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EDITED AND REVIEWED BY
Andrew Juan Challinor,
University of Leeds, United Kingdom

*CORRESPONDENCE
Leanne Zeppenfeldt
✉ leanne@clim-eat.org

RECEIVED 31 October 2024
ACCEPTED 04 December 2024
PUBLISHED 16 December 2024

CITATION
Zeppenfeldt L, Merrey DJ, Loboguerrero AM
and Dinesh D (2024) Editorial: Reforming
agri-food research and development systems
to meet 21st-century needs.
Front. Sustain. Food Syst. 8:1520399.
doi: 10.3389/fsufs.2024.1520399

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Editorial: Reforming agri-food research and development systems to meet 21st-century needs

Leanne Zeppenfeldt^{1*}, Douglas J. Merrey²,
Ana Maria Loboguerrero³ and Dhanush Dinesh^{1,4}

¹Clim-Eat, Wageningen, Netherlands, ²Independent Consultant, Gainesville, FL, United States, ³Adaptive and Equitable Food Systems, Agricultural Development, Global Growth and Opportunity, Bill and Melinda Gates Foundation, Washington, DC, United States, ⁴Faculty of Environment, School of Earth and Environment, University of Leeds, Leeds, United Kingdom

KEYWORDS

agri-food research and development, food systems transformation, AR4D reform, transdisciplinary research, research governance

Editorial on the Research Topic

[Reforming agri-food research and development systems to meet 21st-century needs](#)

The research and innovations produced by the twentieth-century agri-food research for development (AR4D) systems have been fundamental in shaping today's world. They have enabled unimaginable progress toward achieving global food security. However, current food systems no longer meet the needs of humanity: hunger and malnutrition are increasing, while the food system produces significant greenhouse gases (GHGs) and is the major cause of biodiversity loss. We need multiple game-changing innovations to transform our food systems (IEA, 2022). We argue that current AR4D systems cannot meet the needs of the twenty-first century. Radical transformation is needed to simultaneously reduce GHG emissions, reverse land degradation, substantially increase food production, and achieve more equitable outcomes. Our food systems' diverse and interconnected crises demand a rich palette of synergistic game-changers across scales to make global agriculture more sustainable and resilient (Merrey et al., 2023).

How these game-changers are developed, researched, and scaled are important processes that shape what transformation looks like (Béné, 2022; Conti et al., 2021, 2024). Therefore, we need an honest assessment of whether the systems tasked with developing these innovations are still fit for purpose. This Research Topic (RT) invited research and reflection on (1) whether or not the landscape of AR4D systems is fit for purpose, and (2) the main bottlenecks, systemic reforms, and financial needs required to ensure they can address the challenges.

Others have recognized the inadequacies of current AR4D systems. CGIAR, the most critical global AR4D system, has implemented multiple

phases of reform to increase its effectiveness through large-scale focused, demand-driven research programs implemented with many partners. [Hellin et al.](#) summarize some of the literature on these changes. They recommend increasing the role of social science because food systems are embedded in larger social systems and co-creating innovation through more equal partnerships. We agree, but we feel that a more radical approach is needed.

This RT invited a wide variety of articles. The contributions included are predominantly reflections from researchers and practitioners. This editorial draws out some insights from these contributions and concludes that even more radical measures are required to address the complex, wicked challenges of the food system.

Contributions focused primarily on strategies for fostering collaboration in agri-food research for development. [Cramer](#) highlights the importance of embedding knowledge brokering in the portfolio and evaluation criteria of research organizations, such as the CGIAR, to ensure that research informs policy and vice versa. [Zeppenfeldt et al.](#) assess the usefulness of paradoxical thinking to support practitioners in navigating their collaborations with incumbent private sector actors. [Boyd et al.](#), based on an examination of both global and United States-led agricultural research initiatives, present innovation, integration, implementation, and evaluation as key cross-cutting elements of research that can help harmonize efforts and incentivize collaboration. [Remans et al.](#) share how “backcasting” is a valuable tool for collaborating and identifying ways to produce game-changing socio-technical innovation bundles. [Collier et al.](#) call for improved collaboration in the post-secondary food systems education of future food systems practitioners. These approaches reflect [Hellin et al.](#)'s call for a greater role for the social sciences, transdisciplinarity, and attention to politics and power in AR4D. We must break the silos that dominate many of today's organizations, projects, and initiatives in the AR4D landscape. These studies address the second question in our invitation and offer useful concepts, theoretical perspectives, and methods to enable closer and more targeted collaboration among these actors.

However, reform of our AR4D systems must go beyond better collaboration. The current architecture of institutions and processes—the research paradigms ([Hellin et al.](#))—that shape funding, collaboration, and strategies must be critically assessed to address solved issues. These include building the institutional capacity of National Agricultural Research and Extension Systems (NARES) to empower them to lead research programs, re-orienting research funding currently allocated to international research partners in a manner that disempowers NARES organizations ([Jayne et al., 2023](#)), and promoting long-term investments that go beyond responding to symptoms to focus on solving the root causes of central development questions like climate vulnerability, gender inequality, and hunger.

Radical reform of institutions is always a difficult challenge. Researchers, donors, and others are comfortable with continuing business as usual or tinkering with the system; there is no immediate incentive to change radically. However, if an institution is no longer fit for purpose and cannot produce the transformative game-changers needed, it must be re-visited. Radical reform

requires phasing out or re-orienting existing ways of doing things to create space for urgent action ([Zeppenfeldt and Dinesh, 2023](#)). We have argued elsewhere that this requires radical policy and governance reform, long-term transdisciplinary research funding, and bold and effective leadership. This will require integrating current partnerships, including national, regional, and global research institutions, universities, NGOs, and the private sector ([Merrey et al., 2023](#)).

In short, we must build on the existing cadre of researchers and research leaders in the private and public sectors to create new *food system innovation ecosystems* as the key to success. An innovation ecosystem is a network of actors, with supporting institutions and policies, that collaborate to identify and promote innovations, including technologies, processes, or forms of organization ([Tropical Agriculture Platform, 2016](#)).

AR4D investments are currently short-term, fragmented, and often operate on one dimension of a problem without understanding the interconnections with other dimensions. We must rethink how we collaborate to design, fund, and govern AR4D. To be successful, long-term stable financial support, accompanied by incentives for the adoption of innovations by women and those with insufficient resources to invest, and incentives for private sector co-investment, will be required.

We recognize that this is a daunting agenda. We are thankful to all the contributing authors who have contributed to important dimensions of this agenda, and we encourage people to read their papers. We hope that this Research Topic and its contributions inspire further study and conversation on how to rewrite the rules of the game for AR4D to ensure that our food systems are climate-resilient, productive, sustainable, healthy, and equitable as the twenty-first century unfolds.

Author contributions

LZ: Writing – original draft, Writing – review & editing. DM: Writing – review & editing. AL: Writing – review & editing. DD: Writing – review & editing.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The handling editor AC declared a shared affiliation with the author DD at the time of review.

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