Economia agro-alimentare /
Food Economy
An International Journal on Agricultural and Food Systems
Vol. 27, Iss. 2, Art. 9, pp. 225-245 - ISSNe 1972-4802
DOI: 10.3280/ecag2025oa18762

Reconsidering EU Pesticide Policy to Address Sustainability

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Abstract

In January 2024, widespread farmer protests across Europe exposed growing tensions between the socioeconomic realities of agricultural production and environmental policy ambitions. Among the most contested issues, pesticide use emerged as a critical friction point, symbolizing broader dilemmas at the intersection of environmental sustainability, food security, and farmers' livelihoods. In response, the European Commission launched the Strategic Dialogue on the Future of EU Agriculture, a participatory platform aimed at fostering consensus among diverse stakeholders and redefining the direction of EU agricultural policy. This paper explores the Strategic Dialogue's contribution to shaping EU pesticide policy through a qualitative content analysis of its final report, triangulated with official stakeholder statements and EU policy documents. Focusing on the discourse on pesticide reliance reduction, sustainability trade-offs, and policy implementation challenges, the analysis applies a deductive-inductive coding framework to investigate the Dialogue's effectiveness in promoting deliberative governance and how the competing priorities were negotiated within the participatory process. The findings indicate broad stakeholder support for synthetic pesticide use reduction and restoring ecological balance, alongside recognition of the knowledge-based, structural, and economic barriers that hinder the transition. The report advocates a phased reduction strategy,

Article info

Type:
Article
Submitted:
30/10/2024
Accepted:
29/05/2025
Available online:
11/09/2025

JEL codes:
Q01, Q18, Q56

Keywords:
Pesticide use
Farmers
Agricultural policy
Environmental policy
Sustainability governance

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supported by targeted financial support for small-scale farms and an increased investment in sustainable alternatives such as biocontrol and Integrated Pest Management. Furthermore, the analysis underscores the importance of ensuring balanced stakeholder representation and addressing power asymmetries in participatory policymaking. The paper contributes to understanding the potential of the Strategic Dialogue's initiative to generate cooperative responses to complex agri-environmental challenges by situating pesticide policy within the wider framework of deliberative sustainability governance.

Introduction

Sustainable food production has become one of the most pressing challenges of the 21st century. Driven by global population growth and increasing per capita consumption (Bahar *et al*., 2020), the growing demand for food is putting massive anthropogenic pressure on the environment, pushing the planet's capacity to produce enough food to its limits (Bevivino *et al*., 2020).

Addressing these challenges is key to achieving the United Nations (UN) Sustainable Development Goals (SDGs), particularly SDG2 – Zero Hunger, SDG12 – Responsible Consumption and Production, SDG13 – Climate Action, and SDG15 – Life on Land (UN, 2015).

In 2019, the European Commission (EC) adopted the European Green Deal (EGD) as an ambitious roadmap to transform Europe into the first climate-neutral continent and drive the European Union (EU) toward a resource-efficient economy (EC, 2019). The EGD includes two interrelated strategies – the Farm to Fork (F2F) Strategy (EC, 2020a) and the Biodiversity Strategy for 2030 (EC, 2020b) – aiming at reducing chemical pesticides' overall use and risk by 50 percent by 2030. Pesticide use reduction is

also part of the global policy agenda. As part of the Kunming-Montreal Global Biodiversity Framework, the UN Convention on Biological Diversity (2022) commits to cutting the overall use and risk of the most hazardous chemicals by at least 50 percent (Schneider *et al*., 2023). These initiatives prompted the revision of the EU pesticide policy to align it with the new, stringent ecological targets.

Nevertheless, the ambitious environmental requirements of the Common Agricultural Policy (CAP) 2023-2027 (EC, 2023) and the F2F strategy (EC, 2020a) have sparked significant tensions. In January 2024, longstanding discontent within the agri-food sector culminated in widespread protests across EU Member States (Finger *et al*., 2024). Whilst specific grievances

reflected the nuances of national agri-food systems, independent farmer associations expressed worries on several common matters. Indeed, they voiced shared concerns about the rapid implementation of environmental regulations, which they perceived as undermining agricultural productivity (Matthews, 2024); they pointed to climate-related risks, fluctuating and unfair incomes, rising input costs, and uncertainty created by trade agreements (Matthews, 2024) as challenges inadequately addressed by the EU's sustainability agenda, which is now perceived as overly environmentalist, at the expense of European farmers' livelihoods.

These events catalyzed swift political engagement and reconsideration of the scale and speed of the pesticide reduction targets. On 25 January 2024, recognising the need for a different approach at a time of polarization around the public debate on agricultural issues, the EC President launched the Strategic Dialogue on the Future of EU Agriculture (EC, 2024a). The initiative was designed and conceived as a forum to bring together major stakeholders from the EU agri-food sectors to reach a shared vision and foster innovative solutions. This shift in approach aimed to strike a balance between the environmental dimension of sustainability and the socioeconomic realities of EU farmers (EC, 2024a).

This paper provides a novel contribution by investigating how deliberative governance mechanisms, such as the Strategic Dialogue (SD), shape policy discourse and stakeholder alignment. The focus on pesticide reduction is particularly relevant, as it represents one of the most contentious sustainability challenges within the EU Green Deal environmental agenda, where cutting the reliance on chemical inputs has become an urgent priority. The work primarily analyses the SD's final output, a report issued on September 4th (EC, 2024b), to evaluate its effectiveness as a participatory process in consensus-building. By doing so, it contributes to emerging literature on participatory policymaking as a tool for navigating contested sustainability transitions (Newig *et al*., 2023; Frelih-Larsen *et al*., 2023; Pickering *et al*., 2022). The analysis presented here potentially anticipates and lays the groundwork for a follow-up study applying critical discourse analysis (CDA).

1. Background

Use of pesticides in agriculture

Classified as Plant Protection Products (PPPs), chemically synthesized pesticides play a pivotal role in modern agriculture by preventing, controlling, and eradicating pests, diseases, and weeds (Kim *et al*., 2017), contributing to increased crop yields and enhanced food quality (Tudi *et al*., 2021).

Pesticides encompass a broad spectrum of chemical substances and are generally classified according to their chemical structure and target organisms, i.e., herbicides, insecticides, fungicides, rodenticides, and plant growth regulators (Franco Bernardes *et al*., 2015).

Their use in the EU remains substantial, with approximately 322,000 tons of active substances sold in 2022 (Eurostat, 2024a), even though this marks the lowest level since 2011. Pesticides are commonly applied to high-value crops such as cereals, vegetables, and fruits, which are particularly vulnerable to infestations (Lamichhane, 2017). Their application has been shown to significantly increase crop yields and decrease production losses (Fenik *et al*., 2011; Tudi *et al*., 2021). By lowering production costs and reducing reliance on labour-intensive practices, they contribute to sustained agricultural productivity and improved farm profitability (Bakker *et al*., 2021; Popp *et al*., 2013).

While chemically synthesized pesticides continue to play a key role in securing yields and protecting crop quality, their recognised environmental and health impacts have prompted a strategic shift toward more environmentally friendly practices. The EU has observed a 46 percent reduction in the use and risk of chemical pesticides by 2022, compared to the baseline average for 2015 to 2017 (EEA, 2024).

This decline is attributed to regulatory measures and increased adoption of sustainable agricultural practices. Indeed, the EU is witnessing a steady transition to organic agriculture, with organically farmed land share increasing from 5.9 percent of the EU's total utilized agricultural area (UAA) in 2012 to 10.5 percent in 2022 (Eurostat, 2024b). Under the F2F Strategy, the EU has set an ambitious target to expand this share to 25 percent by 2030 (EC, 2020a), signaling a systemic move away from chemical inputs towards more ecologically sound farming models.

Hazards of pesticide toxicity in agriculture

Despite their benefits, PPPs' improper and excessive use can pose significant risks to human health and the environment. Chemicals' inherent toxicity and relocation to non-target environmental matrices through transfer processes such as adsorption, leaching, volatilization, spray drift, and run-off (Liu *et al*., 2015) exacerbate these risks. Only a small proportion of the applied amount is directly consumed or contacts the targeted pests (Franco Bernardes *et al*., 2015), leaving non-target organisms vulnerable to exposure (Elgueta *et al*., 2017), and leading to negative effects on soil and water (Fang *et al*., 2017; Kim *et al*., 2017), and air quality (Tuncel *et al*., 2008). This contamination can persist due to the resistance of pesticides to degradation

(Bilal *et al*., 2019; Mitra *et al*., 2024). Moreover, pesticide residues in food represent a direct and serious threat to human health (Kim *et al*., 2017).

EU strategies for sustainable pesticide use: the role of the SUR

In recent years, the EU has intensified efforts to promote the sustainable use of pesticides, focusing on the reduction of risks associated with PPPs, particularly through the CAP 2023-2027 (EC, 2023) and the EGD (EC, 2019), both of which promote strict environmental goals. In 2020, the Commission adopted two mutually supportive strategies, namely the F2F Strategy (EC, 2020a) and the Biodiversity Strategy (EC, 2020b), setting targets to reduce the use and the risks associated with chemical pesticides and to phase out the most hazardous ones by 50 percent by 2030. To ensure the legal enforceability of these targets, the EC adopted a proposal for the Sustainable Use of Plant Protection Products Regulation (SUR) (EC, 2022a) by replacing the earlier Directive 2009/128/EC (2009). The proposal sought to address the shortcomings of the latter, which had limited success due to its non-binding targets and inconsistent implementation across Member States (EC, 2022b). Its provisions would introduce binding legislation for reduction targets (Art. 5), enhance the measurement of pesticide use (Arts. 14-16), and standardize the approaches to Integrated Pest Management (IPM) systems (Arts. 12-13). However, while intended to support sustainable agricultural practices, the SUR has sparked significant controversy (Candel *et al*., 2023), with farmers stating concerns about the economic impact of rapid pesticide use reduction. This has led to a review of the SUR targets and the broader EU approach to sustainable agriculture.

2023-2024 protests and the withdrawal of the SUR

The 2023-2024 protests spread widely throughout Europe, suggesting a "contagion effect" (Finger *et al*., 2024). After weeks of intense demonstrations, in February 2024, EC President Ursula von der Leyen announced the withdrawal of the SUR, considering it a symbol of polarization (EC, 2024c). The decision was driven by the protests and the related political pressures, exacerbated by the European Parliament's rejection of the proposal and the Council's failure to reach an agreement on alternatives (European Parliament, 2024). In the same speech, the EC President highlighted the crucial role of the SD in tackling the multifaceted challenges confronting sustainable agri-food systems (EC, 2024c).

Growing concerns about global food shortages and heightened geopolitical tensions intensified debates around pesticide-free production systems, especially when the implications for national food self-sufficiency are considered (Mack *et al*., 2023). To navigate these concerns, EU policy should align agri-food systems with planetary boundaries while ensuring equitable cost distribution. The balance between agricultural viability and environmental protection is often framed as a lose-lose situation where the gains to improve one come at the expense of the other (EEA, 2023). A major challenge will be avoiding a zero-sum approach and developing integrated solutions.

Economic implications of pesticide reduction targets

Recent ex-ante modelling exercises offer a convergent – though not identical – picture showing that a rapid 50 percent cut in chemical-pesticide use and a short-term transition to lower-risk practices are likely to impose measurable, but highly heterogeneous, macroeconomic shocks across the EU.

Barreiro-Hurle *et al*. (2021) project an average 10 percent reduction in crop yields if the EU's 2030 pesticide reduction targets were applied instantaneously without suitable effective alternatives. However, yield effects are remarkably crop- and region-specific. Bremmer *et al*. (2021) report granular EU-27 simulations with no discernible losses for several arable crops in northern Member States, yet contractions of up to 30 percent for high-value perennial crops – e.g., grapes and olives – in southern France and Italy. Rapid shifts in land use, yield levels, and yield variability could erode EU self-sufficiency in sensitive supply chains, a point repeatedly raised in Council and European Parliament negotiations (Schneider *et al*., 2023).

Bremmer *et al*. (2021) also report marginal changes in cereal prices, whereas wine- and olive-oil prices increase appreciably. Ex-ante estimates indicate a decline in EU farm income of 15-17 percent, with an uneven burden on specialized perennial systems (Barreiro-Hurle *et al*., 2021).

These projected yield and income effects explain why many stakeholders advocate a phased or hazard-based approach to pesticide use reduction.

The Strategic Dialogue: collaborative solutions for sustainable pesticide policy

The Strategic Dialogue on the Future of EU Agriculture was conceived as a collaborative forum to facilitate structured debate and to foster collaboration across a diverse spectrum of stakeholders. Chaired by Peter Stroh Schneider, it has involved 29 stakeholders, including representatives

from environmental and other Non-Governmental Organisations (NGOs), farmer and consumer organisations, agri-industry and business players, and research institutions. Over the seven-month-long deliberative process, plenary sessions have focused on four critical priority areas, i.e., enhancing prospects for farmers and rural communities, sustaining agriculture within planetary boundaries, advancing knowledge and technological innovation, and promoting a competitive and sustainable EU food system (EC, 2024a).

These focal points reflect a growing recognition that the shift toward sustainable agriculture requires both regulatory targets and support mechanisms for the implementation of alternative practices (Boix-Fayos & Vente, 2023), including IPM, biocontrol methods, and organic farming.

The Dialogue concluded with the publication of the final report titled "A Shared Prospect for Farming and Food in Europe", adopted by consensus among the 29 participants; this is intended to inform the EC's work on the Vision for Agriculture and Food and a new SUR proposal (EC, 2024a).

Unlike traditional public consultations, which typically gather feedback from the public or stakeholders through formal submissions, the SD fostered an interactive and iterative process, thus encouraging in-depth discussion. Often framed as a highly polarized issue, with stakeholders holding opposing views, pesticide policy appeared to benefit from this structured multi-stakeholder approach. Deliberative processes, such as the SD, allow stakeholders to explore each other's positions and work toward common ground, fostering collaborative solutions. This approach aligns with recent research on the role of participatory processes in sustainability governance and policy design (Frelih-Larsen *et al*., 2023), suggesting that diverse stakeholder engagement is the key to achieving both ecological and socioeconomic goals.

2. Materials and Methods

This study employs a qualitative methodological approach to examine how the SD frames and navigates the contested issue of pesticide policy within the broader landscape of EU agricultural sustainability. The SD was launched by the EC in early 2024 as a participatory initiative designed to foster dialogue among key actors in the EU agri-food system and to identify consensual pathways for the future of agriculture. Structured around seven plenary sessions held in Brussels between January and August 2024, the SD engaged a wide spectrum of stakeholders, including farmer associations, agricultural cooperatives, agri-food businesses, NGOs, civil society organisations, financial institutions, and academic researchers. This design aimed to ensure the integration of several, often conflicting, perspectives regarding the future

of EU agriculture. Moderators played a role in facilitating the co-construction of shared visions.

To analyse how pesticide governance was addressed within the SD deliberative process, the study applies qualitative content analysis (QCA) to the SD final output (Hsieh & Shannon, 2005; Mayring, 2014; Assarroudi *et al.*, 2018). QCA is regarded as particularly well suited to policy research in sustainability contexts, where existing theoretical insights guide inquiry while allowing room for inductively emerging categories. This methodological approach aligns with the study's theoretical grounding in deliberative sustainability governance, which examines how inclusive policy processes cope with socio-ecological trade-offs while fostering collective learning in contexts marked by uncertainty, competing values, and diverse interests (Newig *et al.*, 2023; Pickering *et al.*, 2022; Hammond, 2020). Accordingly, the analysis seeks to assess the SD's capacity to mediate tensions between environmental imperatives – i.e., pesticide use reduction – and economic and social concerns voiced by agricultural stakeholders.

The primary document analysed is the final SD report (EC, 2024b), complemented by a selection of official EU legislative texts, including the F2F (EC, 2020a) and Biodiversity Strategy (EC, 2020b), the CAP (EC, 2023) and the SUR proposal (EC, 2022a), which provide the institutional and regulatory backdrop for the Dialogue. Additional data were drawn from publicly available statements, position papers, and organisational reports from SD participants, allowing for the triangulation of discursive positions across stakeholder groups. A purposive sampling strategy was employed to select the documents based on two inclusion criteria: (i) institutional authoritativeness and (ii) relevance to the study's research questions, particularly regarding pesticide regulation, environmental sustainability, and agricultural policy trade-offs. The unit of analysis is thematic, meaning that themes, rather than words or isolated phrases, serve as the core coding units. This allows for an interpretive analysis of explicit policy content and underlying normative framings, including problem definitions and proposed solutions.

The analytical process integrated deductive and inductive coding. A preliminary coding framework was developed based on the existing literature on pesticide regulation, sustainability governance, and participatory policymaking. Categories included justification for pesticide reduction, competing policy objectives and tradeoffs, proposed alternatives, governance mechanisms, and stakeholder inclusion and influence. As analysis progressed, new sub-themes were added to capture emerging discursive patterns, including the framing of risk, the role of innovation, and the invocation of fairness and feasibility.

Stakeholder representation and power asymmetries within the deliberative process were mapped through the clustering scheme adapted from Frelih-

Larsen *et al.* (2023), as illustrated in Table I. The framework categorizes actors based on their affiliations – environmental and other NGOs, farmers and agricultural workers, research, and agri-food industry, business, and trade – and interests, enabling a more granular understanding of the relational dynamics shaping consensus and dissent in the Dialogue. Overall, the methodological approach is consistent with the study's overarching aim of exploring the extent to which deliberative processes support cooperative responses to contested sustainability issues. Although this study focuses on discursive construction and stakeholder positioning, it could lay the foundation for a follow-up analysis employing CDA to deeply interrogate power relations and exclusions within the SD's output.

3. Results

The SD report shows a long-term vision to transform EU agri-food systems by 2035-2040, emphasising the functional integration of environmental, social, economic, and institutional factors at each stage of the agri-food value chain. This approach aims to move beyond compromise-driven solutions, favoring collaborative responses that integrate ecological sustainability with economic resilience. Indeed, the report provides a set of political principles and specific concrete recommendations addressed to both the EU and the Member States levels, which align with the EGD's ambitious environmental targets.

The Dialogue's process involved 29 key stakeholders, representing a broad cross-section of vested interests, including environmental and animal NGOs, farmer and agricultural worker associations, agri-industry representatives, consumer protection groups, and academia.

Official participant organisations are clustered according to their affiliations and interests.

The SD acknowledges that transitioning to sustainable agri-food systems inevitably involves conflicting interests and complex trade-offs that can only be solved through careful balancing.

Moderators of the working groups played a critical role in fostering cohesion and facilitating the development of shared perspectives. Indeed, the structured process allowed opposing views to be aired, advancing deliberation and striving for consensus. Yet, power dynamics among stakeholders have also influenced the discussion as participants represented varying degrees of power over agricultural policy and financial resources. In other words, while the SD report seems to reflect an agreed direction, there may be imbalances in stakeholder representation, with industry and business, and NGOs wielding different types of influence compared to smaller farmer associations.

Table I - Clustering of participant organisations in the Strategic Dialogue on the future of EU agriculture

Cluster	Description	Participants
Environmental NGOs	Environmental charities focused on ecological advocacy	BirdLife Europe & Central Asia; European Environmental Bureau (EEB); Greenpeace Europe
Other NGOs	Charities focused on animals, food, and rural development	Agroecology Europe; Compassion in World Farming – Eurogroup for Animals; European LEADER Association for Rural Development (ELARD); European Food Banks Federation (FEBA); Rural Youth Europe; Slow Food
Farmers/ Agricultural Workers	Farming unions and organisations focused on agriculture	European Council of Young Farmers (CEJA); General Confederation of Agricultural Cooperatives (COGECA); Committee of Professional Agricultural Organisations (COPA); European Federation of Food, Agriculture, and Tourism Trade Unions (EFFAT); European Coordination Via Campesina (ECVC); IFOAM Organics Europe
Research	Academic researchers, and evidence-led entities	Stockholm Resilience Centre – EURAGRI; Wageningen University & Research
Agri-Industry/ Business/Trade	Industry, agrichemical business, biocontrol business, retail, consumer protection, financial services	European Consumer Organisation (BEUC); European Liaison Committee for Agricultural and Agri-Food Trade (CELCAA); European Association of Co-operative Banks (EACB); EuropaBio; EuroCommerce; European Investment Bank (EIB); European Landowners Organisation (ELO); Euroseeds; Fertilizers Europe; FoodDrinkEurope; FoodServiceEurope; Employers' Group of Professional Agricultural Organisations (GEOPA)

Source: Authors' elaboration adapted from Frelih-Larsen, Chivers, Herb, Mills, & Reed (2023).

Key recommendations focused on phased reduction in synthetic pesticide use and the promotion of unconventional pest management strategies, notably IPM and biocontrol methods. However, although promising, these alternatives

require larger adoption to achieve the EU environmental targets. Current limitations are attributed to the challenges in securing support and price premiums through labeling systems (Deguine *et al.*, 2021; Lefebvre *et al.*, 2015). Accordingly, the SD indicated establishing premium support systems through quality certifications and eco-labels to increase consumer support and market viability. These would enable sustainable products to reach wider markets, improving the visibility and economic viability of farms willing to invest in non-chemical methods. Moreover, the report suggests enhancing accountability by establishing an EU system for transparent and comparable assessments of sustainability performance and pesticide use across EU Member States. An incremental approach would provide flexibility to adapt to different national contexts.

In addition, the report advocates for increased investment in research to scale up practical and low-risk alternatives to conventional pesticides. It highlights priority areas for research, including biocontrol technologies, IPM advancements, and soil management practices that bolster ecological resilience; in this regard, it suggests that collaborative public-private investment could drive the required innovation to accelerate the sustainability transition.

Expanded adoption of IPM and biocontrol will require Member States to address the economic challenges associated with sustainability transitions. Acknowledging the difficulties faced by smaller farms, the SD outlines several actionable pathways for potential policy adjustments. Recommendations include providing financial support beyond existing CAP mechanisms to help smaller operations to reduce pesticide dependence – i.e., targeted subsidies and incentives for adopting biocontrol, IPM, and organic farming practices. This support would help to address the high upfront costs associated with shifting to more sustainable pest management methods.

The resulting recommendations reflected areas of agreement and underlying tensions. For instance, Environmental NGOs and consumer protection groups strongly advocated for stringent pesticide use reduction and enhanced sustainability measures. Conversely, agricultural and farmers' organisations raised concerns about the economic feasibility of rapid transitions, underscoring the need for financial support and phased adaptation.

Overall, the report reflects a broad consensus on reducing reliance on chemical inputs and increasing support for viable, non-toxic alternatives, thus mirroring EGD goals. However, it advocates for a more gradual and financially supported transition, which would balance the urgency to achieve ecological objectives with the economic pressures on EU farmers. Agri-food systems should be progressively transformed, enhancing pesticide use efficiency while encouraging the adoption of substitutes.

4. Policy Recommendations

The EU agri-food sector stands at the crossroads of environmental sustainability and agricultural productivity, necessitating significant innovation for non-conventional PPPs for pest and disease control (Galli *et al.*, 2024). Transitioning to sustainable agricultural practices requires investments in alternative solutions, including precision agriculture (Sishodia *et al.*, 2020), biocontrol (Hulot & Hiller, 2021), and IPM systems (Deguine *et al.*, 2021). These approaches were reaffirmed in the SD final report (EC, 2024b), advocating a systemic shift toward low-input farming models through a phased reduction in the use of synthetic chemicals coupled with targeted financial support.

Sustainable practices have proven effective in maintaining satisfactory yields while lowering reliance on chemicals (Ratto *et al.*, 2022; Pecenkaa *et al.*, 2021). Moreover, studies have shown that significantly lower pesticide inputs result in equivalent yields. Data from 946 French conventional arable holdings indicate that total pesticide use could be reduced by roughly 42 percent without any loss of either yield or gross margin in 59 percent of the farms analysed, with the largest savings potential on high-input holdings (Lechenet *et al.*, 2017). Framing outreach around such figures could help dispel the perception that lower chemical intensity necessarily entails lower profits. However, training and capacity-building programs should be prioritized to equip farmers with the skills and knowledge needed for the adoption of low pesticide-input pest management practices.

Among the alternatives discussed, the SD strongly supports biocontrol techniques, e.g., natural enemies, beneficial microorganisms, and substances of biological origin. These methods can offer targeted pest control with fewer environmental externalities. IPM also balances productivity with ecological concerns, yet its adoption remains uneven and requires enhanced institutional support and financial incentives (Deguine *et al.*, 2021). Precision agriculture tools, such as satellite-based monitoring and digital application systems, can further help to minimize the use of chemical inputs through more targeted treatment. Furthermore, although not widely adopted at scale, mechanical and physical methods, including steam or hot water weeding, have been explored as chemical-free alternatives, particularly in small-scale and organic systems (Riemens *et al.*, 2022).

The role of prevention has emerged as equally critical. Crop rotation, soil fertility management, biodiversity enhancement, and the restoration and conservation of ecological infrastructures are essential to reduce pest pressure and chemical dependency. As emphasised in the SD report (C.2.2; C.2.4), preventive approaches should be seen as critical for sustainable pest

management, aligning with agroecological principles and fostering long-term resilience (EC, 2024b).

However, despite the environmental rationale and agronomic potential of these alternatives, the risk of large production loss due to pests remains a prominent obstacle to the reduction in the use of pesticides (Chèze *et al.*, 2020). Financial stability during the adaptation process is essential and must be ensured by subsidies tailored to the needs of farmers with low and insecure incomes to help them adopt riskier low-pesticide practices. Environmental and health improvements may not be sufficient motivation for some farmers to accept changes in their current practices.

In this regard, the SD recommends specific support mechanisms, including targeted payments for the adoption of IPM and biocontrol (C.1.3), as well as broader access to innovation through public-private research partnerships and advisory services (C.5.1) (EC, 2024b). Area-based payments, such as direct payments in Pillar 1 of the CAP (EC, 2023), may contribute to income stability and indirectly support pesticide reduction by alleviating economic pressures. Conversely, result-based payments could be less conducive to such reductions, as they often entail higher risk exposure and uncertainty for farmers, potentially discouraging the adoption of low-input practices.

A further enabler of the transition could be the establishment of a coherent policy framework. The SD report calls for the implementation of a benchmarking system to monitor sustainability performance at the farm level, including indicators related to pesticide use (C.1.2) (EC, 2024b). This would facilitate the comparison of practices, improve transparency, and create incentives for those adopting non-chemical approaches. Moreover, to enhance market viability, the Dialogue also recommends the development of quality certification schemes and eco-labels that reward farms that commit to reducing pesticide use while providing consumers with reliable information about environmental performance.

Reflecting policy efforts to support a phased reduction in the use of chemical pesticides, the EC's draft proposal of January 6th (EC, 2025), introduces a revised labeling" scheme for PPPs, repealing Regulation (EU) No 547/2011 (2011). The proposed framework would employ a colour-coded classification system to indicate whether a product is considered low-risk or qualifies as a "candidate for substitution". By visually differentiating products based on their hazard profile, this approach supports informed decision-making and gradual behavioral change.

Governance and policymaking must evolve to address the complexities of sustainability in the agricultural sector. A participatory governance model, such as the European Board on Agriculture and Food (EBAF) (EC, 2024d), could provide a stable platform for multi-stakeholder participation and collaboration among farmers, policymakers, and civil society. The board has

been set up for five years. However, its implementation requires the adoption of a robust framework by the EU institutions to ensure the EBAF serves as an inclusive, well-balanced, and effective advisory body to the EC (IEEP, 2024).

Conclusions

The debate surrounding pesticide reduction in EU agri-food systems highlights the intricate challenge of reconciling environmental sustainability with agricultural productivity and economic viability.

Convened to address growing tensions and discontent within the agri-food sector, the SD provided a structured platform for fostering collaboration and deliberation among diverse stakeholders from the EU agri-food sector. Its participatory approach sought to mediate polarization and produce actionable recommendations for the transition toward integrated farming systems.

Overall, the SD's outcomes emphasise the effectiveness of inclusive, multi-stakeholder engagement in formulating policy solutions that integrate both ecological goals and socioeconomic realities.

The final report advocates for a phased reduction in pesticide use, enhanced support mechanisms for small farms, and investment in research on biocontrol and IPM. By prioritizing gradual adaptation and tailored support, the SD highlights the need to alleviate the economic burden on small farmers while advancing toward the EGD's ambitious ecological targets, mirroring other studies stating the need to combine market incentives and investments in technological advancement to foster a larger adoption of sustainable agricultural practices (Mack *et al*., 2023; Deguine *et al*., 2021; Lefebvre *et al*., 2015). This approach shows that structured, participatory frameworks can yield balanced, pragmatic solutions potentially more effectively than top-down regulation or traditional public consultations alone. However, while the SD achieved consensus, not all interests may have been equally represented, pointing to areas where consultative frameworks might improve. The success of the SD indicates the value of establishing a permanent consultative body, such as the proposed EBAF, providing a more balanced representation from academic institutions, farmers, environmental and animal protection groups, and consumer advocacy. This model could help mitigate polarization and promote sustainable transitions in the EU's diverse landscape, offering a model for policy areas where conflicting interests need to be reconciled to achieve long-term sustainability.

This paper provides a timely analysis of the SD's approach and outcomes, providing insights into how collaborative policymaking can help reconcile challenging priorities. However, given the power dynamics and varying levels

of influence among stakeholders, the SD initiative raises questions about inclusivity and effectiveness.

Although this paper provides valuable insights into the SD deliberative process and its outcomes, it is not without its limitations. The study acknowledges that this is a preliminary analysis and that further research is needed. The focus on pesticide reduction may not fully capture the broader scope of the SD. Moreover, while QCA provides an in-depth view of policy discourse and decision-making, it does not address the causal effects of policy interventions. Additionally, the reliance on textual sources might imply that informal political negotiations or stakeholder influences are not reflected. Despite these limitations, the results obtained give useful indications for subsequent in-depth studies.

A follow-up study applying CDA to the Dialogue's report will enhance this preliminary assessment by investigating how discourse patterns, participant influence, power dynamics, and points of contention influenced the SD's recommendations. This could reveal whether the SD has effectively balanced the diverse stakeholder interests and competing priorities or if structural adjustments are needed for greater equity in representation. Further research could also explore strategies for mitigating power imbalances within the EBAF initiative.

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