



The Emergence, Dynamics, and Agency of Social Innovation in Seed Exchange Networks

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Abstract. Seed movements are more than a manifestation of the struggle to increase farmers' and gardeners' access to seeds. In this article, we explore seed saving and sharing as networked practices for the maintenance of genetic diversity as well as for social innovation in a new type of seed exchange networks in Hungary, Austria, Spain, Switzerland, the UK and the European Coordination of the Let's Liberate Diversity network. We analyse our qualitative interview data using Transformative Social Innovation theory as a new perspective to link social movement and social innovation literature. We focus on the emergence, dynamics, and agency of seed exchange networks in Europe as innovative social configurations to explore how seed networks promote transformations in agricultural, ecological, political, material, social, and cultural realms. We conclude that social innovation arises when the material exchange of seeds is intertwined with interpersonal sharing of knowledge that helps to create new social relationships and reframe global agricultural problems. The materiality of the seed is the intermediary that unites people, ideas, and networks across sectors, and serves as a means to redefine social relationships and create new modes of learning, doing, framing, and organising.

Introduction

The everyday practices of food provisioning, exchange, and processing require that farmers and gardeners have access to a broad variety of seeds. This access is increasingly limited, however, by restrictive seed legislation, intellectual property rights on seeds, and expanding corporate control over the world's seed supply (Kloppenburg 2010). Increasing dissatisfaction with global food systems has led to an academic research area that is oriented towards understanding the role that seed networks play in the transition towards a more sustainable food system (Pautusso et al. 2013).

Seed saving and sharing as locally-grounded customs for the maintenance of genetic diversity and healthy crops pre-date the foundation of official new seed networks or organisations in many parts of the world (Pautusso et al. 2013). In the last forty years, however, beginning in the United States and spreading to Australia, Europe, India and elsewhere, a new type of seed exchange network has formed along with the revelation that agrobiodiversity has been rapidly decreasing due to the industrialisation of agriculture (Balázs et al. 2015).

Research on social movements and institutional/organisational change (Snow et al. 2008, Greenwood et al. 2017) has contributed to better understanding the emergence, dynamics, and agency related to social transformation, while the literature on social innovation (Mulgan 2006, Murray et al., 2010, Moulaert 2013) has emphasised how civic creativity and its community problem-solving capacity and potential can be mobilized when dealing with social challenges. As Bock (2012) has shown, the ambivalent use of the term of social innovation for

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sustainable production, collaboration, and social learning, as well as revitalising rural societies, has resulted in complicated definitions and limited insights from the field of agriculture and rural development.

In this article, we analyse the transformative social innovations of seed networks in the European Union (EU). We draw upon Transformative Social Innovation (TSI) theory as a new perspective on seed exchange networks, as a way to link social movement and social innovation literatures. The research was conducted as part of an EU project entitled TRANSformative Social Innovation Theory (TRANSIT). We focus on the emergence, dynamics, and agency of seed exchange networks as innovative social configurations, illustrated by qualitative research data from case studies in Hungary, Austria, Spain, Switzerland, and the UK, and the broader European Coordination of the Let's Liberate Diversity network (LLD). We argue that the materiality of seed exchange serves to unite the social innovation dimensions of knowing, doing, framing, and organising (Chilvers and Longhurst 2015), thus becoming a critical site for social transformation in agricultural, ecological, political, material, social, and cultural realms. These new networks promote social innovation by preserving and recreating knowledge about seeds and agrobiodiversity; reinventing seed exchange practices as the foundations of new ways of organising socio-ecological relations; and consciously framing seed sovereignty as an essential requirement for transforming agricultural systems.

Conceptual Framework and Methodological Approach

Transformative social innovation (TSI) theory considers social innovation as heterogeneous social-material collectives comprised of human and non-human elements, implemented in the cognitive, material, social, and normative dimensions (Avelino et al. 2014, Wittmayer et al. 2015, Haxeltine et al. 2016). The TSI perspective invokes insights from several roots, starting from transition theory, and, in particular, that of socio-technical transitions (see, e.g. Geels and Schot 2007, Seyfang and Smith, 2007). It also builds on theories of public or policy discourses around social innovation (Moulaert 2013) to unpack potential and capacities to challenge, alter, and replace dominant structures. TSI theory distinguishes different levels and dynamics within the system and theorises the transformative role of transnational networks (Avelino et al. 2016). According to TSI theory, social innovation is a process made up of these four dimensions: it includes new ways of knowing, doing, framing, and organising that challenge established, dominant institutions (see, e.g. Chilvers and Longhurst 2015).

In terms of social innovation and biodiversity conservation, the literature has begun to document how farmers recreate knowledge and coin new knowledge categories (Nazarea 2005, 2006, Demeulenaere 2014); invent new practices or challenge dominant structures (Aistara 2014, Kloppenburg 2014); reframe agricultural issues (Demeulenaere 2014, DaVia 2012); and organise new or reorganise existing social networks (Aistara 2011, Kloppenburg 2010). For example, the French peasant seeds network has created new forms of knowledge contestation through their collaboration with scientists and other social movements (Demeulenaere 2014). Regarding new practices and meanings, Virginia Nazarea (2005 and 2006) has shown how immigrants who bring seeds with them from home create an “out of place sense of place” through transporting seeds and planting them in their new environments, thus transforming seeds into embodiments and carriers of social memories. Seed movements often re-frame agricultural issues, such as reintroducing notions of peasant autonomy and repeasantization in Europe (Da Via 2012), introducing new concepts such as “peasant seeds” in France (Demeulenaere 2014), or positioning seed sovereignty as a form of civil disobedience in India (Trauger 2015). Finally, mobilisations around seed politics have resulted in new modes of organising and innovative types of socio-ecological connections, such as in a spontaneous protest against a farm's accusation of illegal sale of seed in Latvia (Aistara 2014, Aistara 2018), and in forging new ties of kinship and relatedness to other organic farmers in Costa Rica

(Aistara 2011, Aistara 2018). Nevertheless, the literature on seed networks and seed exchange does not engage centrally with the concept of social innovation, and these different types of innovations are rarely brought into dialogue with one another. Similarly, and paradoxically, social innovation studies in the agricultural and food sectors have not yet incorporated into seed exchange practices (Bock 2012, Kirwan et al. 2013, Neumeier 2017).

In order to trace transformative potential, social innovation processes are characterised by three aspects: the emergence of initiatives, the dynamics of networks, and the agency of individual actors and networks (Avelino et al., 2016). We outline each of these processes as they apply to transnational seed networks in the following sections of this article. In Section 3, we trace the emergence of the seed movements to point out conditions for their organic, bottom-up development and new configurations. Following Haxeltine et al. (2016) we describe fragile seed networking configurations that help emerging innovations. These “institutionally nomadic formations” (Pel et al. 2017) usually start from civil society or small businesses that systematically seek links to communities that can foster further change in the current regime. In section 4, we analyse and interpret the dynamics within seed movements and in relation to one another and their broader social contexts and dominant legislative frameworks. In section 5, we reflect on the role of agency in transformation (Haxeltine et al. 2016), looking at each seed group’s perception of their distributed, dispersed agency to affect locally rooted yet globally connected social change. Finally, in section 6, following Haxeltine et al. (2016) we present our case as shaped by and productive of these dimensions: Knowings (knowledge, cognitive resources, competencies, forms of appraisal), Doings/material commitments (performance of practices, technologies); Framings/meanings (as issue definitions, visions, imaginaries, commitments); and Modes of Organising/governing (how initiatives are configured, organised, governed). We conclude that these four dimensions are interwoven within the materiality of seed exchange.

Methods

Seed sovereignty is a value-laden and sufficiently political topic that brings to the table the issues of power, domination, empowerment, and equality.¹ Therefore, we engaged in dialogue with the seed initiatives we studied through a self-reflective, ‘sympathetic but critical’ disposition. The research seeks to produce benefits for the initiatives under study, and the key informants were engaged as knowledgeable partners who contribute to our shared understanding of social innovation potential and who co-create new knowledge and action with us.

This study has evolved out of the authors’ long-term engaged scholarship with various farmers’ and seed networks (Aistara 2011, Aistara 2012, Aistara 2018, Balázs et al. 2015, Balázs et al. 2016). Access to diverse seeds of delicious vegetable and fruit varieties has been a formative experience for both authors, living in formerly state-socialist Hungary and Latvia. A personal desire for eco-cultural diversity oriented the authors to take part in the work of green civic organisations and pursue participatory action research. The research was motivated by the authors’ belief that by better conceptualising the practices of seed swaps and understanding the grassroots and bottom-up mechanisms of seed exchange networks, we will create helpful and reflexive knowledge of the collective dynamics and patterns of seed exchange for a vast number of initiatives all over the world working on similar issues. We conducted participant observation at several international seed meetings from 2007 to 2015 and carried out in-person or skype

¹ The lexicon of food defines seed sovereignty thus: “Seed sovereignty reclaims seeds and biodiversity as commons and public good. The farmer's rights to breed and exchange diverse open source seeds which can be saved and which are not patented, genetically modified, owned or controlled by emerging seed giants.” <https://www.lexiconoffood.com/definition/definition-seed-sovereignty>

interviews with leading figures of five national European seed exchange networks and representatives of the European Coordination for Let's Liberate Diversity! (LLD)². We visited and interviewed local seed exchange networks in the UK ([Seedy Sunday](#)) Austria ([Arche Noah](#)), Hungary ([Magház](#)), Spain ([Red de Semillas](#)) and Switzerland ([ProSpecieRara](#)) to capture critical turning points in the organisations' work and the motivations and expectations of people involved.

The emergence of seed exchange networks: “Gardens instead of lawn and thuja”

Seed networks at the transnational level are as diverse as the seeds they save and manage. While hundreds of local movements promote the saving and sharing of seeds as a form of food sovereignty and an alternative to genetically modified organisms (GMOs) and corporate control of seed, there is not one organised and interconnected global seed network at present. Instead, there are many national networks and several regional hubs in North America, Europe, Australia, Latin America, Africa, and India (See Figure 1 and their detailed description in Balázs et al., 2015).

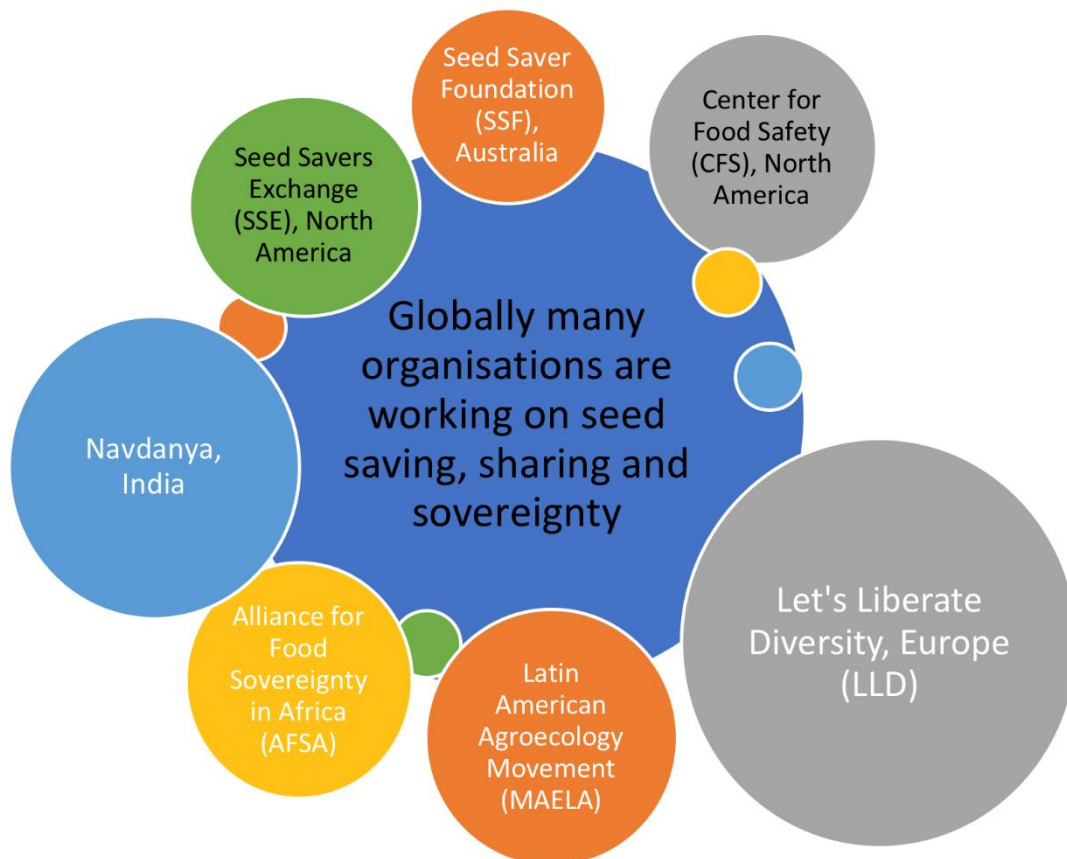


Figure 1: Intersecting regional hubs of seed networking. Source: Authors.

Few studies on seed movements have looked at the interaction between them or analysed their practices as forms of social innovation. Studies of traditional seed networks have mostly focused on farmer practices, and how both agrobiodiversity and social relations have emerged and been maintained through seed exchange (see for example Bellon 1996; Zeven 1999; Brush 2000, 2004; Zimmerer 2003; Coomes 2010; Pautusso et al. 2013). With the emergence of new,

² LLD currently includes member organisations from Scotland, Switzerland, Spain, France, Italy, Germany, and Luxembourg.

intentional, and dedicated seed exchange networks since the 1990s, a new strand of research has been documenting farmer seed networks, their social meanings, and interactions with local institutions and legislative change (Carolan 2007; Ellen and Platten 2011; Thomas et al. 2011; Vernooij 2012, Coomes et al. 2015).

Seed movements encompass ecological, agricultural, material, political, social, and cultural discourses in the narratives of their emergence. Common themes include, for example, the increasing industrialisation of agriculture, which has led to the decline of genetic diversity and the loss of landraces and heirloom seed varieties, limited access to seeds, increasingly restrictive seed legislation, the breakdown of community social relations, and the loss of culturally significant crops and tastes. The first new dedicated seed networks started in the US, Australia, and India and a few countries in Europe in the 1970s and 1980s, as these changes began to spread in industrialized countries, but a second wave of new seed initiatives took off in much of Europe, Latin America, and Africa only in the 2000s with the rise of anti-GMO campaigns and new legislative change (see details in Balázs et al., 2015).

A key reason for the emergence of many seed movements throughout the world is as a response to seed legislation and the introduction of intellectual property rights on seeds. Similar measures are promoted in diverse countries' seed laws through efforts to harmonize legislation with international treaties (Aistara 2018). On the one hand, the International Union for the Protection of New Varieties of Plants (UPOV) Convention, adopted in 1961, protects "breeders' rights," and was made stricter through critical amendments restricting farmers' rights to save and exchange seeds in 1991. It is now often spread through free trade agreements that require implementation through national laws in Latin America, Africa, and Asia³. The granting of breeders' rights, patents, or other forms of intellectual property rights and patents on seeds has significantly altered farmers' rights, resulting in prohibitions or restrictions on seed exchanges, and the concentration of seeds into larger and larger seed companies.

In Europe, the EU seed laws require registration of all seed varieties in the EU Common Catalogue. The Conservation Varieties directive (2009/145/EC and 2008/62/EC) creates a space for lowering the barriers for registration for traditional varieties (by incorporation of derogations into national laws). The legislation gives exceptions for:

- *non-commercial usage*: seed owners who do not publicly offer their seeds on the market
- *maintaining genetic diversity*: seed swaps that facilitate maintenance of genetic diversity
- *economically insignificant varieties*: no need to certify the varieties
- *local commercialisation*: requires unique labels that are different from officially certified varieties
- *small quantities for end-users*: seed owners do not need to record data on seed, no need to official package (tax stamp), no need to printed inscriptions.

These possibilities for derogations imply that EU member states can opt to modify specific provisions of the EU seed laws due to their internal needs and circumstances, but such legislative change often requires active mobilisation by seed movements and can still result in conflicts (Aistara 2014).

On the other hand, the FAO International Treaty on Plant Genetic Resources (ITPGR), often seen as a counter-weight to UPOV's "breeders' rights," recognises "farmers' rights" to save, exchange, and sell seeds, but leaves the implementation of these rights up to states. Implementation has been weak to date, often also requiring mobilisation by seed movements. Seed movements operating on local to regional levels have emerged in response to the

³ Although it will change in 2020 the UPOV convention guarantee breeders' rights to protect varieties for 20 years, but do allow exceptions for research, unlike US patent laws.

unevenness of these legislative frameworks, to challenge unfair restrictions and unite people, plants, and ideas (See Table 1).

Seed movements seek to achieve social transformation in the same agricultural, ecological, political, material, social, and cultural realms that led to their emergence, through new ways of knowing, doing, framing, and organizing. Common elements echoed across the missions and visions of many of these national and regional groups include: protection of agricultural biodiversity, cultural heritage, and the knowledge necessary to sustain them; creation of local community seed banks or other means of ensuring access to seeds; exchange of seeds and knowledge among gardeners, farmers, and in many cases scientists and researchers; and promotion of legislation at all levels to ensure farmers’ and gardeners’ rights to all of the above (Balazs et al 2015).

Table 1: Levels of seed exchange networking.

international context	no global umbrella organisation, but coordinated knowledge exchange about effects of global treaties such as ITPGR, UPOV
regional hubs	platforms in North America, Europe, Australia, Latin America, Africa, and India that also initiate transnational networking and global campaigns particularly for legislative change
national level organisations	awareness raising on agrobiodiversity; lobbying and monitoring of seed laws that structure access to seeds
local grassroots movements	community-based seed exchanges and activities with multiple stakeholders (hobbyists, farmers, activists, gardeners, small seed companies, scientists, gene banks, bakers and chefs)

All the seed networks included in this study grew out of informal networking of dedicated seed savers and people interested in growing food, who were well-connected to their local sustainability scene. Leading actors in seed exchange networks are home gardeners, urban gardeners, and small-scale farmers who maintain agrobiodiversity, bring back and experiment with long-forgotten seed varieties, and produce food without environmental harm from pesticides or soil erosion (Birol et al., 2005; Eyzaguirre and Bailey, 2009; Schupp and Sharp, 2012; Calvet-Mir et al., 2016). Seed exchange is organised through non-monetized mechanisms and is promoted in the interests of self-reliance, self-sufficiency, and alternative food provisioning (Balázs et al., 2015, Balázs et al., 2016, Balázs, 2018). A brief overview of the main characteristics of the emergence of each case study initiative is provided in Table 2.

Table 2: Case studies on seed exchange networks in Europe

seed exchange networks	critical turning points (CTPs) in their development
ProSpecieRara, Switzerland (PSR) In Switzerland, private seed savers started networking and free exchange of genetic materials and knowledge in 1982. They observed that in modern farming, successful business results are of prime importance and there’s no place for rare species. For 30 years the organisation has been supporting rare plant and animal species with the aim of maintaining genetic diversity. ProSpecieRara has 10,500 donors and 3,500 active seed savers and breeders. Coop, the Swiss supermarket chain, markets a large part of such products under the Pro-Specie-Rara-Label.	1982-2016: Building up a network 1999: Cooperation with COOP Swiss supermarket chain 2000: Shifting from conservation to development 2005: Communication target wider public 2005: Creating a label

http://www.transitsocialinnovation.eu/sii/prospecierara	2009: Political campaign - Diversity for all
<p>Arche Noah, Austria (AN) Arche Noah (meaning Noah's Ark) was founded by an US citizen, Nancy Arrowsmith in 1990, bringing together two local seed networks in Austria. People met informally until, after a decade, they had to decide whether to stay small or keep growing and professionalise. There were conflicting views, but some of the members decided to formalise into Arche Noah, which has now become an organisation of 13,000 members. The main aim is preserving and developing the diversity of cultivated plants. Mission statement: Biodiversity is a Source of Life for us and Future Generations. http://www.transitsocialinnovation.eu/sii/arche-noah</p>	1997: Secession seven years after the foundation 1998-1999: Take-off - moving from theory to practice 1999: Finding financial stability and consolidation 2000: Consolidation of networks and operations 2008: Financial crisis initiated a broader movement of gardening renaissance 2010: Extension of AN's office in Brussels
<p>Red de Semillas, Spain (RdS) In April 1999, a small group of people involved in the organic agricultural, ecological, and rural development movements in Spain organised a workshop in Madrid on agricultural biodiversity, which they laid the foundations of the organisation. Later, in 2005, a non-profit association was established and now the Spanish seed network (Red de Semillas "Resembrando e Intercambiando"-RdS) is an informal federation that brings together 20-25 local seed networks throughout Spain. The members of these local groups are farmers and farmer organisations, technicians, agricultural experts, supporters of responsible consumption, local action groups, university staff and students, ecological activists, researchers and other people interested in developing a different agri-food system. The primary objectives are the reintroduction of local, traditional and farmers' varieties in the framework of agro-ecological food systems, food autonomy, and the central role of family farming. http://www.transitsocialinnovation.eu/sii/red-de-semillas</p>	1999: Approval of the European directive regarding conservation varieties 2004: Approval of the International Treaty on Plant Genetic Resources for Food and Agriculture 2005: Red de Semillas set up their own association 2006: Approval of the new seed legislation in Spain 2008: Creating a federation of local seed networks 2013: Changing the coordination of the organisation
<p>Magház (Seed House), Hungary (MH) The political significance of seeds first reached public attention in 2011 around the 5th Let's Liberate Diversity (LLD) conference in Szeged, Hungary, where volunteers organised the first community seed-swap. This allowed 'agrobiodiversity savers' to start a conversation about seed issues in Hungary. They gained skills to organise and manage projects about gardening, nature conservation, food-self provisioning and community agriculture. The initiative aims to preserve gardens '<i>instead of lawn and thuja</i>'. They pursue <i>in-situ</i> maintenance of agricultural genetic diversity to help farmers adapt to climate change and market vulnerabilities. Beyond farmers, the network is open to home gardeners, hobby gardeners, and everyone</p>	2009: Open Day on Agrobiodiversity in the Parliament 2011: The first seed-swapping event in Szeged, Hungary 2012: International Meeting at Arche Noah 2012: Establishment of Magház 2013: Let's Liberate Diversity conference in Basel 2014: Publication on the Practicality of Seed Saving

<p>interested in food self-provisioning, and invites them to community-building around seed saving and swapping. At the heart of the network is the cultivation of trust-based relations. The founders' group consists of 5 active and dedicated individuals who share the work with a network of 200 active registered members.</p> <p>http://www.transitsocialinnovation.eu/sii/maghaz-seed-house</p>	
<p>Seedy Sunday, UK⁴</p> <p>This, the most prominent and longest-running community seed-swapping event in Britain, has organised events since 2002 in Brighton. A volunteer-based activity in each February chose the Imbolc, a Gaelic festival celebrating the beginning of Spring to involve people into a celebratory, convivial and carnival gathering.</p> <p>http://www.seedysunday.org/</p>	

As illustrated in Table 2, each studied seed network emerged and framed activities in a slightly different way, with a focus on different discourses and elements of social transformation. While PSR appeared around the practice of preserving specific rare varieties and species, AN focused on saving agrobiodiversity as a whole. RdS was interested in re-framing dominant agricultural and rural development paradigms, and MH emphasised the need for trust-based modes of community organising. Although in some cases, the new networks split off from existing larger ones (RdS and AN), the growth of these initiatives did not transform the original ambition or purpose. As the organisations got bigger, participation increased through volunteering, and the initiatives became better at what they do, and more professional without becoming commercialised. This required considerable effort, however, as highlighted by one of the interviewees from RdS: “The organisation only operates if we work hard, so if we want the organisation to be active, we have to be active” (CTP2-chairperson). Also, the leader of AN highlighted: “we could keep it to a manageable size and could really scale it up on other outlet points. So, we began to have a big market in Vienna in the botanical garden, and 10,000 people attend there. So finally, it is really growing” (CTP5-chairman).

One challenge at the heart of such expanding networks is the cultivation of trust-based relations. As stated by one of the founders of MH: “Earlier I worked at a gene bank where I realized the need for a community gene bank which would be based on a civil network” (CTP1-founder). “One needs fertile soil for seed swapping. Those who exchange their seed also give the gift of an entire year and share the belief in the future” (Website of www.maghaz.hu). This credo also highlights the transformative potential that is from the start embedded in the seed itself (see Figure 2 below): “The seed encapsulates all necessary knowledge for life. You can learn about the best environment where the seed can germinate, the old traditions of its production, the agro-techniques, the tricks of gardening, and sowing the seed. When you harvest, you learn how it was used in the old days as a fresh ingredient and in different processed forms. When you want to save the seed, you can rely on the peasant breeders' simplicity and the practicalities of maintenance” (Website of www.maghaz.hu).

⁴ The Seedy Sunday case in Brighton have been completed by Adrian Smith (SPRU) within the TRANSIT project, however it is not part of the case study database that deepened our analysis by providing critical turning points in the history of the initiative.

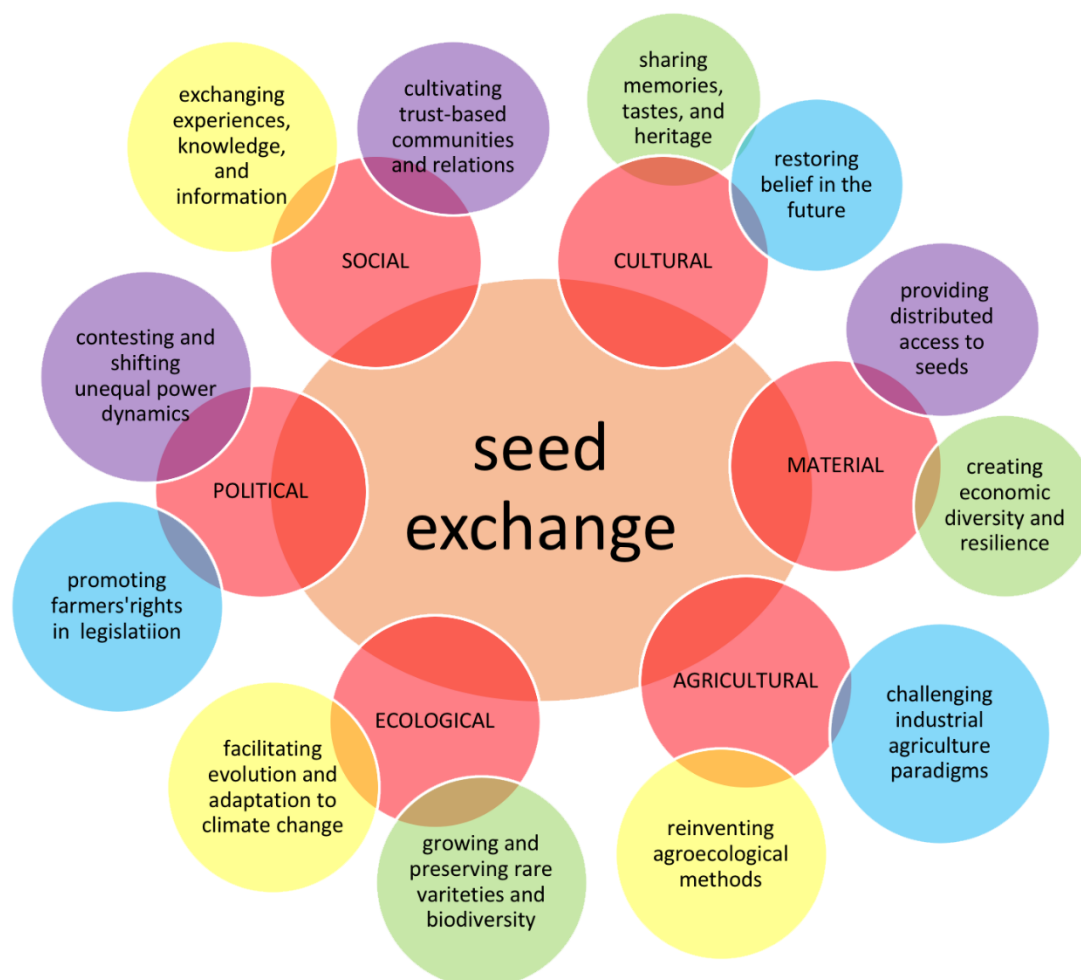


Figure 2: Diverse discourses are surrounding seed exchange, represented in red circles. While many of these realms overlap, yellow circles indicate new modes of knowing; green – new modes of doing; blue – new modes of framing; and purple- new modes of organising. Source: Authors.

The narratives of the emergence of the various seed movements thus convey numerous overlapping agricultural, ecological, political, material, social, and cultural discourses in which seed movements are involved. Seed networking encapsulates myriad aspects of cultivating food sustainably: it gives farmers and gardeners access to a diversity of seeds, reimagines rural development models, prevents genetic erosion and promotes sustainable agriculture, improves democratic participation in the food system, connects people to share to food cultures and meanings, and allows them to experiment with creating new communities and social relations surrounding seeds and food. This diversity of goals and meanings of seed exchange allows seed movements to simultaneously engage in new ways of knowing, doing, framing, and organising, which is key to social innovation and transformation.

Community dynamics of social innovation: “Knowledge about growing really exploded”

Transformative social innovations in seed networks emerge through the dynamics that exist within and among different seed movements at the community level, between seed movements and dominant state and international institutions at the national and regional levels,

and in relation to the broader socio-material context nationally and globally (Haxeltine et al., 2016).

New social dynamics within initiatives are created through efforts to spread seed-saving knowledge and practices and to develop online tools for seed networking. In Arche Noah, attitudes changed after the financial crisis: “it did not seem so strange anymore that people grow food in the city,” explained the CEO.

“In Austria, it was something completely unknown, after decades of green lawns and nicely cut trees without vegetable gardens. Mainstream gardens were representative and full of pesticides – so it was a bit like a shift in paradigm that gardens will be again for food production. OK, it seems now a bit of exaggeration, but it was the feeling at that time, and since then knowledge about growing really exploded. It also had to do with social media, the quick sharing of information in urban gardening, and big retailers who were trying to be trendsetters” (CTP2-chief executive).

Arche Noah created partner farms to produce seeds, and these seeds became available through the initiative: “anyone could take seeds home easily and start his or her own garden without being professional” (CTP2-chief executive).

At the community level, social dynamics are focused on building trust and sustaining momentum to continue activities. Seed swaps are typically small-scale convivial events featuring gardening practicalities, tasting of seasonal food, local varieties, exchange of leaflets, etc. A broad coalition of seed swapping actors take part in their work: events are prepared by local volunteer gardening and community groups, municipalities, and schools that provide facilities, decorations, tables, cooking, etc. When, for example, Magház organises seed swaps in Hungary, people bring seeds they have saved, labelled, and packaged appropriately to the event. Magház can best help local organisers in arrangements for running the seed swapping and inviting speakers and supporting local volunteers. Similarly, the central dynamic of Seedy Sunday in the UK is as a convergence point for community networks. It created an experimental space in a dense urban setting like Brighton and showed that there are opportunities for people to have a go at growing.

The broader policy landscapes of seed legislation described in the previous section influence social dynamics and the relationships between different seed networks and dominant institutions both at the national level and within Europe. Because national legislation still structures farmers' and gardeners' access to seeds, seed saving and exchange can become a politically subversive act when it is done in order to contest regulations. In RdS, the general perception was that “politicians say that we are not representative, that the seeds that we are working with are not good for what they call ‘productive’ agriculture. We talk about real agriculture, but the politicians say that they need other seeds, not local varieties (...) the Spanish Government is not progressive enough in this field” (CTP1-chairperson). At a national level, seed regulations thus can often become a common point for mobilisation by various groups within the country. The RdS representative identified the adoption of new seed legislation in Spain in 2006 as a crucial moment for the movement: “It was our first new law regarding local seed issues so it was a turning point in the way that we could start to say to the Government that we have an article that talks about farmers’ rights so you (the Government) and we have to work on that, or we have a title in this law which talks about plant genetic resources, so you (the Government) have to develop it” (CTP1-chairperson). As compared to many oppositional sustainability campaigns, seed exchange creates a positive vision of a society that is built on sharing, personal trust, and collaboration. In the case of MH, several environmental, food, and seed-saving groups came together to organize the first Open Day on Parliament on the International Day of Biodiversity in 2009, involving dedicated, talented and enthusiastic volunteers seeking to reach out to community networks to maintain or halt the decline in agrobiodiversity.

At the regional level in Europe, however, the proposed overhaul of EU seed legislation in 2013 became a key space of negotiation or “issue space” (Whatmore 2009) around which European seed networks were forced to try to reconcile their differences in framing seed politics. On the books since the 1960s, the laws promote high-yielding varieties at the expense of genetic diversity by requiring that all varieties be registered in the European Common Catalogue. At a seed legislation workshop in Austria in 2013, one member of Arche Noah explained that they oppose the seed laws not only for practical reasons but also on an ideological basis because they stem from the logic of “purity” that began during the authoritarian regimes before WWII and have continued since. Representatives of different European seed networks feel unified by a common goal: “We share a vision of diversity, with free access to genetic resources, and no constraints to do our work in the field,” said one LLD member (Interview September 2015). An Italian representative added that the shared vision includes “freedom to try new ways of keeping and exchanging seeds - to be in control over the evolutionary process. The drivers may be different- based on ecological versus traditional knowledge, but the goal is the same” (Interview September 2015).

Many European seed groups did come together to sign a joint declaration (Vienna Declaration 2013) because they realised the importance of sending one clear message to politicians. Eventually, in part due to campaigns held by various European seed networks, the European Commission withdrew its proposal, which was hailed as a success by Arche Noah and other groups. Nevertheless, internal debates among seed movements revealed key differences in opinion surrounding whether seeds are free and should be considered part of the commons, or rather common property that should be governed by strict rules that would allow space for seed networks to continue their operations but place restrictions on large companies that may want to infringe on that space. A representative from AN observed that different agrarian histories and relations to the state in different seed movements led to different conclusions about the proposed EU legislation: “I had underestimated that at the beginning-how the life experience that people bring with them will influence legal interpretations and strategies... Content-wise essentially there is not a difference, the differences are for cultural reasons” (Interview November 2015).

In sum, the social dynamics governing seed networks are essential for social innovation at various levels. While many of these European seed movements emerged out of informal groups and contribute to community development, it is through building national networks that they have gained political momentum to begin to influence regulations. National differences in the socio-political contexts pose challenges for unified positions at the European level, however. In most of these initiatives, the importance of community dynamics remains an often underappreciated effort, which is needed to co-create change by recognising the value everyone brings to the organisation, negotiating different aspirations, opinions, and contestations, and making sure people feel respected and listened to (Pel et al., 2017).

Agency for social innovation: “The work makes us feel more empowered”

Following the definition of Chilvers and Longhurst (2015) and Wittmayer et al. (2015), we understand agency as an emerging phenomenon and a relational effect of the configurations within and between different collectives. As explained by Haxeltine et al (2016:41), “agency is not a static set of capacities, but rather a fluid process through which individuals and groups direct their actions to effect change at individual and interpersonal levels on the one hand, and in the social and political context in which they exist, on the other hand.” Here we present how seed exchange networks perceived their possibilities to create change in the world.

Social agency for transformative change becomes evident in seed initiatives in the agricultural, ecological, political, material, social, and cultural realms mentioned earlier. Through their practices and struggles, seed networks create new forms of agency. Local seed

exchange initiatives primarily develop social agency by encouraging people to regain their autonomy in the cultivation of food and plants. Beyond the actual seed saving and sharing, social agency emerges as creating a new community by sharing the know-how and experience. Local seed initiatives successfully contribute to finding a way around restrictive seed legislation and developing alternatives or gaining support for seed law campaigns. A further possibility for agency in social innovation lies with the focus on legal issues through lobbying that creates empowering engagements with society.

First, seed movements exercise their social agency in the agricultural realm, often embodied in individual capacities and physical activities such as the ability to save seed, share seed, and grow your own food. In the Seedy Sunday case, it includes acquiring skills, appreciating the art and science of seed saving and cultivation. Magház in Hungary shares the know-how of saving and sowing seed, *in situ* seed management and supplying sustainable food for self-sufficiency.

In the ecological realm, movements exercise agency to spread scientifically sound and holistic understandings of agro-biodiversity, in response to a new global trend of growing interest in traditional and unique varieties. As the founder of Magház explained, “there is a lack of scientific basis about varieties and seed saving and variety maintenance.” Initiatives, therefore, launch awareness-raising campaigns about how agrobiodiversity can be maintained by all people (home gardeners, seed-savers, hobby growers). It is thus not only an issue of farmers’ rights for seed, but, as the founder mentioned in the interview, “We would like to make these varieties more used in gardens and more popular among customers.”

Actors involved in seed movements also exercise agency in the social and cultural realms through developing interactions in the community. Interpersonal experiences can be the basis of visions for more substantial changes in society. Seed networking events create new communities by encouraging people to experiment with growing their own food and cultivating rare varieties. In case of Magház, the agency is in the local communities where the events, workshops, and trainings are organised. This often is expressed in the creation of new private or community seed banks or other means of ensuring access to seeds. Initiatives also exercise cultural forms of agency by facilitating the exchange of seeds and knowledge not only among growers and consumers but also chefs and bakers involved in culinary heritage projects, such as in a French Peasant Seeds network experiment with culinary uses of different old grain varieties. At the community level, meaningful interactions with like-minded individuals for the protection of agricultural biodiversity serve to empower people. Nevertheless, limited resources and relying solely on volunteers can create tensions with other organisations, and ultimately disempower seed exchange actors.

Seeds as material objects come to embody the knowledge and agency of those who manage them, as seed varieties have a certain plasticity. In AN, they observed that “seed is a developing organism, and it is not something that stays like this and nothing changes (...) we experienced in our seed bank that if a seed is out and we harvest the seed and give it out for two to three years, then the seed comes back, and it is not really the same seed. The question is what is it then? Is it the old seed we had three years ago, or is it a new seed?” (CTP5-chairman). This plasticity, however, also serves to limit the ability of networks to market seeds as stable varieties. Therefore they sometimes enter into breeding activities to improve them. Seed networks often seek to popularise seeds that have been forced out of the market for some reason, such as low productivity, inability to harvest mechanically, or genetic diversity at the population level. In order to sell seeds of rare varieties to consumers, seed movements must work somewhere in the space in between the conservation and breeding sectors, specialising in “diversity breeding” and “niche varieties.” Organisations, such as ProSpecieRara have a science team that performs research on the quality of varieties before they are reintroduced into the market. The leader explained the challenge:

“We tried to introduce our varieties in an organic context of farming. Unfortunately, it caused more problems. We cannot use pesticides, and the old varieties have no resistance against diseases. If we want to go to the big market context, we have to improve the variety. These varieties are worthwhile to improve. We have to adapt our plants to the situation. We shift from only conserving to developing the variety. This is a shift from pure conservation to development of plant genetic resources” (CTP3 - chief executive).

In this way, the collective agency of various seed actors becomes embodied in the improved seed varieties marketed by PSR.

The social agency is also played out in innovative ways of securing financial resources. Many have membership fees, which include a certain amount of seeds. Some receive at least part of their funds from selling seeds. Arche Noah, from the very beginning, aimed at autonomy by ensuring that “a non-governmental organisation will not go bankrupt. Basically, not depending on governmental money...” as [we] “knew that we had a very sexy topic. Gardening, plants, organic gardening, and healthy eating were sexy at that time, so we had to work on how to make this into a campaign” (CTP4-chairman). Magház often relies on financial and administrative support from the Bese Association to organise events, training, and seek funding for launching new agrobiodiversity-related activities. Magház members have good connections to some government representatives and pressure groups for family farming. Local seed groups keep costs low by managing their network out of a home office, and some of the organisations fund part of their operations through the sale of heirloom seed varieties. European groups can rely on cooperation with researchers where they have been able to take advantage of European funding programs or EEA Grants.

Finally, agency is also exercised in the political realm. Agency is needed to analyse aspects of seed legislation, mobilise support for campaigns, and lobby for change. Here the kind of agency being created is about being able to raise awareness and commitments amongst people. For example, AN hired a campaign coordinator who worked on organising people to react to the EU's legislative changes. Rather than assuming that the legislation was too complicated to understand, they organised several legislation workshops to bring together people from different European and EU accession countries. The workshops started with the basics, explaining the European legislative process, the problems with the current legislation, and the proposals on the table. They then discussed possible national-level and European-level ways of organising campaigns and collective messages to the European commissioners and European Parliament. In Red de Semillas, the 2006 seed law mobilised lobby work for the recognition of farmers' rights, as the Spanish government “did not elaborate the technical regulation for farmers to produce and sell their own seeds in favourable conditions (...) As a group, we want to propose other ways to organise the production and trade of artisanal seeds of local varieties, but the Spanish government do not want to change and open the legislation” (CTP5-6-chairperson).

Most often, these different kinds of actors and agency need to be strategically integrated to achieve social transformation. Magház proclaims the need to combine forces of the informal, underground seed groups with the more institutionalised, market-oriented, or politically motivated initiatives. After stopping the proposed changes to the EU seed laws, an Arche Noah representative concluded that:

“I would say that all in all, the work we have been doing makes us feel more empowered. What makes me feel confident is that results are achievable when cooperation happens successfully. I am not pessimistic at all but feel like a learner. I feel we all have to learn how to make collaboration happen even better and be more inclusive. I think it is a challenge to function well with few resources, on a voluntary basis, with sometimes no common language: the spoken one and the 'societal' one. Also,

one needs to be pragmatic and realistic on how broad cooperation can go and have the courage to not insist on cooperation where it turns out to be fruitless, and to agree to disagree without regrets and reproaches” (Interview November 2015).

Similarly, in Seedy Sunday, agency also involves the knowledge on how to operate diplomatically: how to present an issue, respecting the diversity of personal and social motivations associated with seed swapping, and knowing when to be a critical voice and when not to push too hard.

Variations of governance solutions for seed exchange networks present a paradox for agency: while some networks prefer formal lobbying as organisations with a policy orientation, and a clear focus on legislative issues, many community-based initiatives seek interpersonal, informal engagement with a broad range of societal actors and prefer to focus on exchange and conviviality. It is the interplay of different approaches that creates socially innovative arrangements. In the Seedy Sunday case, for example, we could not explicitly locate one theory of change. However, community participation is clearly implied. The growing community-level awareness of seed issues also leads to changed attitudes. The empowering practice that Seedy Sunday cultivates is peoples’ participation in growing their own food. Participants of the network are learning about seeds and food issues. As it becomes a growing scene in Brighton, more and more people know how to organise events, and get speakers on various seed issues.

If we understand agency as an emergent phenomenon that is “fundamentally distributed, and a relational effect of the configurations within and between different collectives” (Chilvers and Longhurst 2015), and as path-making, rather than path-dependent (Garud and Karnoe 2010), we can see that the intersection of divergent approaches and efforts may have the most possibility for social innovation and making new paths through collaboration among many actors, rather than following old paths under the guidance of experts. Similarly, seeds travel through these networks in a dispersed way, rather than through centralised distribution by state agencies or private corporations. In sum, initiatives developed considerable but distributed social agency: by encouraging people to take back some control over an element of their lives, which is the cultivation of food and plants. This social agency cannot reverse current trends in industrial food systems on its own. It can, however, contribute to successful campaigns to stop harmful seed legislation and is part of a sustainable food movement that challenges the legitimacy of dominant systems of food production and consumption. Also, more powerful social agency builds up through seed exchange events that raise social issues, while simultaneously celebrating a friendly atmosphere and fun activity.

Social Innovation in seed exchange: “What these people are doing existed only in my wildest dreams!”

The various seed networks studied at the European level have many socially innovative aspects to their work that cut across the categories of knowing, doing, framing, and organising (Chilvers and Longhurst 2015). Seed exchange networks are distinguished from many other social movements in the importance of the materiality of their work. Seed exchange networks are socially innovative in that seeds become the intermediaries that transform social relations across time and space. The reproduction, maintenance, categorisation, and exchange of seeds as a form of preserving biodiversity facilitate new types of social interaction.

The most significant social innovation comes in the connection between the material exchange of seeds and the social exchange of knowledge and values through which the networks are built. The primary activity of almost all of the seed networks that operate at local, national, or international levels is the exchange of seeds. While seed exchanges are organised differently in various locales (sometimes via mail order catalogues and the internet, at times through informal personal networks, and sometimes as public events, such as at the bi-annual LLD meetings), they are not only a material exchange but also a way of making intimate connections

to people and remaking social relations. The crafting of social and spiritual networks through material exchanges is an ancient tradition much studied by anthropologists (for example Malinowski 1920, Mauss 1954, Strathern 1991, etc.). However, what is new here is the conscious sharing of seeds and knowledge across borders and outside of the localities where particular seeds have gained their histories and meanings in the first place. One French representative explained that when receiving seeds from someone from another country, even if the seed may not be easy to adapt to local conditions, what matters is the intention and the value carried by the seed: “The value is sacred - seeds bring with them energy from other countries (...), then our work starts with this seed, to adapt it. However, the spirit of this [sharing of the seed] is powerful” (Interview September 2015).

Seeds have also been used innovatively as a political tool as a form of framing campaigns for legislative change. In a campaign to influence European lawmakers, coordinated by Arche Noah, rather than just sending politicians responsible for EU seed legislation emails to express concern over the proposed regulations, Arche Noah encouraged farmers, gardeners, and activists from all over Europe to send seeds to the politicians, with a plea to help save them. As the Arche Noah representative observed, “The politicians felt troubled because they could not just throw them away like you can delete an email. Mr Silvestris, the rapporteur for the seed legislation, thanked people for the seeds and said he would plant them” (Interview November 2015). She noted that this brought a sense of responsibility and awareness to politicians that the seeds are alive and should be planted and protected.

Table 3: Seed exchanges as sites for social innovation

New ways of knowing	<ul style="list-style-type: none"> • collecting and sharing knowledge about rare seed varieties and agrobiodiversity • generating new knowledge on how seeds evolve and adapt to climate change • experimenting with and reinventing agroecological management approaches
New ways of doing	<ul style="list-style-type: none"> • growing old and rare varieties for ecological and economic diversity and resilience • exchanging seeds and their embodied memories and tastes • context-sensitive local events
New ways of framing	<ul style="list-style-type: none"> • positioning seed exchanges discursively as social and political acts rather than merely agricultural practices • linking conviviality and fun with challenges to dominant paradigms • emphasising sharing and collaboration as pathways to the future • creating scientifically sound and complex messages for different stakeholders or single, explicit central messages to the whole society
New ways or organising	<ul style="list-style-type: none"> • building trust-based long-term interactive processes rooted in local contexts • shifting political power through massive campaigns and through amateur breeding and decentralized seed dispersal • light network structures; semi-formal institutions

Thus, seed exchanges held at the local, regional, and international levels are quintessential examples of what Schatzki (2002) has called “configurations” that integrate all four dimensions of social innovation (knowing, doing, framing, and organising) – see Table 3

above. These are social innovations that can also serve as inspiration and be dispersed and expanded to other contexts, as has happened in Eastern Europe. For example, public seed exchanges spread as a practice to Hungary, Latvia, and other Eastern European countries after people participated in such events at the European LLD conferences. As one Latvian member explained after her first experience at the LLD meeting organised in Szeged, Hungary: “What these people are doing existed only in my wildest dreams! However, for them, it is just part of what they do as their daily work.” Since then she organises an annual seed exchange for gardeners, organic farmers and permaculture activists in Latvia, and is now starting the first seed library in the country.

Conclusions

Seed saving and exchange as a new type of social innovation builds on an ancient practice that has been marginalised by seed laws and thus triggered civic networks to reinvent this tradition. Our cases illustrate that seed saving and exchange has a central narrative of social change: the concerns about global food supply, agrobiodiversity loss and resource depletion are represented in the individual joys of growing food and sharing skills, and in the political ideals of resisting agri-business in the name of seed and food sovereignty. These networks and practices bring together agricultural, ecological, political, material, social, and cultural discourses related to food and seed sovereignty.

Seed exchange networks consist of food self-provisioners, home gardeners, hobby gardeners, activists and volunteers who save and share their seeds. The practice of seed exchange creates not only a vision of a society that is built on sharing, personal trust, and collaboration, but also makes new material pathways to shape that world. Seed saving and sharing create a distinctive counter-cultural context in various local manifestations: initiatives facilitate sharing of seeds and knowledge through creating new encounters and interweaving material and spiritual experiences in open convivial events. Seed exchange events promote the idea of practice-based learning in non-formal settings. Seed networks also shape a new understanding of production and consumption that is anchored in localisation and an alternative to global supply systems.

In conclusion, social innovativeness of new seed exchange networks arises from the fact that the material exchange of seeds entails the interpersonal sharing of knowledge and values through which social relationships are built and reinforced. Successful seed exchange networks emerge as a result of community initiatives and can also enhance community development. Seed networks thus embody and recreate the diversity they promote. Seed exchange is a social process that facilitates social innovation whereby the materiality of the seed is the intermediary that unites people, ideas and networks, and serves as a means to redefine social relationships and create new modes of learning, doing, framing, and organising.

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