




Article

Cultivating Agroecological Networks during the Pandemic in Argentina: A Sociomaterial Analysis

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Abstract: The COVID-19 pandemic has motivated a turn towards more agroecological food production and food sovereignty. This article aims to analyze how the agroecological actor network has emerged in and around the capital of Buenos Aires and the province of Santa Fe, in Argentina, during the pandemic. The research questions are: How has the agroecological actor network emerged during the pandemic in Argentina? In what ways are agroecological networks enacted through coupling and decoupling practices? The study is based on interviews with practitioners, and observations of online events. In our results, we show how the production of compost, exchange of seeds and experiences, governmental programs, and food fairs are coupled and assembled in the agroecological network. The agroecological network is decoupling from the conventional agroindustrial model with pesticides and chemical input, supermarkets, and the global food system. The conclusion is that the pandemic has worked as a crisis where the agroecological network has been expanded.

Keywords: agroecology; Argentina; COVID-19 pandemic; sociomaterial perspective; food sovereignty



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1. Introduction

Argentina is currently experiencing what many view as a turn to agroecology [1–7], expressed in a multitude of activities that seem to challenge the hegemonic production model based on genetically modified crops, including extensive use of pesticides, which has had tremendous impacts on ecosystems and health [8,9]. Many Argentine municipalities have legislated against fumigation in urban areas [10,11]. As a result of this resistance and legislation, different initiatives have emerged, such as agroecology and food sovereignty programs at universities, fairs, experimentation in community gardens, training and public events, and government programs. In total, 130 Argentine municipalities have legislated against the use of agrochemicals and organized an agroecological network called RENAMA (National Network of Municipalities and Communities that Promote Agroecology) [12].

Agroecological production is understood as part of planning for a more sustainable urban food supply [13]. In this study, we consider that urban, peri-urban, and rural areas are connected, “because in choosing to eat biodiverse organic food, they [urban members] are becoming partners with farmers” [14] (p. 136). Community groups cultivate the available land, such as sidewalks or parks, due to the complex bureaucracy of making legal agreements on access to urban and peri-urban land. Some municipalities allocate urban land for agroecology or set up food markets where agroecological products can be sold. Rosario municipality in the Province of Santa Fe has been a flagship in this sense, since they have planned urban gardens and food fairs to market agroecological products [15]. The COVID-19 pandemic gave an unexpected boost, since agroecology worked as a response during the lockdown that lasted almost a year [16] that immobilized the transport of food and left a large part of the population, who had informal or semi-informal jobs, without income. Finally, high inflation on food prices contributes to food insecurity [17,18].

Monzón and Sosa [19] observed that during the first days of the pandemic, the demand for agroecological food increased in Buenos Aires. The number of orders, products per order, and buyers doubled, and in some cases, even multiplied by ten. However, there are difficulties in measuring agroecological practices due to the great variation in how they are carried out, including projects that are in transition from the industrial to the agroecological model. In total, 45% of the urban and peri-urban production in the city of Buenos Aires is based on aid from programs that encourage agroecological practices that supply the local market [20,21].

Previous studies on urban food supply highlight how cities are organized in relation to food [22]. In reference to food insecurity, the role of government policies has been discussed, and how faulty policies have generated failed markets and institutions that sustain food security [23,24]. Pre-COVID-19, Mier et al. [2] identified key drivers to bring agroecology to scale, and among them we find (1) recognition of a crisis that motivates the search for alternatives, (2) social organization, (3) constructivist learning processes, (4) effective agroecological practices, (5) mobilizing discourses, (6) external allies, (7) favorable markets, and (8) favorable policies. Similarly, O'Hara and Toussaint [25] analyze how innovations in food production with community-focused strategies “can offer urban communities sustainable alternatives to food access”. In this study, we will address similar aspects of community-focused strategies while highlighting government policies and the call for food sovereignty. In turning our attention to food sovereignty, we highlight food justice and that it matters what kind of food people have access to, who produces it, and the relationship between the place of production and the place of consumption [26]. Food sovereignty is not necessarily opposed to food security [27] but promotes a reorientation of the food system towards agroecology, peasant rights, and local production [28,29]. Given the existence of a great diversity of programs and initiatives for agroecology, Argentina becomes an interesting case to study the governance of agroecology in metropolitan areas, and how it constitutes resilience in a country that cyclically experiences crises.

The COVID-19 pandemic has attracted attention in research and among organizations [3,5,6,9,26,29–34]. Reviews have been performed [9] and journals such as *Agriculture and Human Values* and *Food Security* have invited articles, and international organizations such as FAO [30] and FIAN [26] have produced reports on the topic. The pandemic has been described as a ‘stress test’ and an opportunity to upscale alternative and local food systems [6,9]. The two-way relationship between food systems and COVID-19 is highlighted [9]. Global supply chains were disrupted. Alternative food systems are interesting as they are perceived to be promising since they are “doing things differently” [35] and are thus able to incorporate innovation and adaptation to the crises [9]. However, as Rivera-Terre et al. emphasize, the influence of alternative and local food systems on sustainability transition is a matter of debate [9,36], and whether these systems contribute to more resilient, sustainable, equitable, and healthier systems must be studied empirically. Development of e-commerce and the role of ICT, digitalization of physical markets [3,6], help online social networks. These organizations “enabled learning exchanges amongst actors already familiar with sustainability principles and practices” and showed adaptation strategies such as “activation of multifaceted social safety nets”, among other things [6].

The objective of this article is to analyze the agroecological practices around the capital of Buenos Aires and the province of Santa Fe in Argentina during the pandemic. From an actor–network perspective, we ask: How has the network of agroecological actors emerged during the pandemic in Argentina? How are agroecological practices promulgated?

1.1. The Rise of Agroecology in Argentina

Historically, Argentina has specialized in agricultural exports. In 1996, the use of genetically modified RoundUp Ready soybeans was approved. It made the country the third largest exporter in the world, establishing this agribusiness system as the dominant agricultural actor network. The technological package includes genetically modified seeds, herbicides, no tilling of the land, and institutions that support the production, infrastructure

for production, processing, and export [37]. Soybeans have a central role in the global food system as animal feed or as an additive in processed products [38].

The rise of the agroecology can be seen in the light of the presence of social movements in Argentina, and recurring social, political, and economic crises, such as in 2001, when politicians were asked to leave their office in a popular uprising which evidenced a lack of trust and legitimacy. Many, particularly urban Argentines, organized themselves in so-called neighborhoods or self-convened assemblies [39,40] to provide food and services that the State was unable to do. The assembly formula has subsequently been used for a wide variety of socioenvironmental organizations that question extractivism, such as resisting the spraying of genetically modified seeds with agrochemicals due to health effects [11,41]. Often, the adversary of the assembly is the State or multinational corporations, and the assemblies work to maintain autonomy. The adoption of genetically modified wheat in 2021 made activists take to the streets of Buenos Aires, and the claim for more information about the content of food also gained attention. During the sanitary restrictions and lockdown, the Argentine president wanted to sign an agreement with China about production and export of pork, which met heavy resistance and critique, not least since the pandemic probably started at food markets in China [42]. The question of food is, therefore, an established topic in social movements in Argentine urban realms.

There have been several political initiatives for (urban) agroecological production in Argentina [43,44]. ProHuerta (Pro Gardening in English) has a long trajectory since 1990, when it was installed during yet another socioeconomic crisis [11,45]. The ProHuerta program, which is run by the National Ministry of Social Development, and the National Agricultural Technology Institute INTA, provides agroecological seeds throughout the country for families in situations of social vulnerability [46]. According to the National Agricultural Census released by SENASA, 5277 establishments at the local level carry out rural work under the umbrella of “agroecology” or organic production out of a total of 250,881 surveyed farms [47]. In fact, organic harvests have increased constantly, from 1995 with 12,162 hectares to 2021 with 96,476 hectares nationwide [47]. The 2018 agricultural census does not include urban agriculture due to the small size of the plots. In 2021, a National Division of Agroecology was installed under the leadership of the experienced agronomist Eduardo Cerdá who had been working at the INTA at Guaminí with extensive agroecological production for many years. Cerdá has been given a prominent role, which we will get back to.

A landmark for agroecology in Argentina in 2021 was when the municipality of Rosario won an international award for its strategic urban planning and interdisciplinary work on agroecology on urban brownfields [15]. The municipality has been regulating peri-urban land for gardens and orchards and has adopted policies for land use and commercial outlets. The proposition to regulate access to peri-urban land for agroecological gardens came from an NGO in early 2001. The proposal coincided with the mentioned crisis and the number of gardens quickly rose to 1000 and more than 10,000 gardeners got involved. The municipality has since continued to promote urban agroecology by regulating 800 hectares of peri-urban land called the Green Belt (el Cinturón Verde), organizing food fairs in the city of Rosario, funding a multifunctional Agroecological Center that provides seedlings, guards native seeds, produces compost, and provides urban green infrastructure [48]. So, even if agroecology has gained momentum in Argentina lately, it is not a new phenomenon. It can be divided into three categories, one extensive for export and some internal consumption, one with organic certificates for export, and one with family farming for self-consumption [43]. In this study, we focus on the first and the last.

The COVID-19 pandemic, together with health restrictions and chronically high inflation, contributed to raising the crisis in food insecurity and also made other “pandemics” visible, such as structural poverty and inequality in access to healthy food [49]. The lockdown caused alterations in the forms of consumption generated by uncertainty about what businesses were allowed to operate, price speculation, availability of products, stockpiling by consumers, and restriction in urban mobility. For example, the multinational electronics

company Apple reported a decrease of more than 80 per cent on vehicular mobility through April 2020 in Buenos Aires [50], i.e., reduced connectivity. Since then, alternative ways of accessing food have become visible [4]. One explanation in the increase in sales was that the provincial government of Buenos Aires made a list of alternative markets in the suburbs and spread them through social networks. Social media were used to systematize offers and orders, which allowed for coordination of production and logistics. This established a digital and territorial network. Since the beginning of the pandemic and the lockdown, agroecological cooperatives have registered a notable increase in followers on Facebook accounts for the Metropolitan area of Buenos Aires [4]. This makes sociomaterial networks interesting to study.

1.2. Analyzing Sociomaterial Networks

The approach of this work is based on the proposal to analyze the emergence of sociomaterial networks [51–54] and relationships in urban regions [13]. Therefore, the interest is placed in examining how different entities (e.g., seeds, humans, policies, compost, technologies) are coupled and territorialized [55,56]. The entities are subject to continuous enrolling and decoupling in emerging networks, which makes DeLanda [57] refer to an ecosystem, relating people, material, and symbolic artifacts in communities, organizations, gardens, and kitchens. This emergence is “a result of a sedimentation of words and constraints consolidated through acts of conventionalization or institutionalization” [58]. Our focus includes an interest in the “indeterminate ontology that keeps the future open to multiple possible materializations” [59]. Deleuze and Guattari [51] use examples of actions that challenge established formations and recognize the agency of non-human actors, such as the power of beans [8] and the government of beans [52].

Actor networks are in a constant process of maintenance, expansion, or dismantling. The enrolment of new entities strengthens the network [52,55,60–62]. Although each entity has its unalterable properties, the connections between them generate new contingent characteristics. According to Simandan, the contingency of urban life is largely due to the competition between urban actors “in which learning from the effects of one’s own actions is very difficult because feedback is delayed”, or is distorted and confused [63]. Müller and Schurr [53] argue that we should focus on the interplay of stability and fluidity in analyses of how actor networks emerge without assuming radical contingency [63]—for example, the hegemonic agribusiness actor network is likely to be managed to maintain its dominant global position.

Building and maintaining a network of agricultural actors requires the capacity to enroll entities and affect, which refers to agency and power. For example, sociomaterial analyses address how a fragrant flower attracts a pollinator or how genetically modified seeds rule politicians [52], allowing for decentered analyses of human agency. The ability to affect the network includes desires, emotions, and memories [60]. In this sense, memories and visions of the future are linked across time and space and assembled within the network of actors. However, engaging more actors may mean that destabilizing processes are neglected, overestimating the capacity of the network, so it is necessary to explore the counterforces that destabilize the actor network [63].

The enrolment and decoupling are fundamental in the study of emergence in agroecology. We will show how the organic leftovers are degraded in the compost, and then coupled to the soil and used to produce food with agroecological qualities. When analyzing agroecological practices as an actor network, we acknowledge that entities are coupled through composting; seeds connect people and soil, weeds incorporate moisture for edible plants; the municipalities enroll producers and consumers at food markets; the State organizes programs such as seed delivery and an agroecological division; practitioners and consumers incorporate discourses of food sovereignty and memories and longings in their visions for the future, and machinery and techniques. Through enrolment and decoupling, the agroecological assemblages emerge.

2. Material and Methods

This study is the result of collaborative learning about agroecological practices during the context of the pandemic. We have worked with two Argentine research assistants, Nahuel Alfonso and Luisa Magdalena, who have conducted and filmed 26 interviews in the field [64]. Qualitative semi-structured interviews were used [65] to allow room to pursue topics of particular interest to the person being interviewed [66]. The interviews were often on-site where people practice agroecology so they could show and explain how they practice agroecology (see Appendix A).

The practitioners have been selected through a snowball sampling process and are farmers, agronomists, journalists, and staff from the National Division of Agroecology province of Buenos Aires and in the province of Santa Fe. A snowball sampling process is useful when the researchers want to study the networks of people in focus, and their connectedness [65,67]. It implies that key persons are identified to start with, and then in connection to the interview, they suggest other people to talk to [65]. This is a way to reach practitioners beyond leader positions.

Buenos Aires and Santa Fe provinces are two of the provinces with a high population density and are the main agricultural provinces of the country. According to the 2010 census, the Metropolitan Area of Buenos Aires had a population of 12.8 million and the Province of Santa Fe had a population of 3.2 million. Sanitary restrictions during the pandemic encouraged online events with agroecology practitioners, turning the internet into a site of continuous learning and exchange [4,6]. Given that agroecology requires skills that are developed in practice, the expansion of the network in the virtual field encouraged the dissemination of experiences and channeled the coordination and interaction of activities and marketing among the participants. For the purposes of this work, this implies the need to analyze the use of social media, such as WhatsApp, and online public events, such as YouTube channels and Facebook pages, as part of the network of agroecological actors [68]. The starting point for the identification of online events and digital technology in the agroecological network was a webinar organized by the College for Nutrition in Rosario in June 2021 [69], where different actors participated and presented their work, such as the municipality that had recently won an award for the Green Belt.

The international research ethics principles have been followed, and the interviewees have signed informed consent to let us record their participation in the study, which have been performed by the mentioned research assistants. All the interviewed practitioners have requested to be mentioned by their full name in the study and that we do not use pseudonyms. To achieve our aim, the recorded interviews have been transcribed, coded, and systematized in their original language (Spanish). The translations of excerpts have been conducted by the authors. Through the coding and analysis of the interviews, we identified enrolment and decoupling within the networks.

3. Results

3.1. Reconfiguring the Agroecological Actor Network during Pandemic and Lockdown

The COVID-19 pandemic created an unusual situation that the Argentine government attempted to curb with a mandatory lockdown on 19 March 2020, which was renewed several times [17]. The lockdown only allowed people to leave their homes to buy food and medicine, and included traffic control by security forces. The mentioned distrust in Argentine governments and international organizations was evidenced in a survey in May 2020, where only 30 per cent of the Argentine respondents stated that they trusted the information about the origin of the virus that the World Health Organization explained, where the virus spread from an animal to humans [70]. Many Argentines believed that the government was withholding information for political reasons and that the restrictions were in part an excuse to deflect political unrest [70]. However, the restrictions and confinement were generally followed by the population, partly due to the deployment of the repressive apparatus and partly due to doubts and uncertainty about the real status of the disease.

In these conditions of prolonged confinement, different communication media opened the way to a process of reflection on alternative food production, inflation, and the increase in food costs that allowed a critique of the world food system. The fact that the pandemic developed in a food market in China contributed to this opinion. However, more broadly, it also brought attention to global connections and health. Urban agroecological production became a means to govern access to food based on connections with government programs for family production, community gardens, and civil organizations, which, although they had been installed before the outbreak of the pandemic, contributed to the creation of resilience in times of the pandemic [3].

The actors in the agroecological network are municipalities, where several form part of the national network of agroecological municipalities RENAMA, cooperatives, farmers, organizations such as UTT (Unión de Trabajadores de la Tierra/The Union for Rural Workers), where 22,000 families produce 115 tons of vegetables per month, at 380 points of sale [71], INTA, the ProHuerta program and agronomists specialized in agroecology, agroecological seeds, knowledge institutes such as the universities where courses on agroecology are organized, journalists, the provincial governments, the State and the newly installed national Division of Agroecology (DNAE), and digital infrastructure including social media such as Facebook, YouTube, and WhatsApp. This heterogeneous set of actors makes us speak of a sociomaterial actor network.

The pandemic and the lockdown as an event, or a stress test [9], meant that the actors had time to practice and reinforce their knowledge. During the last 5–10 years, new university programs and elective courses on agroecology have been implemented. The academic production and education at knowledge centers have played a key part in enrolling more actors in the agroecological sociomaterial network. Through the interviews, we observed that the influence of the University of Buenos Aires and the Agronomy Faculty (FAUBA) in the agroecological ecosystem is constituted as a center of power. The view of the FAUBA as a powerhouse in terms of the agribusiness paradigm makes the elective courses in food sovereignty, abbreviated CaliSA (Cátedra Libre de Soberanía Alimentaria) interesting. Tamashiro [72] explains how an extension project at CaLiSA, at the Faculty of Agronomy UBA, saw the demand for bags with agroecological food double, reaching 900 bags per month in the capital and the suburbs. The increase involved the number of clients and incorporated a great diversity of agroecological products and food cooperatives during 2020. Before the pandemic, bags with agroecological produce were delivered to the university premises every fortnight. Due to traffic restrictions during the lockdown, they began to deliver door-to-door every week. CaLiSA also expanded its scope to people or organizations that buy bags at a wholesale price and market them in different neighborhoods. This way, the pandemic generated innovation in the distribution of agroecological products. According to Poggi and Pinto [4], until March 2020, an average of eight tons of agroecological products were sold per month in the Metropolitan area of Buenos Aires. From the start of the lockdown, this increased to an average of 55 tons.

The growing demand for healthy food in cities supported agroecological production [7]. The actors that promote agroecological production not only opted for commercialization, but also took advantage of the pandemic situation to promote agroecological values and highlight the consequences of the different production models, for ecosystems, biodiversity and the soil, and organizing food markets. Therefore, activities in urban centers are interconnected and contribute to rural areas (Carlos Carballo, agronomist and founder of CaLiSA). Despite the mobility restrictions, the practitioners managed to organize agroecological markets under social distancing and other requirements such as using facemasks and limited public capacity. By being able to establish themselves as a consumption option with a constant flow of products, they began to transcend the sale of fruits and vegetables. The sustainable food market in Mercedes was set up based on previous experiences in other provinces. According to the interviewees, one of the fundamental principles is to invite everyone in the area to the food markets, even those in transition from conventional to agroecological production, since market visitors should find a variety of products that

meet all their needs (Mario Aldalay, coordinator of the Sustainable Market of Mercedes, province of Buenos Aires). At the agroecological market, products such as eggs, honey, wine and cheese, seed producers, educational institutions, and hygiene product producers were incorporated.

3.2. *Giving the Urban–Rural Agroecological Actor Network Capacity*

In our study, we view the urban and rural areas as connected due to the intricate networks of relationships between production and consumption [14]. Our analysis shows how practitioners attempt to make the agroecological network expand at the expense of the dominant agroindustrial paradigm by giving the network capacity. However, counterforces [63] can be noticed in the rural areas, not least regarding what to produce on the land. Agroecological producers, who have been involved in the transition from conventional production describe how they consulted several agronomists about how to transform the production from GM soybean and corn, but the consulted agronomists dedicated to conventional production maintained that these seeds were the only option. It was only when they got to know and network with established agroecological producers that they learned how to start the transition process.

Agronomists at INTA have played a central role during the pandemic by organizing online events and, where possible, on-site trainings on agroecological gardening, composting, along with the distribution of seed kits. Observation of the process in Rosario also shows that INTA and ProHuerta were present in the development and governance of the awarded program since 2001, together with the political will of the municipality (Raúl Terrile, Agricultural Engineer, Rosario). The agroecological movement has thus benefited from an existing network; the practices that have been developed in the INTA demonstration sites are important in the network, particularly to show that an alternative to conventional agriculture is possible and as a form of legitimization.

One practitioner said: “Guaminí, in the south of the province of Buenos Aires is a very powerful place for agroecology. For many years they have been practicing [agroecology] with Eduardo Cerdá as advisor. I went there to visit producers. I wanted to bring seeds for the field here, a few years ago. I remember that I went to one guy to buy from him. ‘Take three bags’, he said. ‘How much do I owe you’, I asked. ‘No, nothing’, he tells me. What do you mean nothing? No, if you are going to do it, to promote agroecology in your area, I will give it to you. But then you also must go promoting the network there.” (Rodrigo Castro Volpe, agroecological producer, staff at NDAE). When identifying agroecological coupling practice, that is, how entities are connected to the network, awareness and pre-pandemic mobilization against GM seeds and pesticides have been essential. However, the state has been identified as being responsible for the installation of the agribusiness model based on GM seeds in 1996, and its detrimental socioenvironmental impact. Many interpret the installation of the National Division of Agroecology as a victory for citizens and mobilized organizations that resist a model that promotes desertification, the use of pesticides, and fumigation in habitable areas, along with the impact on the health of the population. Despite the critical stance towards the State, our study shows that public policies and programs play an important role in the sociomaterial network. ProHuerta was established in 1990 to deliver seeds and self-sufficiency to citizens in need [73], and, thus, as a way to manage hunger in times of crisis in both rural and peri-urban contexts. The program and the distribution of agroecological seeds is an example of coupling that contribute to increased connectivity. The programs contribute to resilience in a crisis such as COVID-19 since they are experienced in supplying seeds through ProHuerta, which meant that the actor network was strengthened during the pandemic, as previously in crises. The practitioners in our study describe how they sometimes use the seeds from INTA, and others how they took courses in agroecology at INTA in the city and learned about how to cultivate urban plots of land, and interact with the soil, and other species among the vegetables. This indicates that INTA is an actor that is networking for urban agriculture.

The strength of the agroecological assemblage has advanced from the recently appointed Director of Agroecology, Eduardo Cerdá, who is described as an experienced and legitimate actor, who has proved the possibilities of agroecology both in urban contexts and even more so in extensive production at the INTA test site at Guaminí, in the Province of Buenos Aires. The fact that he has been traveling abroad with his experiences gives him extra credit. Cerdá is dedicated to the cause and trustworthy and, therefore, invited to events, such as the urban agroecology school in central Buenos Aires, las Margaritas. Cerdá strengthens the agroecological network by showing and practicing. Marisa Fogante, an agroecological producer and entrepreneur in Rosario who works with Cerdá, mentioned that he never uses the word for fighting in Spanish, [luchar]. “He always says ‘don’t fight anyone’ because it doesn’t make any sense. He always says that we are going to show how it is done and the impact it has in action.” Simultaneously, several express that the appointment of the Division of Agroecology and Cerdá by the government is an example of a contradiction—how can a government at the same time approve of genetically modified wheat, which happened in 2021, sign an agreement with China for pork export, and support agroecology, they ask.

Agroecology is contrasted with the agribusiness model throughout the interviews and talks. The agribusiness model is described as a monolith, something that is extremely difficult to change or destabilize. Therefore, the change to agroecology will take time “a paradigm shift is not built overnight, so it seems to me that all the initiatives that add up to install this new paradigm are welcome” (Alicia Rinaldi, journalist and coordinator of UTT agroecological food bags in Buenos Aires). The Division of Agroecology is part of the nation’s Ministry of Agriculture, Livestock and Fisheries that passed the family farming law in Congress in 2015 and “has not yet been able to regulate it.” (Carlos Carballo) This critical voice questions whether the initiative will have much effect and whether it will be implemented at all, based on previous experiences. At the same time, the battle over what agricultural model will rein in Argentina, where two are posed side-by-side and coexist, must be fought within the very State apparatus, according to Carballo. The fact that the “food paradigm based on agroecology and food sovereignty is increasing forces and is growing” (Marcos Filardi, lawyer and founder of the Hunger Museum, Buenos Aires) gives the practitioners hope and the capacity to enroll actors in the network.

The practitioners explain how they “show other forms of production” (e.g., Cielo Rivas, agroecological producer and student of biodynamic agriculture). They illustrate how there are other ways of doing agriculture, by working the soil. This can be viewed as a kind of a pedagogy where the actors perform the alternative, and do not just resist by protesting against pesticide use and genetically modified seeds. The Division of Agroecology will work with municipalities, education, develop regulations, institutional linkages, develop clusters, and reduce the use of agrochemicals. “The division will make visible everything that has been done in the country” (Marisa Fogante). Being able to show the experiences of extensive agroecological farming, and that it can be just as successful as conventional agriculture, is mentioned by several practitioners as a way to strengthen the network. Similarly, the municipality of Rosario “shows you that it is possible” (Veronica Argomedo, biodynamic producer). Since agroecology, to a large extent, is based on trust and getting people to believe in this alternative, they work with demonstration sites where people can come and see for themselves and be convinced.

The practitioners are constantly referring to how production and consumption of agroecology is different from the conventional food system. At conventional supermarkets, mass-produced items are sold that all look the same [38]. The practitioners refer to the fact that the agroecological product often looks heterogeneous; there is diversity. New consumers need to become accustomed to that. Vegetables may have traces of insect bites, or be of different colors and sizes, unlike industrial products sold at supermarkets that all look homogeneous. The focus on diversity is opposed to the global homogenizing forces of agricultural production, and to the specialization of production that separates or kills other

entities with pesticides. At the same time, it is opposed to the specialization in seeds when trying to maintain indigenous seeds, with a clear decolonial discourse.

3.3. *Cultivating Networks in the Time of the Pandemic*

During the pandemic, producers began to receive calls from people who had not previously bought agroecological groceries from the solidarity economy. This demonstrates that instead of paralyzing the commercialization of agroecology, the pandemic revitalized the network. The direct sale of local products promoted interactions that recreate the value of food, where the place of origin and the characteristics of production are inscribed [49].

Digital technologies become components in the sociomaterial network. Our analysis shows that the Internet and social platforms enabled networking and sharing of experiences during the pandemic and played a role in connecting heterogeneous actors in the agroecological network. During the pandemic, producers were delivering bags (bolsones) with agroecological vegetables, eggs, and fruits to the homes of urban consumers, often through WhatsApp. Moreover, at the same time, the state and social movements use social networks for the promotion and transfer of knowledge. The pandemic allowed debates, talks, and posts about sustainability and food sovereignty to multiply on social networks during the context of preventive social distancing. As an illustration of the digitally enabled interest in agroecology in Argentina, INTA organized a MOOC (Massive Open Online Course) developed first in France and then adapted to Latin American contexts with cases from the continent. A total of 50,000 participants enrolled in the course in 2020 [74]. The videos recorded from the second edition of the MOOC on YouTube had 12,780 visits and is part of the network of agroecological actors.

Related to relationships and connectivity, we observed that practitioners reflect on their network practices in a manner analogous to nature, as a species in the ecosystem where the components guarantee balance. At a webinar about the award-winning agroecological practices in Rosario, one of the presenters stated that “Just like we cultivate vegetables, we need to cultivate networks” [69]. This illustrates how the practitioners attempt to expand the network in urban (sociomaterial) contexts by imitating ecosystems which we interpret as if they are attempting to strengthening the actor network by incorporating and enrolling more actors and entities (even if the relationship between consumers and producers, and an actor network, are different analytical units). Gastón Malano, an agronomy student and producer, explained that he attempts to “generate networks of seed exchange, networks of knowledge exchange”. This requires that the practitioners observe and learn continuously. However, in our material there are examples of practitioners who explain that they had to reduce the amount of land under cultivation to be able to deliver their products to customers, or reduce the number of hens in relation to experiences of poor conditions for the egg-producing animals when they were too many. These we consider as illustrations of how the agroecological quality of the network is not simply strengthened by “more” entities.

Another aspect of this is how we humans relate to nature when we produce food. “We must not treat nature as an enemy” [75], Christian Raggio said in a YouTube video during the agroecology month, organized by RENAMA, the National Division of Agroecology (DNAE), and the Argentine Society for Agroecology (SAAE) in 2021. This understanding is mirrored in the way the conventional agriculture is practiced with pesticides, killing certain species that are seen as a weed. In distinction to killing plants, insects, and fungus with agrochemicals, the agroecological practitioners talk about caring about nature, life, soil, and biodiversity (e.g., Rocío Tabares, journalist, communicator, and socioenvironmental activist). Several organizations ground their activities in seed banks, such as the one at The Agroecological Center in Rosario, and at The Hunger Museum in Buenos Aires. During the interviews, the practitioners also referred to and showed plants that are kept for seeds in their own gardens. Seed banks and diversity relate to the discourse of food sovereignty. The exchange of seeds is based on a notion that the seeds belong to humanity as a common good, not to private corporations. By sharing seeds, the relationships between actors in the network is strengthened.

In our material, practitioners describe how they are collecting organic waste to make compost, which is then used to fertilize and improve soil that is low in nutrients. There is no governmental system for organic waste, and sometimes social movements organize the management of organic waste in the neighborhood. Improving the soil by agroecological practices is a long-term endeavor, and a way to respect nature. At the Agroecological Center in Rosario, they produce compost, which they sell at fairs, and the urban farm Las Margaritas in Buenos Aires collects organic waste that is used to produce compost and fertilize their vegetables. Making compost implies observing and understanding natural processes and cycles. “The soil is very generous, very generous. We plant a seed and a plant that gives you 2000 seeds” (Sofía Galindre, student of food inspection and vendor at a sustainable market, Mercedes).

The caring for the environment, the soil, and others in agroecology is described as a philosophy of life; sometimes ‘going back’ to what the grandparents did. This requires knowledge of recipes, cooking practices, the soil, and the processes in the land and crops. Simultaneously, it is perceived as clashing with the conventional way of life (Luciana Aguilar and Débora Pedemonte Román, agroecological producers at Huerta la Verbena). One important way of practicing the transformation from conventional agriculture and food production is to cut middlemen, and not to purchase food at conventional supermarkets. This is described as disconnecting from the conventional global food assemblage, what we take as decoupling. The constant networking that the actors in the agroecological network enact thus includes both enrolment and decoupling from others.

Analyses of actor networks address coupling practices, including discourses and the way practitioners speak about agroecology, such as how they incorporate health and ecosystems. At INTA, agronomists who work with agroecology highlight that the poor and unemployed who look for seeds at the program ProHuerta, have come to talk about and understand food sovereignty and ecological problems that they find that agroecology can remedy. This is something that the agronomist professionals express did not happen before, and, therefore, it is interpreted as if the discussion about the ecosystem has reached new segments of society. Other examples of the argument about agroecological practitioners as caring about nature and recognizing our interconnectedness in ecosystems, is when Omar Ardiles, journalist and teacher said that “agroecology is respect and love for what surrounds us”, and Carlos Briganti, plumber and founder of the Urban Agroecological School in Buenos Aires defined agroecological practitioners as “guardians of the seeds”. Furthermore, Briganti stated that “making compost is the best way to become an activist”.

Despite that the State has implemented and favored an agroindustrial system over the agroecological, the governmental initiatives it has adopted have steered towards upscaling the agroecological system. As already mentioned, the seed distribution at INTA, where the State makes sure that anyone who wants to produce agroecologically receives agroecological seeds, without pesticides, preceded the pandemic; there was an established network.

Like Marcos Filardi said: “The change is underway in my opinion, as a seed it is already sown/ . . . /It is not like the entire agroindustrial system will be transformed from this public policy, but the truth is that it invites us to problematize food”.

4. Discussion

The aim of this study has been to analyze the agroecological practices around the capital of Buenos Aires and the province of Santa Fe in Argentina during the pandemic, with the questions: How has the network of agroecological actors emerged during the pandemic in Argentina? How are agroecological practices promulgated? The results show several similarities with other cases in Latin America during the pandemic, which we will discuss here.

Research prior to the COVID-19 pandemic has highlighted how the recognition of a crisis that motivates a search for alternatives is a driver for agroecology [2]. Although crises have been recurrent in Argentina, the pandemic was a crisis (or a stress test) [6,9] that allowed the connections in the agroecological network to be revitalized and expanded.

Despite the lockdown as a government response to the pandemic, practitioners have continued to network and connect with other actors through seed exchange, compost and soil improvement, and technological devices and social media. This socio-technological network and the lockdown allowed more communications and events to take place online. In this sense, the spread of the COVID-19 virus produced connectivity that contributed to a reconfiguration of the agroecological network, making it expand. As we have shown, the very source of the virus in the global agroindustrial food system was often the reason human actors turned to agroecology as an alternative. This is similar to what Rivera-Ferre et al. reported too, on the two-way relationship between the pandemic and agroecology [9].

Alternative food systems, such as agroecology, are promising since they are ‘doing things differently’ [35] and are able to incorporate innovation and adaptation to the crises [9], including using mobilizing discourses [2]. Through coupling of heterogeneous elements, such as seeds, humans, the governmental Division of Agroecology, compost, and videos on social media and food bags, the agroecological actor network was strengthened and the dominant agroindustrial actor network organized around GM soy is continuously challenged. Like Deleuze and Guattari have pointed out metaphorically, plants may enter cracks in the solid rock and the roots can break new ground [51]. By showing how agroecology works, that the seeds cultivate networks as they are exchanged or selected, planted, cared for, harvested, distributed, and eaten in urban–rural networks, and organic waste is turned into compost, the actors distance themselves from the agroindustrial production and indicate how the alternative is possible, and how things can be done differently [35]. Agroecology is represented as a response to the COVID crisis and other crises of socioenvironmental and economic character. This leads us to think that a model that contradicts the central agroindustrial paradigm can be a solution in an unexpected and critical situation.

Our sociomaterial analysis (see, e.g., [15,37]) shows the practitioners imitate ecosystems by enrolling different actors in agroecological practice. It is a way to cultivate sociomaterial networks [62]. Compost can be seen as an actor in this sense, as the cultivation of networks is not only enacted by humans. The assemblage is shaped through the decomposition process of organic material, which interacts with biological entities to generate nutrients for the soil. We address the actions of not only humans, but also pollinating insects and seeds. Their co-functioning emerges and can become components of larger actor networks by forming alliances or coalitions [63,76]. The diverse agroecological seeds, plants, and products contribute to agroecological quality and food sovereignty. However, the seeds do not force humans to plant them, and there are seed kits from ProHuerta that never get planted, family farms that are abandoned, and compost that is never completed or applied. The turn to agroecological production implies an emerging enrolment of actors has contributed to a kind of stabilization, much like a dormant seed that sprouts under the right conditions.

The connectivity within the agroecological network produces a differentiation between agroindustrial and agroecological practices. The actors distance themselves from the dominant agroindustrial paradigm due to the socioenvironmental health effects of herbicides, the standardization and homogenization of production and consumption of food, and the belief in human supremacy and separation from the ecosystems. Agroecology, on the other hand, is described as producing non-toxic food, heterogeneous according to the seasons and interaction of different organisms in the production. It includes a diversity of seeds and products that are not dependent on inputs purchased in dollars but exchanged, harvested from the plants, or distributed through the governmental program ProHuerta.

Previous research has shown that policies can play a supportive role and act as drivers to scale up agroecology [2]. In Argentina, supportive public policies at municipal levels, such as RENAMA, and at the national level, such as the installation of the National Division of Agroecology, and through programs at INTA and ProHuerta, contribute to showing that agroecology works. However, governing heterogeneity may be more complex than the governance of something heterogeneous, standard, and stabilized. In contrast with

governance models for increasing production capacity in conventional agriculture, which is usually top-down and focused on a specific sector and quantity [77], steering towards upscaling of agroecological practices requires enrolment of heterogeneous actors such as traceable vegetables, new kind of farmers and consumers, agricultural lands, seeds, and governmental policies.

There are some limitations to our research. This paper is the result of a collaborative pilot study with a limited number of interviews with a set of practitioners. Measuring the contribution of agroecology in the system of food production in Argentina through quantification of agroecological food that is produced and consumed, as well as post-COVID development of agroecology, requires further research. This pilot study could be used as a starting point for such studies.

5. Conclusions

Agroecological policies were already being promoted by the municipalities of RE-NAMA and the national government through ProHuerta before the pandemic. The pandemic allowed an expansion through old and new political initiatives as a way of guaranteeing access to food for the population during the closure of provincial borders during the lockdown. Furthermore, governments used social media to connect producers and consumers. However, agroindustrial production is still essential for the Argentine GDP and very difficult to destabilize no matter how much the practitioners attempt to strengthen their network to outrun the agroindustrial complex. Related to this, a reflection that emerged from this study is that the coexistence of two opposing agricultural systems can fulfill differentiated and even necessary functions.

Even if there are critical voices questioning whether the central government will be able to implement the policies, the installation of the National Division of Agroecology, and the practices at INTA and ProHuerta, the government is promoting collective actions to improve agroecology, and the agroecological actor network is expanding and assembling new actors. However, networking is often a strategy in governance practice, expressed, for example, in the institutionalization of clusters, not just in agroecology. Therefore, it is vital to continue studying the practices and the development of the agroecological actor network in Argentina and explore how it evolves (i.e., continue to expand or if it will contract and be disassembled) as the COVID-19 pandemic is phasing out.

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Appendix A Interview Questions

- When did you get in contact with agroecology?
- What does agroecology mean to you?
- Why do you think people should practice agroecology?
- What do conventional supermarkets mean to you?
- If you are involved in an organization or network, how do you work with agroecology? What channels do you use for communication?
- Do you find that there are any differences between agroecological products and conventional products? In that case, what?
- Do you work on getting more people enrolled in agroecology? How, in that case?

- What is your opinion about the National Direction of Agroecology and their work? This question was posed towards the end of the interview, if they had not raised it before.
- Are there any challenges to agroecology from your point of view? What, in that case?
- Is there something we have missed in our questions?

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