SCAR
Standing Committee
on Agricultural Research

RESEARCH AND INNOVATION PRIORITIES FOR MORE SUSTAINABLE FOOD SYSTEMS IN EUROPE AND GLOBALLY

SCAR Food Systems FOOD

ARCH
European Agricultural Research towards greater impact on global CHallenges

Bioeconomy Strategic Working Group

Summary

In the face of climate change, biodiversity loss, environmental degradation, food insecurity and hidden hunger, there is an urgent need to reverse the unsustainable trajectory of food production, processing, distribution and consumption in the EU and globally. Making sustainable and healthy diets accessible to all, improving equity, building resilience and transforming governance of food systems are four critical and interlinked areas of intervention. These areas offer important opportunities for the EU to lead targeted support for research and innovation (R&I) and effectively accelerate the transformation towards sustainable food systems in Europe and globally. Based on international expert consultation, this policy brief highlights 16 critical R&I needs to be addressed by the EU and provides cross-cutting recommendations. Specifically, due to the interconnectedness of food systems, the global dimension must be included in R&I efforts to be effective. Moreover, strengthening R&I processes for collaboratively developing pathways to shifting diets bear a great leverage for efficient transformation. Finally, inclusive, multi-actor and participatory approaches, suitable to the specific context, are a prerequisite to generate relevant results and to achieve more sustainable food systems.

Introduction

This policy brief highlights the key insights and recommendations from the virtual workshop "International Expert Consultation on Research Needs and Priorities for the Transformation to Sustainable Food Systems at European and Global Level", which took place 23rd to 25th January 2024. The goal of this workshop was to discuss the challenges the EU food system is facing in the global context, and to identify priority R&I issues that need to be addressed.

The workshop was jointly organized by three of the Strategic Working Groups (SWG) of the Standing Committee on Agricultural Research (SCAR) namely SWG ARCH, SWG FOOD SYSTEMS and SWG BIOECONOMY. It brought together 120 participants from research organisations, public authorities, EU institutions, the private sector, funding agencies and NGOs from 32 countries.

The participants shared their knowledge, ideas and expertise around four topics: "Sustainable and healthy diets", "Equity and fairness", "Resilience" and "Governance". They discussed specific questions identified by the SCAR SWGs prior to the workshop. While a general summary can be found in the workshop report, this brief presents the policy-relevant findings of an in-depth analysis of the authors. It primarily targets R&I policymakers and funders within the European Commission and national ministries. It also offers guidance to researchers and their institutions on conducting research in this field.

Four areas of R&I intervention to accelerate the transformation of food systems

The world is confronted with a critical imbalance: while per capita calorie production is sufficient to feed all, food insecurity and all forms of malnutrition are alarmingly high, with negative consequences for human health and well-being and for national economies. The global food system generally fails to deliver healthy and sustainable diets that are affordable to all[2]. In the face of multiple crises, such as climate change, conflicts, biodiversity decline, economic shocks and natural disasters, it is becoming increasingly urgent to transform food production, distribution, and consumption practices in a way that increases resilience and leads to the realisation of the human right to food for all.

From a local perspective, the actual performance of food systems differs significantly; the reasons for this are manifold, often interlinked and context-specific. Local communities concurrently face opportunities and barriers in applying agro-ecological principles to foster sustainable food system transformation and change consumption patterns. A detailed understanding of the linkages and interdependencies between the various elements of food systems is still lacking. It includes transparency of current and future actual costs of food production and associated externalities as well social, cultural, economic and environmental trade-offs and synergies on different scales. In turn, this makes it difficult to take effective action for improvement.

While this is a challenge, it is also an opportunity: food system transformation can be an effective lever to achieving the Sustainable Development Goals of the United Nations 2030 agenda (UN, 2022)[3]. However, for food system transformation to address a wide range of development objectives simultaneously, designing coherent and multi-sectoral policy interventions is a major task.

R&I is essential to close existing knowledge gaps and support navigating a just and fair transformation of food systems. The European Union's research and innovation programme is a major enabler to support the realization of the European Green Deal's vision to make the EU climate neutral by 2050 and to re-orient the EU's economy and society towards a just and sustainable future. In this regard, the European Partnership for a Sustainable Future of Food Systems (FutureFoodS) is designed to support the transformation of the various EU food systems in line with the objectives of the European Green Deal, the Farm-to-Fork Strategy and the Food 2030 policy. However, as food systems are interconnected regionally and globally through supply chains and international trade and, for example, 19% of cropland required for EU consumption comes from outside the EU[4], R&I to support food systems transformation cannot be implemented using only a European perspective. It is therefore also important to leverage synergies with the EU's Global Gateway strategy[5] and its strategic R&I partnerships, such as the AU-EU Innovation Agenda[6] and the future International Research Consortium.

To accelerate the transformation to sustainable food systems at European and global scales, R&I needs were identified and how R&I should be undertaken was discussed, according to four areas of intervention[8] by international experts invited to the workshop in January 2024.

1. Enhancing performance measurement and monitoring of food systems

Sustainable and healthy diets, should be "…protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources" (FAO 2010) for all. This requires a detailed and contextualized understanding of food systems, their components and linkages on different spatial and time scales. Recognizing the true costs and benefits of food production and consumption offers a significant lever for effective action and public policy decisions in favour of sustainable and healthy diets and hence, the transformation of food systems.

2. Strengthening resilience and food and nutrition security

Strengthening the resilience of food systems is a precondition to ensure food and nutrition security (FNS). Thus promoting resilience should be a key policy objective in itself. Focusing on food system resilience calls for a clear understanding of shocks, stresses and risks, and reveals critical vulnerabilities. In turn, different pathways to enhance robustness, strengthening recovery and leveraging reorientation for building resilience can be assessed. Generally, resilience-enhancing measures need to be linked to sustainability norms so that resilience capacities become drivers for sustainable food systems transformation. However, how to operationalize the concept and how to make food systems resilience measurable at different levels and scales is still debated.

3. Promoting inclusiveness, equity and fairness

Inequalities in FNS undermine the fundamental human right to food as well as social and political stability. As an ethical imperative, their reduction requires addressing inequalities within and beyond food systems. Leaning on inclusive multi-actor approaches, mutual learning and international cooperation to develop capacities and improve local situations is widely acknowledged, yet not consistently implemented. For example, sharing research infrastructures and data between the global south and north is needed to support knowledge generation and integration, drawing from and valuing local and traditional knowledge for the development of socially just, economically fair and environmentally friendly local food systems.

4. Improving governance and harmonizing policies

Governance of food systems is a critical determinant of FNS. It describes "the ability of actors to steer the food systems to achieve food security, enhance resilience, facilitate adaptation, or to instigate transformation"[18], and involves actors and activities within and outside food systems. Due to the complexity of food systems, it is necessary to work in ways that move beyond linear engineering approaches and seek to accommodate inherent social struggles within the transformation processes[19]. R&I plays a pivotal role in reducing uncertainties on how to design and improve the impact of necessary policy interventions to achieve greater food system sustainability.

R&I needs towards sustainable food systems at European and global scales

For each of these four areas of intervention, key R&I needs have been collected (see workshop report for more details). These are summarised in Fig. 1. They offer well-founded starting points for funding agencies and researchers alike to design effective research programs and projects

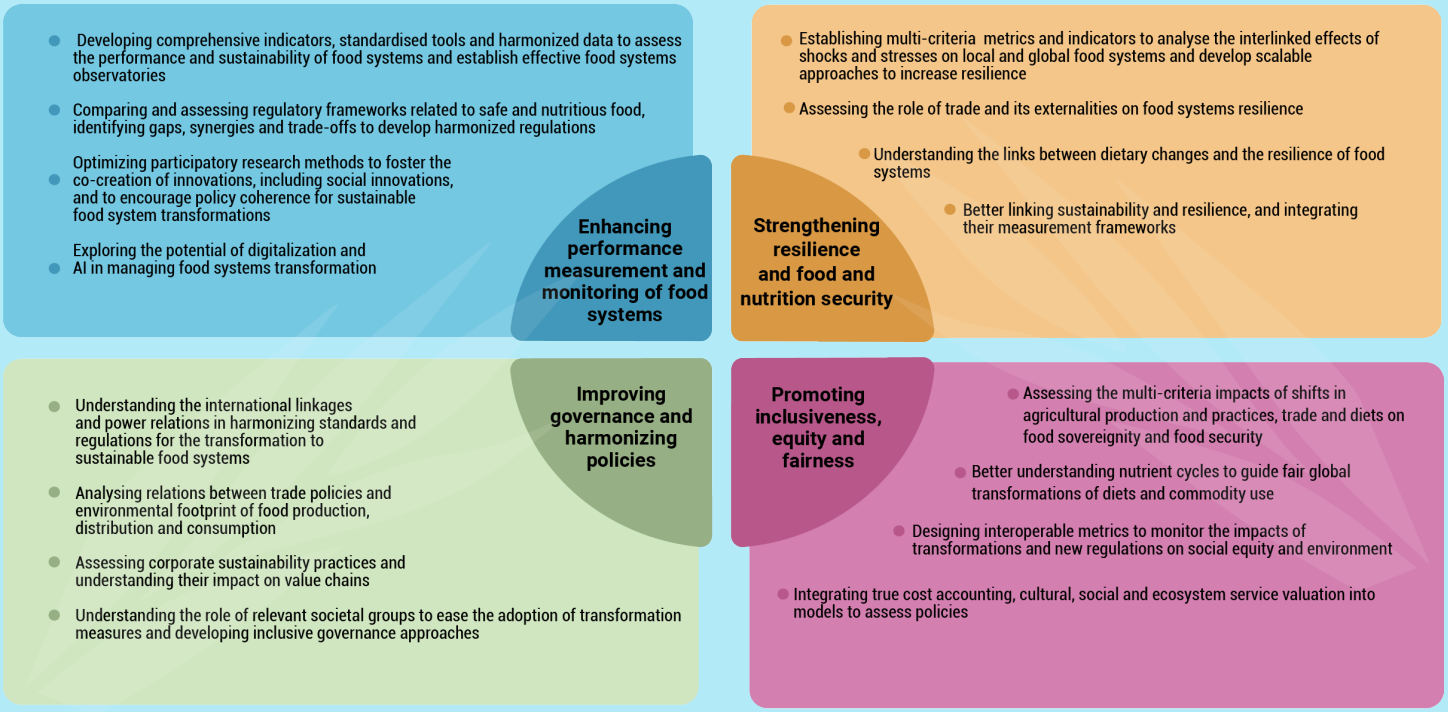


Fig. 1: Summary of 16 key R&I needs identified during the workshop in January 2024

Reviewing the 16 identified R&I needs (Fig. 1) revealed three important cross-cutting dimensions:

Global dimensions across all areas of intervention, from metrics to policies

R&I priorities in all four areas highlight the importance of integrating European as well as global perspectives. In that respect, these R&I priorities suggest new opportunities for the EU to lead the way on developing more effective and scalable solutions and to contribute to global food security and healthy nutrition within planetary boundaries for a growing world population.

Measuring performance and monitoring food systems to guide equitable transformations require holistic indicators that reflect social, economic and environmental changes at different scales, as well as data collection and models that adhere to international standards and interoperability. This will reduce redundancy and ensure that resources are utilized optimally, whilst the financial and operational burdens are shared in a fairer manner. In this context, sharing research infrastructures and supporting open data systems are cost-effective strategies. Moreover, it provides an opportunity for European research institutions to achieve further global recognition and accelerate excellence.

Coherent food-related policies are a prerequisite for sustainable transformations of European and global food systems. R&I can fill critical knowledge gaps to harmonize policies across sectors and borders, and foster global policy alignment. Nutrient cycles, i.e. of nitrogen (N), phosphorus (P) and potassium (K) can become central threads for the assessment of interventions, similar to the carbon cycle for the governance of climate change. For instance, support is needed to build comprehensive knowledge on the N-cycle to inform the development of coherent policies on sourcing and using proteins, developing dietary guidelines and governing commodity use at local and global scale. Further, priority should be given to supporting R&I related to the integration of a true cost accounting system and ecosystem services valuation into policy assessment and modelling. Thereby, models to support decision-making must address the information needs of various stakeholders and need to reflect different scenarios.

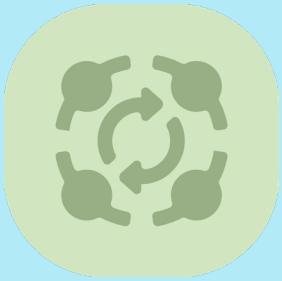
Across all areas of intervention, digital technologies including artificial intelligence models bear great potential to bridge information gaps and assist in decision-making for sustainable food systems transformation. However, R&I must integrate such technologies in a responsible manner. Thus, when supporting R&I in food systems digitalisation, the EU must ensure inclusivity and fairness, e.g. that small-scale producers and vulnerable populations will not be excluded from data ownership and from the benefits arising from the use of their data. Also, the use of natural resources and energy must be considered. Again, supporting fair international R&I cooperation may allow European stakeholders not only to contribute but also to benefit from developments outside the EU in terms of simple and cost-effective digital innovations for small-scale producers and sustainable business innovations. From this perspective, the European partnership FutureFoodS should strengthen its linkages to the European partnership “Agriculture of Data”.

R&I on dietary shifts as an effective lever for all areas of intervention

Changing the way we eat in the EU is an undeniable necessity to make the European and global food system more sustainable and resilient. This is also one of the main objectives of the European partnership FutureFoodS. The research needs identified during this workshop reinforce and supplement the partnership's strategic research and innovation agenda. R&I is required to guide effective and inclusive interventions on both shifting supply and demand to improve the sustainability of diets and food systems as a whole. In this regard, comprehensive methods and assessment tools have to be developed to predict the impact of dietary shifts on food systems sustainability and resilience as well as its relevance for addressing climate change and other environmental challenges. Moreover, support is needed for R&I to compare and assess the effects of regulatory frameworks, including international standards related to the sustainability, safety and nutritional value of food. R&I will also help in identifying gaps, synergies and trade-offs to develop harmonized regulations at local, European and global levels. Such regulations will need to be inclusive, leaving no-one behind, notably small-scale producers and marginalised communities. Fostering R&I in this direction will support the creation of innovative value chains, with improved economic stability for producers, healthy food environments and a reinforced nutritional security for the consumers.

Dietary shifts and beyond, the transformation to sustainable and resilient food systems are intractably linked to changes in local and global trade relations. Hence, current and future trade policies have to be assessed through the lens of their actual contribution or constraint onto food systems transformation, including desired dietary changes, at different scales. In particular, the effects of trade policies on the environmental footprint of food production, transportation and consumption, including issues of water and food waste management, need to be assessed at European and global level in order to limit negative externalities and develop sustainable solutions. The EU Timber Regulation (EU No 995/2010) which aims to prevent deforestation and to combat trade in illegally harvested wood, i.e. prohibiting its release on the EU market even if produced outside the EU may serve as an important learning example as it underlines the European leverage for overcoming global challenges.

Multi-actor platforms, participatory approaches and inclusive governance, the key for successful R&I interventions



Across all areas of intervention, co-creation of knowledge is critical to develop successful and socially accepted solutions and encourage policy coherence for sustainable food system transformations. Complex societal problems cannot be solved by one scientific discipline alone or indeed by scientific knowledge alone, and thus, require collaborative, multi-actor and transdisciplinary approaches. It includes framing problematic situations in a way that considers not only ecosystem-based dimensions but also stakeholder perspectives and their individual and collective capacities. Developing inclusive pathways of transformation requires strengthening the interface between academia, industry, society as well as policy. The research processes need to enable

the integration of different perspectives and different types of knowledge, while its structures need to ensure good governance along all its stages. In turn, related capacities need to be built along with creating supportive funding conditions.

The triad of political, social and economic systems represents key interacting components that shape food systems. They are inherently a large part of the solution for the successful transformation to food systems that will be environmentally sustainable, socially equitable and economically viable. However, they are represented by very heterogeneous stakeholder groups with different values, goals, influences, needs, knowledge and constraints. Thus, there is a strong need to understand their perspectives to influence the adoption of transformative measures and to build inclusive governance approaches. This also underlines the need to find common ground and to translate research results into customized messages for the different stakeholders. For example, making the potential benefits of transformative measures more explicit in terms of economic value as well as social and environmental benefits may foster their adoption. Support is needed to build related capacities for inclusive interfaces and for communication and dissemination.

Opportunities for the EU to lead on inclusive R&I to transform food systems

In order to measure and monitor the performance of food systems to deliver sustainable, safe and nutritious food at European and global scale, the EU should lead the development of comprehensive yet robust and standardised tools to holistically assess true and future costs of the current food systems, including local and global perspectives. For the successful development of such tools, a transdisciplinary approach as well as inclusive communication is crucial. In addition, data science and Artificial Intelligence (AI) will play an important role exploiting all types of data and in combination with other tools, will help in improving and harmonizing performance measurement of different agrifood-systems. Thus, they will support decision-making for effective transformation pathways.

Nutrient balance and biomass competition have to be systematically addressed across production and consumption systems on different scales. Therefore, R&I is needed to assess and valorise the potential benefits of novel food and farming systems, such as vertical agriculture, urban farming, cellular agriculture, insect bioconversion etc. as well as innovative protein sources and novel food technologies. This includes the investigation of barriers and enabling factors for their adoption on both, supply- and demand-side as well as for the adoption of existing systems such as organic farming or agroecological practices. Moreover, the value of neglected and underutilized plant and animal species, including related indigenous and tacit knowledge, needs to be tapped for the sustainable transformation of food systems.

To better cope with disruptions and vulnerabilities of European and global food systems, it is crucial to integrate resilience thinking into the development of the envisioned food systems observatory in FutureFoodS. Based on a clearly defined concept of resilience, which is linked to sustainability, such an observatory should map all relevant food system practices, interventions, and their impacts on resilience across scales. For its conceptualization, actor-orientation, context-specificity and bottom-up approaches need to be considered. Resilience mapping also requires the definition of metrics and threshold values as well as coherent indicators and procedures. The latter need to be linked to existing tools and methodologies as well as ongoing initiatives like, for example, the Food Systems Countdown Initiative (FSCI), the European Climate Neutrality Observatory (ECNO), EIT Food Consumer Observatory, the different EU market price observatories, the European Drought Risk Atlas, EU food quality observatory or the European Drought Observatory. Moreover, other regional initiatives, e.g. the EU-AU Partnership on Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA) or PRIMA must also be linked. Through these actions, the observatory will contribute to a better understanding of how policy interventions, projects, farming types, etc., improve resilience and contribute to the transformation to sustainable food systems.

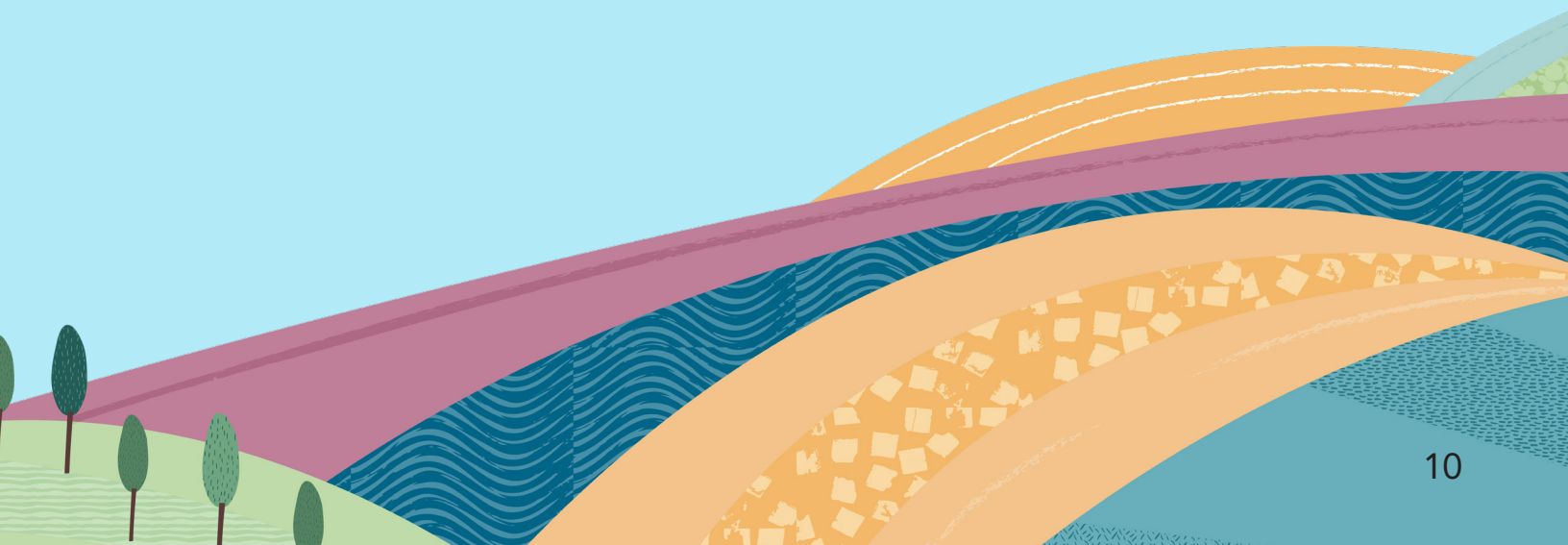
To enhance preparedness and response mechanisms in times of crisis, policies and R&I interventions should strengthen resilience rather than providing short-term emergency responses. There is a need for R&I to contribute to the elaboration of a comprehensive resilience strategy, which taps into the potential of strengthening reorientation capacities to enhance adaptability and recovery, and is linked to the agenda of transformation to sustainable food systems. Such a strategy needs to account for short-term shocks as well as long-term stressors. It must also relate to the European Food Security Preparedness and Response Mechanism (EFSCM) and integrate lessons learned from DG ECHOs Resilience Marker.

For an equitable transformation of food systems at European and global scale, R&I must be supported to provide policy-makers with a contextualized and evidence-based understanding of what makes diets sustainable or unsustainable. Such an approach should take into account local and regional as well as global perspectives. By considering resource capacities, local traditions, know-how and culture, equitable and fair transformation pathways can be developed to make healthy diets accessible to all. Moreover, the integrated analysis and modelling of local/regional and multi-criteria impacts of global food systems will provide guidance to help address trade-offs involved between for example international trade and food sovereignty, modernization of value chains and socio-economic equity, and job protection in small farming systems and intensification and mechanization of agriculture. Thus, interventions targeting

the EU can appropriately consider linkages and side effects to countries outside the EU.

R&I needs to frame the co-construction of technological and social innovations at local scale to empower local communities, support adoption and identify pathways to scaling. To trigger a transformative change of food systems at European and global scale, the EU has the chance to play a leadership role and prepare future trade opportunities by funding international collaborative multi-actor research and innovation. This will enable the creation of spaces in which European and global stakeholders share experiences, learn from each other and develop transformation pathways for inclusive and locally adapted sustainable food production methods, food environments and governance approaches. These exchanges can form the basis for the development of equitable value chains and global trade, ensuring in the meantime the long-term competitiveness of the European agri-food sector and thus, the development of a sustainable global food system.

Harmonized policies, standards and certification schemes will be necessary to facilitate an equitable socio-economic and environmentally friendly local and global transformation of food systems. Through R&I, context-specific policies and governance approaches will need to be jointly developed, taking into account different scales, power relations and specific needs of stakeholders. Hence, the EU should support R&I to foster dialogue and communication between relevant food system stakeholder, including producers, industry, civil society, academia and policy at local, regional and European level. For example, the establishment of an integrated system of councils for sustainable and resilient food systems transformation should be examined further as well as an Open innovation ecosystem operating in a territorial context integrating innovation and research processes in a public and private partnership (Living Labs) could be useful to test.



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