

Sustainability in global agriculture driven by organic farming

Agricultural practices need to change to meet the United Nations Sustainable Development Goals by 2030. How to achieve the SDGs is heavily contested. Here we propose a policy framework that triggers the required transition. Organic agriculture, although not a silver bullet, is a useful component in such strategy.

Frank Eyhorn, Adrian Muller, John P. Reganold, Emile Frison, Hans R. Herren, Louise Luttikholt, Alexander Mueller, Jörn Sanders, Nadia El-Hage Scialabba, Verena Seufert and Pete Smith

Sustainable agriculture and food systems need to provide sufficient and nutritious food for all, while minimizing environmental impact and enabling producers to earn a decent living. Most agree that agriculture and food systems urgently need to change to make progress on several Sustainable Development Goals (SDGs) while staying within planetary boundaries¹. However, the way to achieve this is intensely debated, with two narratives dominating the discussion: incremental steps to improve efficiency in conventional agriculture while reducing negative externalities, versus transformative redesign of farming systems based on agroecological principles.

The debate is polarized for good reason. Transformative systems such as organic farming have proven sustainability benefits, including improved soil quality, enhanced biodiversity, reduced pollution and increased farm incomes^{2,3}, but in many contexts result in lower yields so that their sustainability per unit product is sometimes questioned^{4,5}. Intensive conventional systems, on the other hand, can be highly productive, but have substantial negative externalities including biodiversity loss, soil erosion, pollution, reduced human health and low farm incomes^{6,7}. In addition, powerful agribusiness and food corporations have vested interests in continuing the conventional agroindustrial model and in perpetuating 'Feed the World' narratives^{2,8}.

The SDGs offer an opportunity to reconcile these divisions by focusing on the sustainability contributions of different farming approaches and the policies that help to accelerate the required transition. Successful transformative systems, such as organic, push-pull and evergreen agriculture, offer inspirational examples and an innovation space for transformation because they are pursuing a radically different approach based on agroecological processes. Conversely, incremental

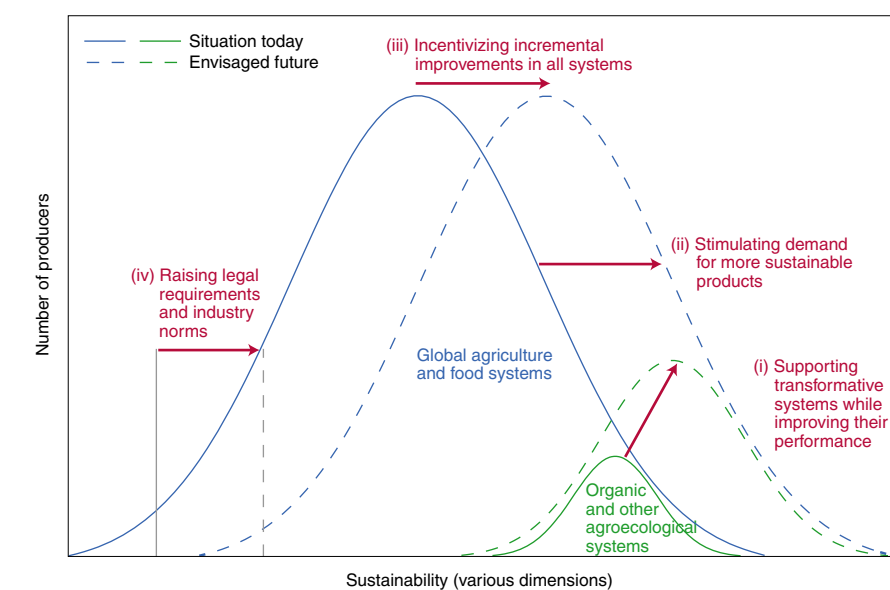


Fig. 1 | Policy interventions (red arrows) to drive sustainability in agriculture and food systems.

approaches, such as precision farming and reduced-tillage, developed in conventional agriculture inspire transformative systems to further improve their performance. Here we argue that policies aligned with the SDGs are needed to promote this transition.

Policy interventions for sustainable food systems

Agriculture and food-related policies play a crucial role both in perpetuating unsustainable systems and in triggering more sustainable ones, since they greatly influence farming and business practices, costs, prices and consumer choice^{1,9}. We identify four important groups of policy interventions (Fig. 1) that can synergistically transition our food system to a more sustainable one: (i) specifically supporting transformative systems through a combination of push, pull and enabling measures, while improving their

performance; (ii) stimulating the pull effect of an increasing market demand for sustainable products; (iii) incentivizing incremental improvements in mainstream agriculture and food systems with regard to combined sustainability objectives; and (iv) raising legal requirements and industry norms in order to rule out particularly unsustainable practices.

Support and enhance transformative systems

Upscaling the area covered under transformative systems such as organic agriculture can directly contribute to many of the 17 SDGs, particularly SDG 1, No Poverty; SDG 2, Zero Hunger; SDG 3, Good Health and Wellbeing; SDG 6, Clean Water and Sanitation; SDG 12, Responsible Consumption and Production; SDG 13, Climate Action; and SDG 15, Life on Land^{2,3}. Policies that specifically support these systems can make important contributions

to advancing the SDGs. Given that the conversion costs of alternative farming systems can be quite high — including higher labour requirements and the need for increased knowledge and training — economic incentives and technical advice are crucial to enhance adoption by farmers¹⁰. At the same time, the performance of these systems should be improved further, particularly in terms of yields, water management and consumer accessibility³.

Government authorities in Germany, Austria and Finland, for example, are implementing policies and action plans that set targets for reaching organic land area shares of 20% (ref. ¹⁰), and Bhutan and some Indian states are even targeting 100% conversion. They have defined comprehensive strategies that include push measures (for example, support to research and advisory services to facilitate uptake of organic farming practices, area-based payments), pull measures (for example, consumer information campaigns) and enabling measures (for example, data collection and institutional development). In order to make alternative systems even more transformative, governments may set additional conditions, such as sustainable use of water resources or limitations on large-scale monocultures that go beyond the minimum requirements of current organic standards.

Fostering the demand of sustainable food products. It can be done through two main mechanisms: (i) raising consumer awareness on the linkages between agriculture, environment, health and social wellbeing, and (ii) enhancing the commitment of retailers and caterers to offer such products. Governments can introduce informational campaigns and support those run by others (for example, non-governmental organizations) and ensure that food literacy is part of educational curricula. They can also contribute to increase the demand of sustainable products by setting targets in public procurement, for example in public canteens. Such demand-related policy measures send powerful signals to producers and businesses and help citizens to make informed decisions as consumers and voters.

Organic agriculture, the most prominent alternative farming system in the marketplace, offers consumers a different option that reflects well the inherent complexity of achieving sustainable agriculture. However, because conventional agriculture is heavily subsidized and market prices do not yet reflect externalities, organic products remain relatively less affordable to consumers¹. Organic agriculture also paved the way

for certification standards that build on incremental improvements of conventional agriculture, such as the Rainforest Alliance, Fairtrade, the Food Alliance and the Better Cotton Initiative. Businesses are successfully using these voluntary standards to promote more-sustainable options to consumers. Some retailers, such as Whole Foods Market, have also introduced their own sustainability assessment systems that are farming-system neutral.

Incentivizing improvements in mainstream systems. Practices that contribute to the SDGs should be incentivized, and unsustainable practices should be disincentivized. This approach could stimulate both mainstream as well as organic producers to enhance efficiency of critical practices, substitute unsustainable practices with more sustainable ones or redesign components of their production system to improve their overall profitability under a reformed policy framework. Full-cost accounting that incorporates the value of ecosystem services and external costs of farming into economic decision-making represents one way to provide conceptual guidance in such a policy reform¹¹. Under a full-cost accounting paradigm, payments to agricultural production units could be linked to their ability to provide public goods, or taxing those production units could be linked to their negative external costs, irrespective of the production system implemented. One example of the former are payments for ecosystem services (PES), such as increasing soil organic matter or implementing biological pest control¹². Taxes on harmful pesticides or nitrogen inputs from sources that are external to regional ecosystem boundaries are examples of disincentives. Full-cost accounting would remove price distortions by including externalities in the price of food and thereby establish a more level playing field for all production systems.

Raising legal requirements and industry norms. Command-and-control approaches that rule out particularly unsustainable practices, such as using highly hazardous pesticides or clearing primary forests, are pragmatic policy instruments to deal with complex problems. Under high stakes and uncertainty, they serve to implement the precautionary principle. Where governments are reluctant to raise legal requirements (for example, due to conflicting trade agreements), key market players should agree to adhere to minimum requirements by referring to standards such as the Round Table on Responsible Soy or the Roundtable on Sustainable Palm Oil.

The need for coherent policies

The shift from competing narratives to a collaborative strategy for reaching the SDGs has already started. UN institutions are recognizing the role of agroecology as a science, a practice and a social movement that contributes to making agriculture and food systems more sustainable¹³. With the concept of Organic 3.0, the global organic umbrella organization IFOAM — Organics International (International Federation of Organic Agriculture Movements) places new emphasis on how organic agriculture can contribute to the wider adoption of sustainable practices and on increased collaboration with other sustainable farming systems¹⁴. Recently, scientists assessed sustainable intensification initiatives worldwide and estimated that 29% of all farms are practicing some form of redesigned systems of sustainable intensification on 9% of global agricultural land⁹. They concluded that adoption of such systems may soon be approaching a tipping point to be globally transformative.

Some laudable policy efforts have been made over the past decade to move agriculture toward sustainability. For example, the 2013 reform of the European Union Common Agricultural Policy (CAP) linked 30% of its direct payments to so-called greening measures including minimum crop rotation requirements and maintenance of permanent grassland¹⁵. Passage of the 2019 US Farm Bill at US\$867 billion provides some research funds for organic farming, promotional funds for local farmers markets, and money for farmers to strengthen conservation efforts. However, given the trends in key indicators, such as greenhouse gas emissions or biodiversity loss, the pace of such reforms is insufficient for meeting the SDGs by 2030. Only if governments ensure that policies are coherently aligned with the SDGs will agriculture become part of the solution instead of being part of the problem. Combining the four groups of policy interventions outlined above provides an effective strategy to achieve policy coherence.

Successful implementation of a reformed and supportive policy context depends on societal debates and social movements that apply pressure to governments and institutions. Thereby, the food system focus is central and entails that consumption patterns and labour conditions need to be addressed. A shift away from animal products towards plant-based diets in industrialized and emerging economies and a reduction in food waste would reduce the overall footprint of the food system^{1,16}. Although such

changes in consumption are difficult to achieve, they would substantially increase the opportunities for multifunctional production systems with potentially lower yields but greater economic, environmental and social benefits¹⁷.

Governments should only support agriculture and food systems that deliver on the SDGs (in line with “public funds for public goods”). However, it is important to take into account that powerful vested interests, including global and national agribusiness corporations, food companies, and commodity groups, command ever-greater market power and heavily influence policies. It will take a critical mass of scientists, farmers, policymakers, businesses and civil society organizations to align on a transformation agenda and pull these powerful players along to achieve the SDGs. Eventually, farmers as well as agri-food businesses will adapt to the changed conditions and benefit from them. They could substitute harmful with less harmful practices or inputs, increase efficiency, redesign system components or adopt a transformative farming system.

Aligning policies and negotiating sustainable pathways are lengthy processes that are often hampered by diverging interests and world views. It is time to recognize that transformative systems such as organic agriculture are not an irrelevant

niche but can play an important role in this transition. They can be utilized as important drivers for developing more sustainable options, changing consumer demand, inspiring mainstream systems to improve their sustainability performance and altogether lifting the bar of what is acceptable in farming in the twenty-first century. Transcending ideological barriers and vested interests while focusing agriculture and food policies on the SDGs needs to be at the top of the agenda in order to accelerate the necessary shift towards more-sustainable food systems. □

Frank Eyhorn^{1,2*}, Adrian Muller^{3,4*}, John P. Reganold^{5*}, Emile Frison⁶, Hans R. Herren⁷, Louise Luttkholt², Alexander Mueller⁸, Jörn Sanders⁹, Nadia El-Hage Scialabba⁸, Verena Seufert¹⁰ and Pete Smith¹¹

¹Helvetas Swiss Intercooperation, Zurich, Switzerland. ²IFOAM — Organics International, Bonn, Germany. ³Research Institute of Organic Agriculture (FiBL), Frick, Switzerland. ⁴Swiss Federal Institutes of Technology Zurich ETHZ, Zurich, Switzerland. ⁵Washington State University, Pullman, USA. ⁶International Panel of Experts on Sustainable Food Systems (iPES Food). ⁷Millennium Institute, Washington, DC, USA. ⁸TMG Think Tank for Sustainability, Berlin, Germany. ⁹Thünen Institute, Braunschweig, Germany. ¹⁰Institute for Environmental Studies, VU University Amsterdam,

Amsterdam, The Netherlands. ¹¹University of Aberdeen, Aberdeen, UK.

*e-mail: frank.eyhorn@helvetas.org;

adrian.mueller@fibl.org; reganold@wsu.edu

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Competing interests

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