



CORE ANALYSIS

# Cultivating change: agroecological perspectives on EU pesticide law

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## Abstract

In search of a climate-neutral Europe, the EU Green Deal presented agroecology as an alternative guide for food system transitions through explicit policy and regulatory actions. While the term agroecology is used in Green Deal policy documents, its meaning remains elusive in both policymaking and academic legal research. To explore existing regulatory frameworks' potential to align with agroecological perspectives for food system transitions, this article analyses pesticide regulation, a core area of agricultural governance, using an agroecological framework. This article aims to contribute to the current legal debate in two ways: it presents agroecology as a framework capable of guiding and assessing law and regulation and illustrates, via a study of EU pesticide regulation, how this framework can be deployed in practice to evaluate legal frameworks.

**Keywords:** food law; pesticide regulation; agroecology; EU Green Deal; Common Agricultural Policy

## 1. Introduction

In a novel take on European food system governance, the Green Deal is evoking agroecological approaches to European food system transitions.<sup>1</sup> The importance of agroecology for future European Union (EU) law and policy is evidenced by the fact that it is embraced by both Green Deal's Farm to Fork (F2F) and Biodiversity Strategies.<sup>2</sup> The synchronised release of these documents presents opportunities for comprehensive perspectives on food production, the environment, and the role of biodiversity that emphasise an agroecological vision for European food systems.<sup>3</sup> One of the primary tactics implemented for facilitating these transitions is the Green Deal's development of a new legislative framework for sustainable food systems (SFS). This approach aims to align and adapt future and existing legislation to more sustainable outcomes using provisions and goals that work towards systemic change. If experts' acknowledgements regarding the agroecological potential for food system transitions are accepted at the institutional level,<sup>4</sup> legal and regulatory frameworks of

<sup>1</sup>European Commission, 'Farm to Fork Strategy - For a fair, healthy and environmentally-friendly food system' COM (2020) 381 final; European Commission, 'EU Biodiversity Strategy for 2030 – Bringing Nature Back into Our Lives' COM (2020) 380 final.

<sup>2</sup>European Commission, 'Farm to Fork Strategy - For a fair, healthy and environmentally-friendly food system' (n 1) 11, 16, 18; European Commission, 'EU Biodiversity Strategy for 2030 – Bringing Nature Back into Our Lives' (n 1) 14, 16.

<sup>3</sup>EU Food Policy Coalition, 'A 10+13 Agroecology Approach to Shape Policies and Transform EU Food Systems' (policy brief) (2021) <<https://eeb.org/library/a-1013-agroecology-approach-to-shape-policies-and-transform-eu-food-systems>>.

<sup>4</sup>International Assessment of Agricultural Knowledge, Science and Technology for Development, 'Agriculture at a crossroads - Global report.' (2009) <<https://wedocs.unep.org/20.500.11822/8590>>; UN Human Rights Council, 'Report by Special Rapporteur Olivier De Schutter on the Right to Food' 17 December 2010, A/HRC/16/49, <<https://digitallibrary.un.org>>.

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food systems should reflect these aims. Most research exploring transitions or transformation towards an agroecological Europe focuses on generating aspirational policy proposals.<sup>5</sup> This article contributes to existing scholarship by illustrating how agroecology can be applied to concrete regulatory policies. More specifically, it unpacks how the existing regulation of pesticides, a core agricultural policy area, can be assessed in terms of its alignment with agroecological principles. To do so, the article develops a normative framework based on agroecological theory and sustainability discourse via the concepts of strong and weak sustainability to analyse the framework.

Pesticides are indispensable within conventional industrial agricultural production.<sup>6</sup> To eradicate weeds, insects, and other agents considered detrimental to intensive production, conventional approaches depend on large quantities of pesticides.<sup>7</sup> This dependency is deepened by the fact that conventional agriculture's lack of biodiversity has been largely linked to further pest outbursts and invasions.<sup>8</sup> The result of conventional pest management is a reinforcing mechanism of increasing dependencies on pesticides, making conventional production's reductionist approach far from resilient or sustainable.<sup>9</sup> While this approach may have been favourable in the past due to a relative increase in yields<sup>10</sup> and lower production costs, recent developments demand fundamental changes to this approach. Pesticides are now known to be highly toxic ecological disruptors that linger in the environment in unforeseen ways.<sup>11</sup> They are

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[org/record/704715?ln=en](https://doi.org/record/704715?ln=en); UN Human Rights Council, 'Resolution adopted by the Human Rights Council on 28 September 2018 - United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas' 8 October 2018, A/HRC/RES/39/12, <<https://digitalibrary.un.org/record/1650694?ln=en>>; HLPPE, 'Agroecological and Other Innovative Approaches for Sustainable Agriculture and Food Systems That Enhance Food Security and Nutrition' (a report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security) (2019); IPES-Food & ETC Group, 'A Long Food Movement: Transforming Food Systems by 2045' (report) (2021).

<sup>5</sup>A Peeters et al., 'A Green Deal for Implementing Agroecological Systems: Reforming the Common Agricultural Policy of the European Union' 70 (2020) *Landbauforschung: Journal of Sustainable and Organic Agriculture* 83; J D van der Ploeg et al., 'The Economic Potential of Agroecology: Empirical Evidence from Europe' 71 (2019) *Journal of Rural Studies* 46; P Migliorini et al., 'Agroecology in Mediterranean Europe: Genesis, State and Perspectives' 10 (2018) *Sustainability* 2724; A Wezel et al., 'Agroecology in Europe: Research, Education, Collective Action Networks, and Alternative Food Systems' 10 (2018) *Sustainability* 1214; S Gliessman, 'Translating Agroecology into Policy' 45 (2021) *Agroecology and Sustainable Food Systems* 1107; A Wezel et al., 'Challenges and Action Points to Amplify Agroecology in Europe' 10 (2018) *Sustainability* 1598.

<sup>6</sup>Conventional agriculture refers to the industrialised globalised agribusiness systems that dominate modern food production.

<sup>7</sup>A Shepon, PJG Henriksson and T Wu, 'Conceptualizing a Sustainable Food System in an Automated World: Toward a "Eudaimonian" Future' 5 (2018) *Frontiers in Nutrition* 104; K de Roest, P Ferrari and K Knickel, 'Specialisation and Economies of Scale or Diversification and Economies of Scope? Assessing Different Agricultural Development Pathways' 59 (2018) *Journal of Rural Studies* 222.

<sup>8</sup>JMH Knops et al., 'Effects of Plant Species Richness on Invasion Dynamics, Disease Outbreaks, Insect Abundances and Diversity' 2 (1999) 2 *Ecology Letters* 286; M A Altieri, P Koohafkan and C Nicholls, 'Strengthening Resilience of Modern Farming Systems: A Key Prerequisite for Sustainable Agricultural Production in an Era of Climate Change' (briefing paper) (2014) <[https://twn.my/title2/briefing\\_papers/No70.pdf](https://twn.my/title2/briefing_papers/No70.pdf)>.

<sup>9</sup>Knops et al. (n 8); Altieri, Koohafkan and Nicholls (n 8).

<sup>10</sup>UNEP, 'Assessing Global Land Use: Balancing Consumption with Sustainable Supply' (S Bringezu et al. eds, 2014).

<sup>11</sup>F Bas-Defosse et al., 'Feeding Europe: Agriculture and Sustainable Food Systems' (policy paper produced for the IEEP Think2030 conference, Brussels) (2018); F Jacquet et al., 'Pesticide-Free Agriculture as a New Paradigm for Research' 42 (2022) *Agronomy for Sustainable Development* 8; P Fantke, Rr Friedrich and O Jolliet, 'Health Impact and Damage Cost Assessment of Pesticides in Europe' 49 (2012) *Environmental International* 9; S Panseri et al., 'Persistent Organic Pollutants in Fish: Biomonitoring and Cocktail Effect with Implications for Food Safety' 36 (2019) *Food Additives & Contaminants: Part A* 601; D Pietrzak et al., 'Pesticides from the EU First and Second Watch Lists in the Water Environment' 47 (2019) *CLEAN: Soil, Air, Water* 1800376; C Pelosi et al., 'Residues of Currently Used Pesticides in Soils and Earthworms: A Silent Threat?' 305 (2021) *Agriculture, Ecosystems and Environment* 107167; F Sánchez-Bayo and KAG Wyckhuys, 'Worldwide Decline of the Entomofauna: A Review of Its Drivers' 232 (2019) *Biological Conservation* 8; IPBES, 'The Assessment Report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on Pollinators, Pollination and Food Production' (S. Potts, V.I. Imperatriz-Fonseca and HT Ngo eds, Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) (2016); F Geiger et al., 'Persistent Negative Effects of Pesticides on Biodiversity and Biological Control Potential on European Farmland' 11 (2010) *Basic and Applied Ecology* 97.

responsible for the deterioration of biodiversity in agroecosystems, both terrestrial and aquatic,<sup>12</sup> and their presence in European soils is now the rule rather than the exception.<sup>13</sup> From a societal perspective, human health is also adversely affected by pesticide toxicity. Side effects from pesticide exposure have been linked to both acute and chronic effects, in addition to illnesses such as Parkinson's disease and blood cancers.<sup>14</sup> These impacts on human health are felt most strongly by the most vulnerable farming populations. Through the F2F and Biodiversity Strategies, the Green Deal calls for changing this pest management approach in favour of agroecologically aligned pest management. Agroecological pest management focuses on mimicking ecosystemic behaviour.<sup>15</sup> Rather than applying toxic elements to eradicate 'whatever' is threatening a crop, agroecology aims to manage potential and existing threats, understanding that undesirable variables fulfil often invisible yet important ecosystemic functions.

This article is structured as follows: section two briefly presents agroecology and explores how it can be operationalised within law and regulation through the development of an analytical framework. Section three introduces the existing regulatory framework for pesticide use. The framework is then critically analysed via the application of the developed framework, assessing alignment/tensions with agroecological perspectives. The article ends by summarising the analysis, providing conclusions and future avenues for continued research.

## 2. An agroecological normative framework

For decades, agroecology has been considered key to transitions towards SFSs.<sup>16</sup> Its documented ability to address the systemic problems inherent to conventional food systems<sup>17</sup> has made it the focus of international interest.<sup>18</sup> While agroecology has grown as an academic discipline since the 1920s, agroecological practice is deeply rooted in indigenous and peasant societies around the world, observed as early as the 16<sup>th</sup> century.<sup>19</sup> Its modern resurgence manifested as a result of global resistance by peasant and small-holder farmers to the unexpected consequences of globalised intensive agribusiness.<sup>20</sup> Generally understood to include three components in its definition, agroecology is simultaneously considered a science, a set of practices, and a social movement: it is a

<sup>12</sup>CA Brühl and JG Zaller, 'Biodiversity Decline as a Consequence of an Inappropriate Environmental Risk Assessment of Pesticides' 7 (2019) *Frontiers in Environmental Science* 177.

<sup>13</sup>V Silva et al., 'Pesticide Residues in European Agricultural Soils – A Hidden Reality Unfolded' 653 (2019) *Science of the Total Environment* 1532.

<sup>14</sup>S Horel, 'Poisoned Farmers: Exposing the Myth of Pesticide Protection in Europe' *Le Monde* (Paris 11 March 2022) <[https://www.lemonde.fr/en/environment/article/2022/03/11/poisoned-farmers-exposing-the-myth-of-pesticide-protection\\_5978418\\_114.html](https://www.lemonde.fr/en/environment/article/2022/03/11/poisoned-farmers-exposing-the-myth-of-pesticide-protection_5978418_114.html)> accessed 4 October 2022.

<sup>15</sup>MA Altieri, *Agroecology: The Science of Sustainable Agriculture* (2nd ed, CRC Press 2018).

<sup>16</sup>FAO, 'The 10 Elements of Agroecology: Guiding the Transition to Sustainable Food and Agricultural Systems' (2018) <[www.fao.org/documents/card/en/c/I9037EN/](http://www.fao.org/documents/card/en/c/I9037EN/)>; IPES-Food, 'From Uniformity to Diversity: A Paradigm Shift from Industrial Agriculture to Diversified Agroecological Systems.' (report) (2016); International Assessment of Agricultural Knowledge, Science and Technology for Development (n 4); FAO, 'Scaling Up Agroecology Initiative: Transforming Food and Agricultural Systems in Support of the SDGs' (2018) <[www.fao.org/3/I9049EN/i9049en.pdf](http://www.fao.org/3/I9049EN/i9049en.pdf)>; HLPE (n 4); UN Human Rights Council (n 4); FAO, 'Agroecology Knowledge Hub' <<https://www.fao.org/agroecology/overview/our-work/en/>> accessed 4 May 2022; IPES-Food & ETC Group (n 4); IPES-Food, 'The Added Value(s) of Agroecology: Unlocking the Potential for Transition in West Africa' (report) (2020); EU Food Policy Coalition (n 3); European Commission, 'Farm to Fork Strategy - For a fair, healthy and environmentally-friendly food system' (n 1).

<sup>17</sup>D Gaitán-Cremaschi et al., 'Characterizing Diversity of Food Systems in View of Sustainability Transitions. A Review' 39 (2019) *Agronomy for Sustainable Development* 1.

<sup>18</sup>International Assessment of Agricultural Knowledge, Science and Technology for Development (n 4).

<sup>19</sup>M Pimbert et al., 'Agroecology' *Oxford Research Encyclopedia of Anthropology* (2021) <<https://doi.org/10.1093/acrefore/9780190854584.013.298>>; A Wezel et al., 'Agroecology as a Science, a Movement, and a Practice. A Review' 29 (2009) *Agronomy for Sustainable Development* 503.

<sup>20</sup>Pimbert et al. (n 19); Wezel et al., 'Agroecology as a Science, a Movement, and a Practice. A Review' (n 19); MA Altieri and VM Toledo, 'The Agroecological Revolution in Latin America: Rescuing Nature, Ensuring Food Sovereignty, and Empowering Peasants'

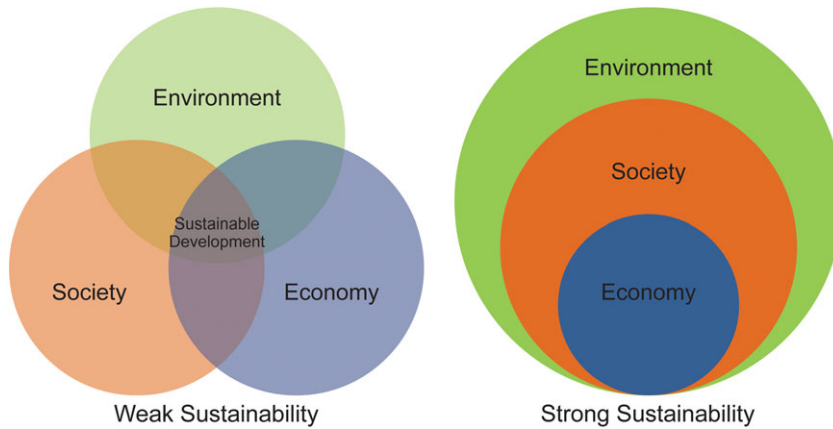


Figure 1. General representations of weak and strong sustainability.

‘transdisciplinary field that [encompasses] the ecological, sociocultural, technological, economic and political dimensions of food systems, from production to consumption’.<sup>21</sup>

Agroecological theory is based on the integrated principle of social and ecological coevolution:<sup>22</sup> human societies are considered a part of nature, within which human beings establish their social metabolism.<sup>23</sup> Food systems, as part of that social metabolism, are social systems embedded within society’s broader environment. In considering food systems as embedded social systems, they should be designed to function within the confines of the environment’s biophysical limitations. Because agroecology is dependent on this harmony as a requirement for sustainable and equitable food systems, which are traditionally found amongst peasant and smallholder farming communities, there is a need for broader institutional design to manage and minimise the unsustainable material exchanges between society and nature; to address the imbalanced distributions of power and status, and to improve the distribution of resources within social systems.<sup>24</sup> Food systems should be ecologically and environmentally appropriate, culturally sensitive, socially just, and economically viable.<sup>25</sup> The embedded nature of agroecosystems within their environment, and the prioritisation of equitable, societal harmonisation with the environment<sup>26</sup> is reflected by strong sustainability discourse. The key distinction between weak and strong sustainability, visually depicted in Figure 1, is how the environment is prioritised in relation to the economy.<sup>27</sup>

Weak sustainability places society, nature, and the economy on a level playing field: each component is as important as the others. This departing point is only made possible by weak sustainability’s premise that ‘natural’ capital can be substituted by man-made capital.<sup>28</sup> This

38 (2011) *Journal of Peasant Studies* 587; World Forum for Food Sovereignty, ‘Declaration of Nyéléni’ (2007); ‘Declaration of the International Forum for Agroecology, Nyéléni, Mali: 27 February 2015’ 58 (2015) *Development* 163.

<sup>21</sup>HLPE (n 4).

<sup>22</sup>M González de Molina and VM Toledo, *The Social Metabolism: A Socio-Ecological Theory of Historical Change* (M Agnoletti ed, Springer 2014).

<sup>23</sup>Social metabolism is defined as the material relationships of exchange of energy, materials, and information *Ibid.*

<sup>24</sup>M González de Molina et al., *Political Agroecology* (CRC Press 2019).

<sup>25</sup>MA Altieri, *Agroecología: Bases Científicas Para Una Agricultura Sustentable* (Editorial Nordan-Comunidad 1999).

<sup>26</sup>González de Molina et al. (n 24); González de Molina and Toledo (n 22).

<sup>27</sup>I Morandín-Ahuerma et al., ‘Socio-Ecosystemic Sustainability’ 11 (2019) *Sustainability* 3354.

<sup>28</sup>Reijnders defines natural capital as the stock of environmentally provided assets from which now and in the future products and services can be derived that are useful to humanity (eg ecosystems, providing services that benefit humans (ecosystem services), natural resources (eg ores) and the physical environment providing services such as insulation). Critical natural capital has been defined as natural capital for which there is no human-made capital as a substitute. Man-made capital

premise makes sustainability a relative concept, where society's intent with regard to sustainability is to reduce the impacts of economic activity by individually addressing sustainability issues in a sectoral manner (ie transportation, finance, food systems, industry, etc).<sup>29</sup> Moreover, weak sustainability conceives of society and the economy as capable of being separate from the environment<sup>30</sup> for their functions, making the inclusion of the environment appear as a benevolent choice in the development of society and the economy. Conversely, strong sustainability discourse maintains that the natural environment embodies and provides the infrastructure that all societal processes are built upon.<sup>31</sup> This approach prioritises meeting environmental goals over economic growth. From a strong sustainability perspective,<sup>32</sup> guaranteeing societal longevity and equitable prosperity requires that societal decision-making be guided by the aim of maintaining and enhancing the well-being, protection, and resilience of the environment and environmental activity. While this topic remains debated in sustainability discourse, research shows that the actual substitutability of natural capital by man-made capital is limited,<sup>33</sup> calling into question the foundation of sustainability as a relative concept that can be approached in sectoral rather than systemic ways. Agroecological sustainability therefore implies a transformation away from the modern, globalised agro-industrial system that is dependent on the separation between the economy and the environment to one based on agroecological principles. These food systems prioritise local, food-sovereign,<sup>34</sup> cooperative, contextually embedded approaches, where institutional frameworks are receptive to the same principles and are capable of designing effective strategies to scale up agroecological transitions (eg public policies working in coordination with social movements, the localisation of food systems, the politicisation of food, etc).<sup>35</sup>

Against this background, it is possible to construct a framework that facilitates the implementation and endorsement of agroecological approaches at institutional levels. To do that, it is helpful to draw on agroecology's rich scholarship, which includes agroecological strategies for institutional transitions and transformation,<sup>36</sup> in addition to a set of thirteen principles<sup>37</sup> that reflect normative (eg 'food systems should be equitable') and causative dimensions (eg 'more biodiverse agricultural systems are likely to be more resilient'), which reflect agroecological theory.<sup>38</sup>

These principles address important agroecological concepts from environmental, social, and economic perspectives and include: (1) Recycling, (2) Input reduction, (3) Soil health, (4) Animal health, (5) Biodiversity, (6) Synergy, (7) Economic diversification, (8) Co-creation of knowledge,

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is defined as manufactured capital (the physical human-made stock) and human capital (knowledge, information, skills, and health). Social RU Ayres, 'On the Practical Limits to Substitution' 61 (2007) *Ecological Economics* 115; L Reijnders, 'Substitution, Natural Capital and Sustainability' 18 (2021) *Journal of Integrative Environmental Sciences* 115.

<sup>29</sup>E Lees and JE Viñuales (eds), *The Oxford Handbook of Comparative Environmental Law* (Oxford University Press 2019).

<sup>30</sup>Environment is deemed a more suitable word for nature as a cluster and replaces it in the remaining text.

<sup>31</sup>Morandín-Ahuerma et al. (n 27).

<sup>32</sup>Strong sustainability tenets include: a finite planet cannot sustain human life with an economy that strives for unlimited growth; excessive production and consumption cause serious ecosystemic deterioration; excessive consumption does not generate well-being in the long term, but it does affect the ecosystems that sustain life and mental health of individuals; there are sufficient solid arguments and evidence to consider that economic growth based on excessive and wasteful production and consumption is a socio-ecosystemic failure; the global problem cannot be tackled with small isolated actions – its complexity must be understood and addressed through profound change (ie from an understanding of the complex system and coupling of human society as a subsystem). *Ibid.*

<sup>33</sup>Reijnders (n 28).

<sup>34</sup>Food sovereignty is defined as 'the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems'. World Forum for Food Sovereignty (n 20).

<sup>35</sup>*Ibid.*

<sup>36</sup>González de Molina et al. (n 24).

<sup>37</sup>Principles are defined as propositions that serve as the foundation for a system of belief or behaviour (ie agroecological), as opposed to legal principles, or commonly accepted standard concepts that are applied to understanding, interpreting, and applying the law in different cases (eg the precautionary principle).

<sup>38</sup>HLPE (n 4).

**Table 1.** Adaptation of the consolidated set of thirteen agroecological principles in Wezel et al, 'Agroecological Principles and Elements and Their Implications for Transitioning to Sustainable Food Systems. A Review' 40 (2020) *Agronomy for Sustainable Development*, <https://doi.org/10.1007/s13593-020-00646-z>

- i) Recycling refers to the preferential use of local renewable resources and the closing of resource cycles of nutrients and biomass.
- ii) Input reduction refers to the reduction or elimination of dependency on purchased inputs and increased self-sufficiency.
- iii) Soil health involves securing and enhancing soil health and functioning for improved plant growth, particularly by managing organic matter and enhancing soil biological activity.
- iv) Animal health ensures animal health and welfare.
- v) Biodiversity is defined as the maintenance and enhancement of diversity of species, functional diversity and genetic resources in time and space at field, farm, and landscape scales.
- vi) Synergy represents the concept of ecosystemic self-organization and regulation, and is defined as enhancing positive ecological interaction, synergy, integration, and complementarity amongst the elements of agroecosystems (animals, crops, trees, soil, and water).
- vii) Economic diversification emphasizes the importance of diversifying on-farm incomes by ensuring that small-scale farmers have greater financial independence and value addition opportunities while enabling them to respond to demand from consumers.
- viii) Co-creation of knowledge focuses on enhancing the co-creation and horizontal sharing of knowledge including local and scientific innovation, especially through farmer-to-farmer exchange.
- ix) Social values and diets emphasize building food systems based on the culture, identity, tradition, social and gender equity of local communities that provide healthy, diversified, seasonally and culturally appropriate diets.
- x) Fairness supports dignified and robust livelihoods for all actors engaged in food systems, especially small-scale food producers, based on fair trade, fair employment, and fair treatment of intellectual property rights.
- xi) Connectivity refers to increased proximity and confidence between producers and consumers through promotion of fair and short distribution networks and by re-embedding food systems into local economies.
- xii) Land and natural resource governance refers to strengthening institutional arrangements to improve, including the recognition and support of family farmers, smallholders, and peasant food producers as sustainable managers of natural and genetic resources.
- xiii) Participation emphasizes the importance of social organization and greater participation in decision-making by food producers and consumers for the purpose of supporting decentralized governance and local adaptive management of food systems.

(9) Social values and diets, (10) Fairness, (11) Connectivity, (12) Land and natural resource governance, and (13) Participation (defined in Table 1). Consolidated from an extensive literature review, these 13 agroecological principles have been formulated from agroecological history and science, including, aligning with, and complementing other less-detailed frameworks that have been formulated to communicate agroecology, like the FAO's ten elements of agroecology.<sup>39</sup> Given that there is no current framework guiding Europe's implementation of agroecology, this framework is meant to provide a baseline of departure for considering and including agroecology within law and policy and is not exhaustive of all the considerations required for agroecological transitions. For greater analytical tractability, the author has grouped these principles into three clusters that connect back to the concept of strong sustainability. Principles 1 to 6 are more closely related to Environment; principles 8, 9, 12, and 13 to Society; and principles 7, 10, and 11 to Economy (Figure 2). The principles help provide characterisations for each cluster, each with an identifiable orientation or trend that can be translated into a guiding framework for regulation and policy aims.

### A. Environment

Orientations for the environmental cluster align with a strong sustainability perspective, where societal governance acknowledges planetary biophysical limits. The cluster focuses on the

<sup>39</sup>A Wezel et al., 'Agroecological Principles and Elements and Their Implications for Transitioning to Sustainable Food Systems. A Review' 40 (2020) *Agronomy for Sustainable Development* <<https://doi.org/10.1007/s13593-020-00646-z>>.

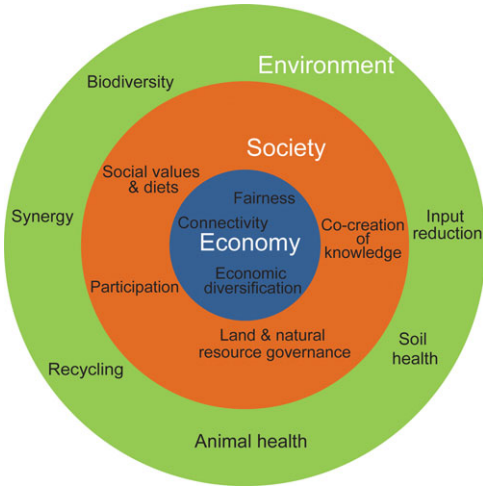


Figure 2. Clustered Agroecological Principles.

re-embedding of agroecosystems into their environment, and various aspects of agroecosystemic self-organisation and regulation that correspond with the concept of biomimetics,<sup>40</sup> reflected by principle 6 (synergy). This includes the closing of resource cycles and improving self-sufficiency through recycling (principle 1), input reduction (principle 2), and integration of healthy agroecosystemic components (principles 3–5); protection and enhancement of soil health (principle 3) through specific practices (such as intercropping, crop rotations, and rotational grazing), in addition to decreasing disturbances to the soil (such as tilling chemical, synthetic fertilisers, and pesticides); and promoting increased biodiversity (principles 4 and 5) in soils and ecosystems adapted to local conditions.

### B. Society

Orientations for the societal cluster are based on an institutional understanding of the ecosystemic structure that human societies depend on. They are guided by cognitive models that enable those institutions to organise society in a way that harmonises with those ecosystemic structures, or the surrounding environment. The cluster focuses on the design and production of actions, institutions, and norms aimed at achieving equitable, agroecologically sustainable food systems.<sup>41</sup> This process begins by (i) identifying and addressing power relations that lead to social inequalities and uneven access to resources. This includes addressing imbalanced dynamics and shifting power away from transnational corporations and global value chains towards peasant and small-scale producer empowerment.<sup>42</sup> The process continues with (ii) the top-down design of institutions that favour agroecological food systems and (iii) the bottom-up organisation of agroecological movements that facilitates their scaling.<sup>43</sup> Point (ii) includes facilitating the participation (principle 13) of peasant and small-holder producers in the governance of land and natural resources (principle 12)<sup>44</sup> as well as enabling changes to societal norms (principle 9). Point

<sup>40</sup>Biomimetics consists of learning and replicating the most complex and efficient ecological processes and applying them to social systems. González de Molina et al. (n 24).

<sup>41</sup>Molina (n 64).

<sup>42</sup>ie their rights are recognised and respected regardless of gender, and they hold the capacity and means to improve their livelihoods, develop skills, and access resources.

<sup>43</sup>González de Molina et al. (n 24).

<sup>44</sup>ie the existence of mechanisms allowing producers to participate in governance and the degree to which they can influence decisions.

(iii) includes providing the necessary support and infrastructure for transitioning producers to organise, co-create and share relevant knowledge (principle 8).

### C. Economy

Orientations for the economic cluster focus on supporting the trends in the environmental and societal clusters, transitioning from globalised markets (which negatively impact farmer incomes and decouple agroecosystems from their surrounding environment) towards resilient, local markets organised by local producers (principles 7 and 11). They also focus on ensuring a just quality of life for all food system workers, especially peasant and small-holder producers, via fair market and working conditions (principle 10). Examples include: acknowledging an increasing diversity of activities, products, and services offered through European agricultural production<sup>45</sup> that implies a stark shift away from monocultural intensification and market commodification (principle 7); the shortening of supply chains, where the majority of products are marketed locally (principle 11); increasing social and economic proximity between farmers, farm workers, and local markets (principle 11); high levels of exchange and trade of products and services amongst producers (principle 11); ensuring the stability of agricultural incomes and profitability over time (principle 10); and tackling issues of generational renewal in farming communities.

The following section begins by discussing the regulatory framework for pesticides. It then shows how the agroecological framework, articulated using the three clusters, can be deployed within the context of pesticide use and pest management to assess the regulatory framework's alignment with agroecology.

### 3. An agroecological analysis of the EU regulatory framework on pesticides

Pesticide regulation occurs via a large body of European legislation requiring a dual-system authorisation process prior to placing any pesticides and active chemical substances on the market. The process is iterative and continuous, requiring renewed authorisation prior to the expiry date of approved substances. While this body of legislation includes a variety of legislative instruments meant to regulate various aspects of pesticide use in the EU, this case study focuses on relevant aspects of the 2014–2020 Common Agricultural Policy in addition to the main regulatory framework. The regulatory framework includes Regulation (EC) 178/2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety (GFL),<sup>46</sup> Regulation (EC) 1107/2009 concerning the placing of plant protection products on the market (PPPs),<sup>47</sup> Regulation (EC) 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin (MRL),<sup>48</sup> and Directive 2009/128 establishing a framework for Community action to achieve the sustainable use of pesticides (SUPs).<sup>49</sup>

<sup>45</sup>Eg diversified 'productive' activities, like selling a variety of crops or types of animals, and services, like the processing of goods in situ, ecotourism, transport, training, etc.

<sup>46</sup>Regulation (EC) 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety (2002) OJ L 31/1.

<sup>47</sup>Regulation (EC) 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC (2009) OJ L 309/1.

<sup>48</sup>Regulation (EC) 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC (2005) OJ L 70/1.

<sup>49</sup>Directive (EC) 2009/128 of the European Parliament and the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides (2009) OJ L 309/71; European Food Safety Agency, 'Pesticide Evaluations: Regulations and Guidance' <<https://www.efsa.europa.eu/en/applications/pesticides/regulationsandguidance>> accessed 13 April 2022.



Within the EU, no regulation exists that defines general principles for agriculture law. Rather, agriculture and fisheries are included in the Treaty on the Functioning of the European Union (TFEU) in Articles 38–44, where it is clarified that a European internal market for agricultural products and a common agricultural policy are expected to coexist. This elaboration resulted in the Common Agricultural Policy (CAP), which constitutes the legal and political backbone of European integration.<sup>50</sup> Initially set up as a system for short-term market regulation based on price intervention mechanisms and guarantees for producers, the CAP has changed in response to developments occurring within the broader international context.<sup>51</sup> Given the article's focus on existing regulatory dynamics, the analysis of the CAP focuses on the policy prior to the agreed CAP reform on 2 December 2021,<sup>52</sup> or the EU CAP 2014–2020.

When it comes to food law (GFL), the European food sector is one of the most heavily regulated sectors.<sup>53</sup> The GFL details important components of food system regulation: it specifies the general principles and requirements for food law; establishes the European Food Safety Authority (EFSA); and defines matters related to food safety. The focus on improving food safety resulted from issues in the 80s and 90s, like the bovine spongiform encephalopathy outbreak, which resulted in severe public mistrust of European political institutions. Through the implementation of a risk analysis-based governance approach focused on food safety, the GFL prioritises two aims: achieving the free movement of food and feed throughout the European Union and establishing rigorous levels of protection for human health.<sup>54</sup> Risk analysis focuses on mitigating potentially unwanted consequences and is comprised of three areas: risk assessment, management, and communication. Within the realm of the GFL, risk assessment calls for expert scientific assessments of food safety measures for the overarching purpose of reducing, eliminating, and avoiding risks to human health; when expert advice is uncertain, the law invokes the precautionary principle.<sup>55</sup> While pesticides are not explicitly addressed in the GFL, Articles 6 and 7 embed risk analysis, assessment, and management, and the precautionary principle<sup>56</sup> respectively to the field of food law, and are of importance to pesticide use and regulation.

The PPP Regulation concerns the placing of plant protection products (more commonly known as pesticides) and their active substances (ie the active chemical or micro-organism within pesticide mixtures) on the market. The aim of this Regulation is the protection of human, animal, and broader environmental health and well-being and the facilitation of European market integration. It defines the approval and monitoring process for PPPs, their active substances, and any safeners, synergists, and co-formulants present, calling for active cooperation between Member States throughout the process. This Regulation goes hand in hand with the MRL Regulation,<sup>57</sup> which settles matters related to legal limits for pesticide residues in food and feed. It aims to harmonise and simplify maximum residue levels for pesticides, setting a common European assessment scheme for all agricultural products (from food to animal feed). The SUPs Directive seeks to establish a framework for the sustainable use of pesticides that prioritises human and environmental health. It also emphasises the usefulness of alternative management approaches

<sup>50</sup>R Barents, *The Agricultural Law of the EU* (2nd ed, Kluwer Law International 2022).

<sup>51</sup>*Ibid.*

<sup>52</sup>European Commission, 'The Common Agricultural Policy: 2023–27' <[https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27\\_en](https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27_en)> accessed 22 June 2023.

<sup>53</sup>M Monteduro et al. (eds), *Law and Agroecology: A Transdisciplinary Dialogue* (Springer-Verlag 2015).

<sup>54</sup>A Szajkowska, 'Regulating Food Law: Risk Analysis and the Precautionary Principle as General Principles of EU Food Law' (Wageningen University 2012).

<sup>55</sup>A Arcuri, 'Reconstructing Precaution, Deconstructing Misconceptions' 21 (2007) *Ethics and International Affairs* 359.

<sup>56</sup>The precautionary principle was codified within EU law in the Maastricht treaty, Art 130r, and later operationalised by the Commission's 'Communication from the Commission on the precautionary principle'. More importantly, the definition provided within the GFL offers the first general definition of the precautionary principle in EU legislation. Treaty of Maastricht (1992) OJ C 191; European Commission, 'Communication from the Commission on the Precautionary Principle (COM(2000) 1 Final)' (2 February 2000).

<sup>57</sup>Maximum residue level is defined as the upper legal level of concentration for pesticide residue in or on a food or feed set.

to pests, such as Integrated Pest Management (IPM) and other non-chemical approaches. To this aim, all Member States are instructed to create a National Plan with defined quantitative objectives, targets, measures, timetables, and indicators, in addition to the development and introduction of alternative approaches through which to reduce dependency on pesticides.<sup>58</sup>

### **A. The environmental cluster**

Environmental cluster perspectives on pest management look to (i) reduce the consumption of/dependence on most, if not all, synthetic pesticides used (principles 1 and 2); (ii) facilitate the adoption of contextualised, appropriate pest management techniques (eg biological pest control, IPM and management of landscape elements, natural/biological pesticides, the inclusion of allelopathic plants<sup>59</sup> within crop rotation, etc) (principles 1 and 2)<sup>60</sup>; and (iii) focus on fostering agroecosystemic health via the improvement of soil health (principle 3) and increasing/fostering contextually appropriate biodiversity (principle 5) that contributes to naturally occurring pest management within agroecosystems. The regulation of agroecological pest management from environmental perspectives would therefore prioritise a systemic food system perspective guided by biomimetics (principle 6).

From agroecological perspectives, (i) reducing the consumption of and dependence on pesticides, and (ii) facilitating the adoption of agroecological pest management techniques fall on two sides of the same coin. Reducing pesticide applications in conventional production leaves an otherwise fragile ecosystem highly vulnerable to pest infestations if no appropriate agroecological pest management techniques are adopted, requiring concerted action to meet pesticide reduction goals. The SUPs Directive is the only instrument present in the examined framework that explicitly states a need, or aim, to reduce pesticide use and dependency (principle 2, input reduction). The Directive justifies this aim by referring to worker protection, protection of the environment, and the prevalence and impact of pesticide residues. It then introduces specific techniques, eg IPM, as viable alternatives. A review of the Directive's effectiveness however revealed difficulties in determining compliance to its aims across the board (setting up of national actional plans, implementation of training and certification schemes, monitoring pesticide application equipment, etc).<sup>61</sup> While 26 Member States managed to report setting up inspection systems for pesticide equipment and all states reported establishing training and certification systems, only five Member States had set measurable targets after eight years, while no Member States set any clear criteria for ensuring the implementation of general IPM principles.<sup>62</sup>

Despite recognition of the importance of reducing pesticide use at the EU law level, the framework is arguably based on the premise that chemical pesticides present the main approach to pest and disease management within European food systems. This discourse is reinforced by the title given to the PPP Regulation, which communicates the belief that pesticides belong on the market, in addition to the fact that it paradoxically conveys that ensuring diversification of agriculture and horticulture requires ample availability of plant protection products and, therefore, specific rules should be established for their use. This is further supported by the

<sup>58</sup>Sustainable Use of Pesticides Directive 2009/128 Art 4.

<sup>59</sup>Allelopathy refers to the phenomenon through which organisms produce chemicals that influence the growth, development, and reproduction of other organisms. M Mohsin Aziz et al., 'Plant Allelopathy in Agriculture and Its Environmental and Functional Mechanisms: A Review' 5 (2021) *International Journal of Food Science and Agriculture* 623.

<sup>60</sup>Agroecology distils a combination of pest-management techniques that mimic ecological processes, to effectively reduce pest populations: (i) making crops less attractive to destructive pests and weeds; (ii) making the environment more favourable to pests' natural enemies, and (iii) attracting pests away from crops. Altieri (n 15).

<sup>61</sup>European Commission, 'Overview Report: Sustainable Use of Pesticides' (2017).

<sup>62</sup>*Ibid.*

historically increasing reliance on exceptional authorisations for applying banned pesticides<sup>63</sup> in the absence of ‘equally efficient pesticides’ and the constant surfacing of alternatives to banned active substances. Reliance on derogations means that the banning of substances, like neonicotinoids, provides no guarantees that they will be entirely off the market<sup>64</sup> or that potential risks will be reduced over time. According to a Pesticide Action Network (PAN) Europe report,<sup>65</sup> EU countries granted 236 derogations of banned pesticides between 2019 and 2022. Neonicotinoid insecticides, which were found to be highly toxic to key agroecosystemic pollinators, account for nearly half of those derogations and have been banned in the EU since 2018.<sup>66</sup> In *Pesticide Action Network and Others*,<sup>67</sup> the European Court of Justice (CJEU) issued a preliminary ruling banning the use of derogations in early 2023. Since then, 29 new derogations have been approved.<sup>68</sup> The reliance on derogations of banned pesticides not only offends principles 2 and 6 (input reduction and synergy respectively), but also the precautionary principle.

When it comes to supporting environmental health, the regulatory framework on pesticides should take a systemic approach to agroecosystemic health via (iii) a focus on soil health and increasing contextually appropriate biodiversity that contributes to naturally occurring pest management within agroecosystems. While both the PPP and MRL Regulations, in their recitals, scopes, and aims, regard environmental health throughout food and feed production processes, even mentioning agroecologically aligned alternatives (ie IPM principles and non-chemical practices), none of these considerations makes it into operable and enforceable provisions. The health of soils (principle 3) is a key component of food production. Considering the impact of pesticide use on soils, the quantity applied is intimately connected to soil health. Much like the sparse focus on input reduction identified within the framework, soil health as a concept is absent from the regulatory framework contrasting principles 3 and 6, soil health and synergy. Soils are first mentioned in Annex I, in a table depicting products and their respective MRLs. This table indicates that while crops are evaluated for residues, there is no attention paid to soil or ecosystemic health once crops are removed from fields (eg no mention of MRL values established for soils). While the MRL Regulation does not focus on residue levels in soils or the surrounding environment, agricultural products are inextricably connected to their agroecosystems. Calculations of product MRLs therefore also provide potential indications of residue levels present in the surrounding environment. This is important because direct ingestion of pesticides is not the only way to contract harms from them. What can be gleaned from this is that pesticides are applied for agricultural production, and the Regulation for monitoring the residue levels of agricultural product levels omits all environmental components within which those pesticides are applied. This implies that many potential risks and existing harms originating from pesticide use are systemically omitted in the regulation of their use. This is worsened by the lack of protection afforded to soils throughout the Regulation which has resulted in measurable levels of soil contamination in the EU.<sup>69</sup>

The most important implication of this observation is that many doses of pesticides are being simultaneously applied without knowing the true risks of their compounded impacts, contrasting principles 3 and 6 (soil health and synergy). According to the CJEU’s judgement in *Blaise*,<sup>70</sup> the

<sup>63</sup>PAN Europe, ‘PAN Europe Takes Legal Action against Systematic Prolongation of Permits for Toxic Pesticides’ by the European Commission’ (*PAN Europe Blog* 7 July 2022) <<https://www.pan-europe.info/press-releases/2022/07/pan-europe-takes-legal-action-against-systematic-prolongation-permits-toxic>> accessed 19 July 2023.

<sup>64</sup>V Storck, DG Karpouzias and F Martin-Laurent, ‘Towards a Better Pesticide Policy for the European Union’ 575 (2016) *Science of the Total Environment* 1027.

<sup>65</sup>PAN Europe, ‘Banned Pesticides Still in Use in the EU’ (2023).

<sup>66</sup>*Ibid.*

<sup>67</sup>Case C-162/21 *Pesticide Action Network Europe*. ECLI:EU:C:2023:30.

<sup>68</sup>PAN Europe, ‘29 Illegal New Pesticide Derogations, EU Commission Closes Eyes’ (*PAN Europe Blog* 20 June 2023) <<https://www.pan-europe.info/blog/29-illegal-new-pesticide-derogations-eu-commission-closes-eyes>>.

<sup>69</sup>Silva et al. (n 13).

<sup>70</sup>Case C-616/17 *Blaise* ECLI:EU:C:2019:800.

PPP Regulation is valid and complies with the precautionary principle. In a theoretical assessment of the Regulation that did not consider concrete cases, cocktail effects on human health and the environment are meant to be considered during both the Active Substance assessment at the EU level and the authorisation of PPPs at the Member State level.<sup>71</sup> The fact that they are meant to be considered, however, does not mean that they are. According to Hendlin et al, cocktail effects are understudied, and prevailing environmental risk assessment methods are deficient in accurately measuring the unintended cocktail effects of pesticides,<sup>72</sup> contrasting agroecology's systemic approach and principle 6 (synergy). From the risk management perspective taken within food law and regulation, this dictates that more stringent post-authorisation procedures are needed and also begs the question of how risk is defined. This is especially relevant given that setting levels of protection, against which risks are scientifically measured, is a 'normative political choice',<sup>73</sup> and would arguably change depending on the food system approaches that are prioritised politically.

The role biodiversity plays in agricultural production is also absent in the regulation of pesticides. While briefly mentioned as something pesticide users should be aware of in the SUPs Directive, there is no mention of its importance to agroecosystems and food production or why EU regulation should be striving to decrease the impacts of pesticides on biodiversity in the first place. Biodiversity is first mentioned in Article 3 of the PPP Regulation, defined as 'variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this variability may include diversity within species, between species and of ecosystems'.<sup>74</sup> Like soils, it is not mentioned again until Article 4 on the approval criteria for active substances. This conceptualisation, however, ensures that biodiversity is seen not as one of the pinnacles to a healthy environment and productive agroecosystem, but rather as an impediment to unfettered pesticide use and conventional intensive agriculture. The sidelining of biodiversity in the SUPs Directive and the PPP Regulation conflicts with principles 5 and 6, or biodiversity and synergy. EU policy is commonly criticised for the existence of a 'gap between the ambition of adopted regulations and the modesty of results on the ground',<sup>75</sup> a phenomenon that includes pesticide regulation. Given the combined effects of a regulatory framework that demands noncommittal pesticide reductions and has historically allowed consistent derogations on the use of banned pesticides, it can be argued that the EU's pesticide regulation has prioritised short-term harmonisation concerns over long-term environmental health.<sup>76</sup>

### B. The societal cluster

Societal cluster perspectives on pest management focus on designing and producing actions, institutions, and norms aimed at establishing agroecosystems with minimal dependence on high

<sup>71</sup>S Röttger-Wirtz, 'Case C-616/17 Blaise et al.: The Precautionary Principle and Its Role in Judicial Review – Glyphosate and the Regulatory Framework for Pesticides' 27 (2020) *Maastricht Journal of European and Comparative Law* 529; *Plant Protection Products Regulation* 1107/2009.

<sup>72</sup>YH Hendlin et al., 'Like Oil and Water: The Politics of (Not) Assessing Glyphosate Concentrations in Aquatic Ecosystems' 11 (2020) *European Journal of Risk Regulation* 539.

<sup>73</sup>R von Schomberg, 'The Precautionary Principle and Its Normative Challenges' in E Fisher, J Jones and R von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives and Prospects* (Edward Elgar, 2006) 19-41.

<sup>74</sup>*Plant Protection Products Regulation* 1107/2009.

<sup>75</sup>E Bozzini, *Pesticide Policy and Politics in the European Union: Regulatory Assessment, Implementation and Enforcement* (Palgrave Macmillan, 2017) 77-104.

<sup>76</sup>To address some of these issues, as well as meet Green Deal targets set by the F2F and Biodiversity Strategies, the Regulation on the Sustainable Use of Plant Protection Products (SUR), a revision of the SUPs Directive, was recently proposed. While noting these developments is important, analysis of the SUR proposal falls outside of the scope of this paper. Commission (EC), 'Proposal for a Council Regulation on the sustainable use of plant protection products and amending Regulation (EU)' COM(2022) 305 final, 22 June 2022.

agrochemical and energy inputs,<sup>77</sup> as dictated by the environmental cluster. The cluster focuses on (i) identifying and addressing power dynamics that lead to social inequalities and uneven access to resources present in the frameworks that regulate pest management and pesticide use. The cluster then focuses on (ii) how top-down processes facilitate the participation (principle 13) of peasant, small-holder, and other transitioning producers in the regulation of pest management and pesticide use (principle 12), and how the processes engage with changes to societal norms (principle 9). Lastly, it explores (iii) how the regulation engages with the provision of support and infrastructure to peasant, small-holder, and other transitioning producers for organising, cocreating, and sharing knowledge (principle 8) around communal, cooperative management aimed at transitioning away from chemical pesticide dependency towards agroecological pest management techniques.<sup>78</sup>

Pesticide regulation can provide various instances where (point i) power balances arguably skew towards the pesticide industry. The first example is the derogations mentioned in the previous section. Despite their problematic implications for continuing reliance on pesticides, derogations of banned pesticides become even more problematic when the pesticide industry can ask for derogations of their own products. In some Member States, the holder of the derogation is the pesticide industry itself, with agribusiness having a heavy hand in the delivery of derogations in general.<sup>79</sup> Research into this relationship between the pesticide industry and the reluctance found in European governance institutions is that the EU takes a pesticide industry-friendly approach: there is an arguable political hesitancy to take the necessary actions required by EU law when it comes to taking pesticides off the market, even when there is clear proof of externalities and damage.<sup>80</sup>

Glyphosate's muddled reapproval procedure, where undue industry influence was also identified, presents another example of industry preference.<sup>81</sup> In the EU, the burden of proof is placed on the applicant, meaning that pesticide regulation and its prescribed environmental risk assessments (ERAs) are dependent on the pesticide industry's privately funded science.<sup>82</sup> In addition to including only 52 per cent of pertinent peer-reviewed scientific literature reporting adverse effects of glyphosate exposures, large portions of the German Federal Institute for Risk Assessment's (BfR) assessment for glyphosate's reapproval were copied from Monsanto's application.<sup>83</sup> Despite the clear conflict of interest presented in the glyphosate case, the CJEU assessed in *Blaise* that the pesticide reapproval procedure's reliance on industry studies as dictated by the PPP Regulation safeguards the precautionary principle and does not lead to bias.<sup>84</sup> This judgement, however, was based on an abstract review of the regulatory framework, rather than a judicial review of a concrete authorisation or approval decision, such as the glyphosate case.<sup>85</sup> An abstract review of the system established by the Regulation, which affirms the Member States' duties to carry out assessments on the basis of state-of-the-art scientific knowledge cannot account for (i) the barriers posed by the strict standardisation of scientific studies to the acceptance of independent studies, or (ii) a lack of systematic independent counter-analysis of the submitted studies not being required.<sup>86</sup> In essence,

<sup>77</sup>Altieri and Toledo (n 20).

<sup>78</sup>González de Molina et al. (n 24).

<sup>79</sup>PAN Europe, 'Banned Pesticides Still in Use in the EU' (n 65).

<sup>80</sup>PAN Europe, 'Pestgate: Why the EU Pesticide Control Does Not Work the Way It Should' (13 June 2023).

<sup>81</sup>V Paskalev, 'The Clash of Scientific Assessors: What the Conflict over Glyphosate Carcinogenicity Tells Us about the Relationship between Law and Science' 11 (2020) *European Journal of Risk Regulation* 520; M Morvillo, 'Glyphosate Effect: Has the Glyphosate Controversy Affected the EU's Regulatory Epistemology?' 11 (2020) *European Journal of Risk Regulation* 422.

<sup>82</sup>C Robinson et al., 'Achieving a High Level of Protection from Pesticides in Europe: Problems with the Current Risk Assessment Procedure and Solutions' 11 (2020) *European Journal of Risk Regulation* 450; Storck, Karpouzias and Martin-Laurent (n 64).

<sup>83</sup>Robinson et al. (n 82).

<sup>84</sup>Röttger-Wirtz (n 71).

<sup>85</sup>*Ibid.*; S Paulini, 'Fact or Fiction? Case C-616/17 and the Compatibility of the EU Authorisation Procedure for Pesticides with the Precautionary Principle' 11 (2020) *European Journal of Risk Regulation* 481.

<sup>86</sup>Röttger-Wirtz (n 71).

the CJEU ruling disregarded how the regulation procedures unfolded in real-world examples, and as a result, it also disregarded the institutionalised biases benefiting industry-funded science.<sup>87</sup>

In addition to the presence of undue industry influence, other problematic components for (point ii) participation (principle 13) were identified in the PPP Regulation protocols, namely lack of transparency and barriers to accessing key authorisation documents. These findings led to the European Citizens' Initiative (ECI) on Glyphosate in 2018, which focused on three areas: (i) banning glyphosate-based herbicides; (ii) ensuring evaluation procedures relied on published studies; and (iii) setting EU-wide mandatory reduction targets for pesticide use.<sup>88</sup> While the Commission concluded that there were insufficient grounds to ban glyphosate, it did commit to strengthening transparency within assessment protocols and emphasised allocating more focus to implementing the SUPs Directive through harmonised risk indicators.<sup>89</sup> Moreover, the REFIT evaluation of the GFL further addressed some of these barriers to transparency, concluding that the then-existing risk communication protocols were ineffective and fomented public distrust.<sup>90</sup> This evaluation led to the adoption of Regulation 2019/1381 on the transparency and sustainability of the EU risk assessment in the food chain and amended the GFL and PPP Regulation, among others. Noteworthy PPP Regulation amendments focused on increasing access to information (Article 10 on public access to the dossiers; Article 16 on public access to the information for renewal) and assessments of confidentiality. This means that existing pesticide regulatory frameworks, due to recent controversies and reflections of societal values (principle 9), showcased an improvement in transparency and access to information, and as a result, potential improvements to participation (principle 13).

### C. The economic cluster

The economic cluster focuses on facilitating a decreased dependence on pesticides for agricultural production at all societal levels. This can be done by providing the necessary support, equitable access to resources, and incentives to all farmers for transitioning away from pesticide dependence towards agroecological pest management (principle 7); changing market conditions to facilitate local exchange and trade of agricultural products grown using agroecological approaches (principle 11); and prioritising a just and equitable living for all farmers (principle 10), ensuring those engaging in agroecological transitions are not excluded from accessing helpful measures.

When it comes to facilitating changes towards more sustainable alternatives, the regulatory framework is up against large hurdles. In 2014, the GFL's 'fitness' assessment determined if the GFL effectively considered the entire food and feed sector and adequately reflected modern policy trends.<sup>91</sup> The main findings of the assessment concluded that the GFL achieves its core objectives, maintaining its relevance regarding trends related to growth, competitiveness, and increased globalisation. However, the fitness checks also determined that the GFL fails to hold up against new challenges like sustainability and food waste.<sup>92</sup> While this gap exists, further analysis of the legal framework reveals the institutionalisation of certain approaches. This is exemplified most

<sup>87</sup>Ibid.

<sup>88</sup>T Laaninen, 'EU Legislation in Progress: Reconsidering the General Food Law' (2019); European Citizens' Initiative, 'Ban Glyphosate and Protect People and the Environment from Toxic Pesticides' (EU Legislation in Progress Briefing for European Parliament) (2017) <[https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/630315/EPRS\\_BRI\(2018\)630315\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/630315/EPRS_BRI(2018)630315_EN.pdf)>.

<sup>89</sup>European Commission, 'Glyphosate: Commission Responds to European Citizens' Initiative and Announces More Transparency in Scientific Assessments' (12 December 2017) <[https://ec.europa.eu/commission/presscorner/detail/en/IP\\_17\\_5191](https://ec.europa.eu/commission/presscorner/detail/en/IP_17_5191)> accessed 18 October 2023.

<sup>90</sup>European Commission, 'Executive Summary of the Refit Evaluation of the General Food Law (Regulation (EC) No 178/2002) {SWD(2018) 38 Final}' (2018) <[https://ec.europa.eu/food/horizontal-topics/general-food-law/fitness-check-general-food-law\\_en](https://ec.europa.eu/food/horizontal-topics/general-food-law/fitness-check-general-food-law_en)> accessed 17 November 2021.

<sup>91</sup>European Commission, 'Infographic: The General Food Law – Fitness Check' (2018).

<sup>92</sup>European Commission, 'Executive Summary of the Refit Evaluation of the General Food Law (Regulation (EC) No 178/2002) {SWD(2018) 38 Final}' (n 90).

explicitly within the PPP Regulation, where plentiful pesticides are assessed as a condition for ensuring the diversification of agriculture and horticulture. This statement lies at the core of conventional production defined by intensive, large-scale monoculture operations<sup>93</sup> based on the pursuit of economies of scale and maximum efficiency within production.<sup>94</sup> While this approach currently provides a certain competitive advantage within existing globalised markets, it stands in stark contrast to all agroecological principles. Attempts at supporting more sustainable approaches to production are found in the reformed CAP of 2014–2020, which came about as a response to various economic, environmental, and social issues. The CAP 2014–2020 emphasised a long-term perspective to three main objectives: competitive and viable food production; the sustainable management of natural resources; and sustainable rural development.<sup>95</sup>

The CAP reform introduced a new arrangement into its two-pillar architecture that, in addition to its income support and safety net measures, aimed to improve the integration of environmental requirements and strengthen rural development.<sup>96</sup> These goals were supported by the new ‘Greening’ architecture, which made use of cross-compliance in the implementation of obligatory agricultural practices under Pillar 1’s Direct Payment scheme,<sup>97</sup> and various other voluntary measures located under Pillar 2’s Rural Development Policy. For farmers to receive the entirety of their income support from the CAP, they first needed to comply with a basic set of rules that ensured statutory management requirements and good agricultural and environmental conditions, or cross-compliance.<sup>98</sup> Following this compulsory base layer, the compulsory ‘Greening’ instrument rewards farmers for respecting three obligatory agricultural practices (ie maintenance of permanent grassland, ecological focus areas, and crop diversification).<sup>99</sup> Moreover, at least 30 per cent of the budget for each Rural Development Program must be reserved for locally adapted voluntary measures beneficial to the environment and climate, which would be supported by training measures, the Farm Advisory System, etc.

While some of its measures incentivise, support, and offer resources to farmers transitioning away from pesticide use, the CAP measures never explicitly mention pesticides. The CAP Pillar-1 Basic Payment Scheme receives the highest proportion of the budget, and as long as cross-compliance is fulfilled, the payment is provided regardless of how agricultural lands are managed.<sup>100</sup> Moreover, the three measures prioritised under the ‘Greening’ direct payment also make no mention of reducing pesticide use or increasing agroecological pest management approaches.<sup>101</sup> While half of CAP beneficiaries of direct payments are very small farms, 20 per cent of CAP beneficiaries, a small number of large-scale operators dedicated to conventional, intensive production, receive 80 per cent of CAP payments;<sup>102</sup> these economic incentives fail to promote agroecological approaches to food systems, contrasting principles 7 and 10.

<sup>93</sup>Shepon, Henriksson and Wu (n 7).

<sup>94</sup>De Roest, Ferrari and Knickel (n 7).

<sup>95</sup>European Commission, ‘Overview of CAP Reform 2014–2020’ (2013).

<sup>96</sup>*Ibid.*

<sup>97</sup>European Parliament, ‘First Pillar of the Common Agricultural Policy (CAP): II – Direct Payments to Farmers’ (*Fact Sheets on the European Union* 2022) <<https://www.europarl.europa.eu/factsheets/en/sheet/109/first-pillar-of-the-common-agricultural-policy-cap-ii-direct-payments-to-farmers>> accessed 20 September 2023.

<sup>98</sup>Statutory management requirements apply to all farmers whether or not they receive support under the CAP; Good agricultural and environmental conditions only apply to farmers receiving support under the CAP. European Commission Agriculture and Rural Development, ‘Cross-Compliance’ <[https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/cross-compliance\\_en](https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/cross-compliance_en)> accessed 20 September 2023.

<sup>99</sup>European Commission, ‘Overview of CAP Reform 2014–2020’ (n 95); European Parliament (n 97).

<sup>100</sup>A Linares Quero et al., ‘Assessment of the Common Agricultural Policy 2014–2020 in Supporting Agroecological Transitions: A Comparative Study of 15 Cases across Europe’ 14 (2022) Sustainability 9261.

<sup>101</sup>European Parliament (n 97).

<sup>102</sup>European Commission, ‘CAP Performance: 2014–20’ <[https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cmef/cap-performance-2014-20\\_en](https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cmef/cap-performance-2014-20_en)> accessed 14 September 2023; Linares Quero et al. (n 100).

Out of Pillar 2 – Rural Development Program’s list of measures, only ‘agri-environment-climate measures’, ‘subsidies for organic farming (conversion or support payments)’, and the ‘risk management toolkit’ focus on incentivising production that decreases pesticide use and dependence.<sup>103</sup> However, even though the agri-environmental and organic production CAP measures have been found to be the main drivers of agroecological practices due to the stability they provide to farmer incomes during vulnerable transition periods, they cannot always be relied on to fully compensate for the additional costs needed to produce organically or otherwise.<sup>104</sup> Moreover, farmers often lack the knowledge to implement the recommended practices which, coupled with the high penalties for making mistakes, negatively impacts agroecological adoption for farmers.<sup>105</sup> Relatedly, the CAP 2014–2020 emphasised the importance of knowledge sharing and access to advisory, information, training, and experimentation services (principle 8). These measures are considered key to facilitating agroecological transitions because they help farmers meet administrative requirements, offer support and community for farmers engaging in transitions, encourage farmer-to-farmer exchanges and experimentation, etc. However, very few farmers have access to these services, and there is a lack of agroecological education and qualified advisers present.<sup>106</sup>

The CAP 2014–2020 also provided various market incentives (principle 11) aimed at facilitating local exchange and trade of agricultural products (eg physical investments; development of farms and businesses; basic services and revitalisation of villages in rural areas; setting-up of producer groups and organisations; encouragement of cooperation between farmers and those involved in the food production chain; etc). These measures contribute to farm and business development in rural areas by enabling autonomous management of food systems on a local scale, helping create short supply chains, and empowering farmers to participate in local rural development.<sup>107</sup> These measures, however, do not focus on decreasing pesticide use and dependency and their funds are generally difficult to access for smaller farms. While this makes them unsuitable for farmers beginning their transitions, they could offer support to producers that have already transitioned towards low-input, agroecological methods of production.<sup>108</sup>

The few, voluntary actions incentivising farmers to decrease pesticide dependency, however, are offset by the fact that the EU heavily subsidises the pesticide industry and pesticide-reliant agricultural practices, which presents a structural barrier to decreasing pesticide use and dependency. In the face of such a mechanism, where €12 billion in pesticide sales were made to farmers in 2019 alone, regulating for agroecological alternatives becomes even more important, potentially providing more affordable approaches for producers. While the global pesticide market has doubled its profits in the past few decades and prices paid by consumers have increased fivefold since the 1960s, farmers’ incomes and share of commodity values have decreased, contravening principles 10 and 11 (fairness and connectivity).<sup>109</sup> Moreover, despite the complicated, multistep risk analysis approaches implemented for pesticide and active substance approval, setting ‘safe’ protocols for their use, etc, the recommended equipment for pesticide application was found to provide ineffective protection for those handling pesticides.<sup>110</sup> Recent investigations establishing the grave inadequacy of those recommendations for protecting

<sup>103</sup>European Parliament, ‘Second Pillar of the CAP: Rural Development Policy’ (*Fact Sheets on the European Union* 2022) <<https://www.europarl.europa.eu/factsheets/en/sheet/110/second-pillar-of-the-cap-rural-development-policy>> accessed 20 September 2023.

<sup>104</sup>Linares Quero et al. (n 100).

<sup>105</sup>*Ibid.*

<sup>106</sup>*Ibid.*

<sup>107</sup>*Ibid.*

<sup>108</sup>*Ibid.*

<sup>109</sup>Basic, CCFD-Terre Solidaire and Pollinis, ‘Pesticides: A Model That’s Costing Us Dearly’ (synthesis of the study) (2021) <[https://lebasic.com/wp-content/uploads/2021/11/Pesticides-a-model-thats-costing-us-dearly\\_EN-Synthesis.pdf](https://lebasic.com/wp-content/uploads/2021/11/Pesticides-a-model-thats-costing-us-dearly_EN-Synthesis.pdf)>.

<sup>110</sup>Horel (n 14).



**Table 2.** Summary of the pesticide regulatory framework's agroecological alignment

Cluster on the pesticide regulatory framework	Identified trends	Interactions with agroecological principles
Environmental Cluster	Strategies for pesticide reduction are not concerted or mandatory	Hinders principles 1 & 2
	Adoption of contextual, agroecological pest management strategies are not mandatory	Hinders principles 1 & 2
	Soil health, biodiversity, and broader environmental health are omitted	Hinders principles 3, 5, & 6
	Food systems are conceptualized linearly	Hinders principle 6
	EU prioritized short-term harmonization concerns over long-term environmental health	Hinders all principles
Societal Cluster	The pesticide industry has shown to have a significant role in the regulation of its own products	Hinders principles 12, 13, & development of just food system regulation
	Fails to engage small-holder and peasant farmers in transitions towards communal cooperative management of local agroecosystems	Hinders principles 8 & 12
	The framework has recently undergone improvements to its participation measures via improvements to transparency that reflect changing societal norms	Supports principles 9 & 13
Economic Cluster	Some mandatory measures exist that offer support to small scale farmers	supports principle 7
	Some voluntary measures exist that support pesticide-free agricultural production	Supports principle 7
	Some voluntary measures support the creation of local markets led by farmers	Supports principle 11
	Navigating access to these measures/funding is difficult for small farmers	Hinders principles 7, 10, & 11
	Penalties for poor or wrong navigation of these measures deter farmers from engaging in more agroecological measures	Hinders principles 7, 10, & 11
	There is an overarching focus on market competition and integration	Hinders principles 7, 10, & 11

farmworkers indicate the injustice and stark power differentials present in existing food systems and call for fundamental changes to pesticide regulation that can better support dignified and robust livelihoods for all actors engaged in food systems (principle 10). Despite CAP goals exemplifying actions and institutions cooperative with agroecology, its strategies were weakly implemented with mixed outcomes:<sup>111</sup> assessments of CAP 2014–2020 performance emphasise that the use of external inputs, like pesticides, continues to be too high.<sup>112</sup> To summarise the analysis (Table 2), while the existing pesticide regulatory framework has potential, it does not currently align with agroecological aims. The framework promotes guidelines for an 'appropriate' and safe use of pesticides but has allowed fragmented, non-committal, and potentially damaging approaches to pest management across the EU.

<sup>111</sup>European Commission, 'CAP Performance: 2014–20' (n 102).

<sup>112</sup>*Ibid.*

#### 4. Conclusion

Using strong sustainability as a conceptual frame, this article operationalised agroecology in the analysis of the current European legal framework on pesticides, showing how agroecology can be better understood in legal terms. Transitioning to pesticide-free agroecosystems demands a concerted, contextual, multi-pronged strategy across governance levels that is capable of addressing and regulating food system dynamics in systemic ways. What can be seen in how pesticides are currently regulated in the EU is that food systems are broken up into simplified elements, then assessed and regulated from linear perspectives that are unable to capture the systemic, dynamic, and interconnected nature of agroecosystems. This linearity has facilitated the setting aside of key elements, like soil health and biodiversity, and the dynamics between them that result in healthy agroecosystemic behaviour. The implication of this is that existing pesticide regulation, and arguably other frameworks regulating food systems, cannot understand, prioritise, or regulate for proper agroecosystemic functioning or (strong) sustainability. The inconsistent application of the precautionary principle with regard to pesticides and the political foot-dragging witnessed at the EU level demands taking a stricter stance on undue influence within regulatory processes and exploring how an agroecological definition of risk would reflect on pesticide regulation. Moreover, when it comes to economic policy measures, the CAP may provide opportunities to expand agroecological pest management on paper but continues facilitating pesticide-based approaches in production.

To comprehensively address these issues, further research into the implications of agroecological operationalisation within the EU, an industrialised, western context, is needed. Further research into the agroecological alignment of the proposed Regulation on the Sustainable Use of Pesticides, the reformed CAP for 2023–2027, and other components of the Green Deal's legislative framework for SFSs is also necessary to assess the sustainability of European approaches to pest management, but also food system regulation. Given that agroecosystems represent one of the most important interfaces between humans and their environment, legal and political institutions must learn to think more systemically. For food systems, this includes gaining a greater understanding of the relationships between ecology, the behaviour of human systems, and the management of agroecosystemic dynamics. Without adequate measures that strengthen agroecosystemic resilience towards pests and other diseases, increased support for producers undergoing transitions, and penalisations for unwanted strategies, dependence on pesticides will continue. The operationalisation of agroecological principles within law will therefore be key to meeting future European policy goals for pesticide use and broader food system behaviour, closing the gap between current unsustainable realities and sustainable future visions.

**Data availability statement.** This Article was produced based on primary legal sources available at <https://eur-lex.europa.eu/homepage.html>, and on secondary literature available through online repositories and university subscriptions.

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