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Editorial: Agrobiodiversity, community participation and landscapes in agroecology

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Editorial on the Research Topic
Agrobiodiversity, community participation and landscapes in agroecology

The current model of conventional agriculture on the planet, originated in the so-called "Green Revolution" (GR), has generated positive and negative effects during its more than 80 years of application, starting in the 1940s. Among the negative effects are the accelerated loss of biodiversity and agrobiodiversity.

Different alternative farming systems propose managing the agrobiodiversity of agroecosystems (farms) to face many of the problems generated on monoculture farms (e.g., soil and genetic erosion, emergence of genetic resistance in pests and weeds, as well as public health problems associated with the use of agrochemicals), which are characteristic of the current conventional model (Vandermeer and Perfecto, 2005; Pollan, 2007).

Many positive effects are attributed to diverse crop fields. To name just a few, at the ecosystem level, beneficial effects have been proven in the preservation of the habitat for beneficial insects (pollinators, natural enemies of pests), reduction in GHG emissions, protection of soil and water, zero poisoning of human beings and nonhumans, reduction of pollutants and hazardous waste, and climate stability (Altieri, 1996; Nicholls, 2002; Letourneau et al., 2011; Gliessman, 2014; Vandermeer and Perfecto, 2018).

Agrobiodiversity is the very foundation upon which agroecology is built. It provides the mechanisms that allow agroecosystems to be managed sustainably through a set of beneficial interactions between their elements (e.g., mutualisms that occur in pollination, mycorrhizae or in crop associations).

The elements that constitute an agroecosystem are directly related to its main agroecological structure (MAS), which refers to the way in which the different sectors, patches, live fences, and vegetation corridors are arranged (spatial configuration), mixed or not with crop areas, grasslands, or agroforestry systems inside the farms and in their close surroundings. An agroecosystem structure is historically constructed by farmers because of innumerable cultural variables (symbolic, economic, social, political, and technological), in conjunction with environmental processes and its evolution configures agroecosystem matrices in the landscape (León-Sicard et al., 2018; Quintero et al., 2022). In this context, the use of the MAS approach, paired with other agroecological tools, such as the farmer-to-farmer methodology and participatory action research, can be employed as inputs into the decision-making process necessary for sustainable landscape management and conservation of agrobiodiversity in rural environments (Holt-Gimenez, 2006; Guzmán et al., 2012).

Most of the world's industrial agricultural landscapes present matrices of farms with very poorly developed agroecological structures that respond to the simplification characteristic of conventional agriculture, which has eliminated forests, corridors, patches, and live fences to make way for extensive monocultures (Vandermeer and Perfecto, 2005; León-Sicard et al., 2018). This simplification has also been the product of pesticides used to eliminate biological competitors to the main crop and to eliminate agents considered pathogenic or harmful.

In contrast, ecological- or agroecological-based agriculture proposes to maintain and reinforce agrobiodiversity in all its manifestations, both on and off the farm, as a way of achieving greater resilience, equity, autonomy, stability, and productivity through the multiple interactions that it fosters. Agroecological landscapes, therefore, will have agroecosystem matrices with more developed structures and functions favorable to agrobiodiversity.

These interactions between the different elements of agrobiodiversity are not restricted to the biological realm but are rather intricately woven into the fabric of socio-ecological systems.

These latter systems, whose central protagonists are the farmers and their cultural actions, are clearly the beneficiaries of the interactions (services) but are also responsible, in multiple ways, for the maintenance of this biodiversity. It is important to highlight that the interactions that articulate these systems manifest themselves on different scales, and in this Research Topic, we will find works that clearly show this fact.

This Research Topic collected 13 articles involving 46 authors from 36 research institutions in 14 countries on four continents (Table 1). The case studies dealing with different levels of agrobiodiversity (from crop to landscape) are based in seven countries: China, Italy, Nigeria, Colombia, Venezuela, Chile, and Uruguay.

This Research Topic includes articles that address the effects of climate change on the soil fauna of agroecosystems (Gao et al.) and how the soil microbiome can be used to adapt crops to the new climate context (Pino and Griffon). Innovative management approaches link silvopasture systems with ecosystem restoration (Durana et al.). Other contributions investigate the needs of the end users of this biodiversity (Tchokponhoué et al.), the role of entrepreneurial identity in shaping attitudes toward sustainability (Rossi et al.), and studies that address people's ecological, esthetic, and medicinal knowledge about the plants in their crops and communities (Kolze et al.; Monagas and Trujillo). Other articles address, at a larger spatial scale, the criteria for establishing community gardens in urban environments (Codato et al.), the

TABLE 1 The 13 articles in this Research Topic.

Authors	Title	Country
María Puppo, Camila Gianotti, Alejandra Calvete, Alejandra Leal, Mercedes Rivas	Landscape, agrobiodiversity, and local knowledge in the protected area "Quebrada de los Cuervos y Sierras del Yerbal," Uruguay	Uruguay
Eleonora Sofia Rossi, Valentina C. Materia, Francesco Caracciolo, Emanuele Blasi, Stefano Pascucci	Farmers in the transition toward sustainability: what is the role of their entrepreneurial identity?	Italy
Carlos E. González-Orozco, Raul Alejandro Diaz-Giraldo, Catalina Rodriguez-Castañeda	An early warning for better planning of agricultural expansion and biodiversity conservation in the Orinoco high plains of Colombia	Colombia
Valentino Giorgio Rettore, Daniele Codato, Massimo De Marchi	How can GIS support the evaluation and design of biodiverse agroecosystems and landscapes? Applying the Main Agroecological Structure to European agroecosystems	Italy
Meixiang Gao, Yige Jiang, Jiahuan Sun, Tingyu Lu, Ye Zheng, Jiangshan Lai, Jinwen Liu	Open farmland is a hotspot of soil fauna community around facility farmland during a cold wave event	China
Dèdéou A. Tchokponhoué, Eric C. Legba, Sognigbé N'Danikou, Daniel Nyadanu, Happiness O. Oselebe, Enoch G. Achigan-Dako	Developing improvement strategies for management of the Sisrè berry plant [*Synsepalum dulcificum* (Schumach & Thonn.) Daniell] based on end-users' preferences in Southern Nigeria	Nigeria
Claudia Durana, Enrique Murgueitio, Bernardo Murgueitio	Sustainability of dairy farming in Colombia's High Andean region	Colombia
Anna Lena Kolze, Stacy M. Philpott, Leonardo F. Rivera-Pedroza, Inge Armbrecht	Campesino and indigenous women conserve floral species richness for pollinators for esthetic reasons	Colombia
Angel Salazar-Rojas, Ricardo Castro-Huerta, Miguel Altieri	The main agroecological structure, a methodology for the collective analysis of the Mediterranean agroecological landscape of San Clemente, Region del Maule, Chile	Chile
Álvaro Acevedo-Osorio, Jonathan Salas Cárdenas, Angela Maribeth Martín-Pérez	Agroecological planning of productive systems with functional connectivity to the ecological landscape matrix: two Colombian case studies	Colombia
Daniele Codato, Denis Grego, Francesca Peroni	Community gardens for inclusive urban planning in Padua (Italy): implementing a participatory spatial multicriteria decision-making analysis to explore the social meanings of urban agriculture	Italy
Carlos Pino, Diego Griffon	Scaling up: microbiome manipulation for climate change adaptation in large organic vineyards	Chile
Olga Monagas, Iselen Trujillo	Medicinal plants, biodiversity, and local communities. A study of a peasant community in Venezuela	Venezuela

precautions that must be taken in terms of conservation before undertaking agricultural expansions (González-Orozco et al.), or the strategic role of managing the relations among agroecosystems and landscapes to build resilient nature matrixes (Puppo et al.; Rettore et al.) The work of Acevedo-Osorio et al. proposed an index of agroecological functionality at the landscape level in Colombia, and Rojas et al. measured the degree of connectivity of agroecosystems with the landscape, using the MAS method, in a Mediterranean environment in Chile.

In all of these works, it is clear that agrobiodiversity, through the multiple functions it fulfills, articulates, and keeps these socio-ecological systems viable. In this way, we can understand it as the glue, often invisible to our eyes, that holds these systems together and, in doing so, makes our own lives possible.

The growing competition of labels for innovative approaches to sustainable agriculture should be analyzed using the elements of agroecology (FAO, 2019), with special attention to agrobiodiversity and its plural connections with food culture and traditions, circular and solidarity economy, and responsible governance (Tittonell et al., 2022).

Agroecology, as a meeting point of plural paths between science, movements, practices, and symbolic tissues, indagates the participatory processes of the construction of agrobiodiversity, food sovereignty, and biocultural diversity (Pimbert, 2018) from a long-term perspective, weaving, often not explicitly, practices of circulation and the construction of complex nested agroecosystems and landscapes.

From an emancipatory perspective (Giraldo and Rosset, 2023), the reflections and practices deal with territorial and food policies that transform structures, do not reproduce exclusion, and cultivate autonomy based on the co-construction of knowledge at a higher level of integration among crops, animal and vegetal species, landscapes, and biomes. Agroecology has the task of revealing the ontology of agriculture itself, deepening the meanings of being, living, and remaining in the places of communities that build and transfer over time, co-evolving multiscalar matrices of nature (Giraldo, 2022).

At a cultural level, the effects of the diverse management of agroecosystems result in greater opportunities for rural employment, greater justice in the social relations of production, appreciation of indigenous, peasant, and Afro-American knowledge, fair trade, and greater opportunities for peace and reconciliation nationally and internationally, among other aspects.

Author contributions

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