Special issue: sustainable agri-food networks [Editorial]

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Editorial

Special Issue: Sustainable Agri-Food Networks

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Our current agri-food networks cause severe environmental, socioeconomic, and health-related problems. The ways we produce, market, consume, and dispose of food are leading causes of environmental degradation and climate change [1,2]. Large-scale profit-oriented food industries exploit human and non-human resources by refraining from paying fair wages, by abetting resource-intensive forms of agriculture, and by being responsible for considerable amounts of food loss and waste [3,4]. At the same time, retailers have for decades promoted unbalanced diets high in sugar, salt, and fat, which have become the norm for most consumers in both developed and emerging markets [5,6], only by the past few years to start mimicking aspects of so-called alternative food networks that allow them additional profits for healthy, fair trade and organic food [7]. Against this background, the question arises of how sustainable agri-food networks might seem (or not), how they can be created and maintained, and how their principles can be multiplied so that they become widespread phenomena.

This Special Issue brings together a series of articles driven by two shared overarching questions: What kind of solutions exist for advancing the much-needed transformation of current agri-food networks towards sustainability? And how can barriers be overcome in this process—be they rooted in consumption routines, underdeveloped technologies, institutional inertia, or political ignorance? For providing answers to these questions, all involved authors share a common understanding of the two key notions of this Special Issue: the notion of agri-food networks is understood to comprise all forms of regulations, resources, technologies, and practices used for the production, processing, distribution, consumption and disposal of food and the resulting socio-economic, cultural, and environmental consequences [8]. The term sustainability is taken to cover all those measures that support the habitability of planet Earth for humans and non-humans alike over a preferably long time [9,10]. Sustainable are thus all those agri-food networks that follow the goal of procuring high-quality, nutritious, and organic food, that provide justice to producers, labor, and consumers at the global and local level, and that foster biodiversity in ecosystems such as fields, forests, waterbodies, and soils.

I am pleased to report that this Special Issue consists of six articles, which involved a total of 33 authors from 23 academic institutions in 13 zones/countries (s. Table 1). The authors involved come from African (Burkina Faso, South Africa, Tanzania), East Asian (China, Taiwan), European (France, Germany, Greece, Italy, Portugal), South American (Brazil), and South Asian (India) zones/countries. Case studies from eight different zones/countries are presented (s. Table 2), namely from Brazil, Burkina Faso, Chile, France, Greece, India, São Tomé and Príncipe, and Taiwan. Qualitative research methods were applied in three articles, quantitative research methods in another three articles, and a mixed methods approach in one article (s. Table 2).

In the first article, Sabine Duvaleix and colleagues [11] look into the role of producer organizations in the European Union (EU) to assist farmers in adopting more sustainable food production practices. Based on 20 expert interviews, the authors compare the conditions of two contrasting case studies in the EU: the pork production sector in Brittany, France, and the olive oil production sector of Crete, Greece. The results show that in both cases producer organizations are becoming increasingly involved in assisting farmers to

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adopt sustainability standards in production, even though this has not been an original task of them. While quality standards, developed by national governments or retail corporations tend to be comparatively unspecific, standards developed by producer organizations can address sustainable production practices in more detail. This is mainly due to the close linkages between producer organizations and producers, which lead to a proper translation of contextual factors into measurable criteria. Based on their findings, Duvaleix et al. [11] suggest generating public support for producer organizations. This would lead to counterweigh the prevalent dominance of retailers in the food supply chain, as recent case studies in other EU countries reveal [12–14], and enhance the sustainability of agricultural production systems in very practical terms.

Table 1. Number of involved authors, institutions, and countries.

Paper No.	Authors	Σ Authors	Σ Institutions	Σ Countries
1	Duvaleix et al. 2020	5	3	2
2	Pizarro Muñoz et al. 2021	4	3	2
3	Rouamba et al. 2021	8	4	4
4	Chang et al. 2021	3	3	2
5	Prazeres et al. 2021	3	2	1
6	Kumari Meena 2022	9	7	1
Editorial	Keck 2022	1	1	1
TOTAL		**33**	**23**	**13**

Source: own calculation.

Table 2. Number of case studies and methods used.

Paper No.	Authors	Σ Case Studies	Σ Qualit. Methods	Σ Quant. Methods
1	Duvaleix et al. 2020	2	1	-
2	Pizarro Muñoz et al. 2021	2	1	-
3	Rouamba et al. 2021	1	1	1
4	Chang et al. 2021	1	-	1
5	Prazeres et al. 2021	1	1	-
6	Kumari Meena 2022	1	-	1
Editorial	Keck 2022	-	-	-
TOTAL		**8**	**4**	**3**

Source: own calculation.

Estevan Felipe Pizarro Muñoz and colleagues [15] deal in their article with the difficulties and trade-offs farmer movements in Latin America face when navigating between the economic opportunities arising from the increasing marketization of organic produce and the political goals and agroecological principles that lie at the heart of their action. In so doing, the authors relate to the elaborate body of literature on food regimes [16–18]. Based on participant observations, document analysis, and 55 semi-structured interviews, the authors examine the strategies of the *Movimento dos Trabalhadores Rurais Sem Terra* in southern Brazil and the state-led initiatives run by the *Instituto Nacional de Desarrollo Agropecuario* in south-central Chile. In an historically informed way, they explain the two very different political settings in these countries and demonstrate the diverging trajectories of the mentioned farmer movements. In the Brazilian case, the sale of produce to conventional markets leads to severe tension. On the one hand, these sales are demarcated as "necessary evil", as they guarantee an unprecedented outreach to a large number of consumers. On the other hand, they are perceived as undermining the central goal of establishing food sovereignty in the long run. In the Chilean case, in contrast, the tension is grounded in the fact that it is actually the state that is building food markets for family farmers and peasants. While the building of these markets is in line with the goals of agroecology, issues such as participation in decision making and democracy are still far from ideal, given the state's techno-scientific perspective on the subject matter.

Armel Rouamba et al. [19] examine the current constraints of pearl millet production in Burkina Faso and come up with concrete suggestions for improving smallholders' potentials for livelihood security [20,21]. In Burkina Faso, as in other parts of the Sahel, the parasitic weed species of *Striga hermonthica* causes devastating damages to major crops such as sorghum (*Sorghum bicolor*), rice (*Oryza sativa*), maize (*Zea mays*), sugar cane (*Saccharum officinarum*) and pearl millet (*Pennisetum glaucum*). The researchers checked for the severity of weed infestations and asked for the strategies that the peasants in the study area employ for controlling them. They conducted a standardized survey in five pearl millet producing regions (n = 300) and discussed their findings afterwards in focus groups with a total of 192 participants. As their findings show, peasants pursue hand weeding, hoeing, and intercropping as main strategy to fight *Striga hermonthica* infestations, whereas they use terraces and mulches to conserve moisture for their crops. Limited access to seeds suitable for their specific soil types, small landholdings, and the lack of land ownership among women are found to be central constraints to substantially improve farming households' livelihoods. Therefore, the authors highlight the need to establish an integrated agricultural development program, which would include the improved provision of extension services, access to micro-finance and the empowerment of women. Along with that they speak up for developing weed-resistant varieties of pearl millet in a participatory way that involves peasants in every stage of developing new cultivars.

Min-Yen Chang and colleagues [22] provide a study on the causal relationships between consumers' values and attitudes as well as their consumption behavior. They ask test persons for the attractiveness of precooked plant-based foods, that are made of purely vegetarian ingredients, provide convenience by saving cooking time, and have low contents of calories, to detect major factors influencing the purchase of this type of food. In so doing, they apply the value-attitude-behavior model, whereas value stands for the study participants' general interest in sustainability and environment related topics, while attitude describes the feeling of individuals when they engage in specific behaviors. The authors test a number of hypotheses, out of which three are particularly interesting, i.e., the relationship between (i) environmental concern and behavioral intention, (ii) time pressure and behavioral intention, and (iii) the routine to cook and behavioral intention. The study shows that a causal link can be suggested valid only in regard to environmental concern, whereas time pressure and the routine to cook do not provide predictive power for consumer behavior. As this study is explicitly designed to help food companies develop effective marketing strategies, the authors suggest them to focus on environmental concerns for expanding their business opportunities.

Ibrahim Prazeres et al. [23] deal in their article with the production and marketing of organic cocoa in São Tomé and Príncipe. While 80% of the agricultural area is under cocoa, being responsible for 90% of the country's export earning, not more than 3300 smallholders produce organic cocoa, usually on plots smaller than two hectares. The authors followed an explorative research design. They conducted expert interviews with 25 stakeholders from governmental institutions, private companies, non-profit organizations, academia, certification bodies, farmer cooperatives, exporters, and others along the supply chain [24,25]. Afterwards they deployed focus group discussions with a total of 200 participants from the *Cooperative for the Production and Export of Organic Cocoa* and the *Cooperative for the Production and Export of Cocoa*. Results show that there are several barriers that hinder the growth of the organic cocoa sector in São Tomé and Príncipe, even though its positive impact on the reduction of environmental pollution, deforestation and biodiversity loss are well known among the involved actors. These are basically either financial or political in nature. On the one hand, the turn to producing organic cocoa involves significant costs needed to recruit specialized staff able to follow the different principles and processes of certification. For being able to bear these costs, access to the banking system must be improved. On the other hand, the turn to producing organic cocoa presumes a more clearly implemented governmental support. Ambiguities and conflicts over land titles and tenure must be

settled, organic cocoa incentivized through relevant economic policies, and corruption in the agricultural sector fought.

Sunita Kumari Meena and colleagues [26], eventually, are concerned with the question of how to improve the phosphorus (P) availability in agricultural soils in India under rice-wheat rotation. Based on data taken from a test site at the ICAR-Indian Institute of Farming System Research in the state of Uttar Pradesh, the authors analyze the P availability in two soil layers (0–15 cm and 15–30 cm) from plots under different treatment schemes after the completion of 19 crop cycles. The different treatment schemes included the application of no chemical fertilizer or organic manure, recommended quantities of nitrogen (N), P, and potassium (K), soil test-based quantities of N, P, and K, as well as the substitution of 25% of the recommended N, P, and K quantities by manure (with and without intercropping). Four sets of soil samples were taken from both surface and sub-surface soil layers and analyzed for soil available P, water soluble P, P pools such as $NaHCO_3$-Pi, $NaHCO_3$-Po, NaOH-Pi, NaOH-Po, Acid-P, and Residual-P. Results show that the application of manure in combination with the intercropping of legumes such as berseem and cowpea can substitute at least in part for chemical fertilizer, while providing opportunities to improving farmers' income and soil health at the same time.

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