau, M., Alcon, F., Contreras, J., Glavan, M., Abrantes, N., Campos, I., Norgaard, T., Huerta Lwanga, E., Scheepers, P. T. J., Ritsema, C. J., & Geissen, V. (2024). *Environmental Science & Technology*, 58(15), 6744–6752.

Mark, J., Fantke, P., Soheilifard, F., Alcon, F., Contreras, J., Abrantes, N., Campos, I., Baldi, I., Bureau, M., Alaoui, A., Christ, F., Mandrioli, D., Sgargi, D., Pasković, I., Pasković, M. P., Glavan, M., Hofman, J., Harkes, P., Lwanga, E. H., ... Tamm, L. (2024). Selected farm-level crop protection practices in Europe and Argentina: Opportunities for moving toward sustainable use of pesticides. *Journal of Cleaner Production*, 477, 143577. <https://doi.org/10.1016/j.jclepro.2024.143577>

Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, 41(6), 955–967. <https://doi.org/10.1016/j.respol.2012.02.013>

Soheilifard, F., Mark, J., Zhang, Y., & Fantke, P. (2025). Farm-level environmental sustainability assessment of agricultural pest control strategies across Europe. *Sustainable Production and Consumption*, 58, 237–250. <https://doi.org/10.1016/j.spc.2025.06.019>