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Neo-farmers: drivers of farming systems innovation and of the transition to agro-ecology? The case of Alentejo (Portugal)

Paula Dolci^a, Coline Perrin^b

^aPhD Student in Geography, University Paul Valéry of Montpellier, Art-Dev Unit (UMR 5281) and INRA Montpellier, Innovation Unit (UMR 0951)

paula.dolci1@gmail.com

^bResearcher in Geography, INRA Montpellier, Innovation Unit (UMR 0951)

coline.perrin@inra.fr

Abstract: Over the last decade in Western Europe, increasing numbers of city dwellers have left the town for the countryside to start farming. In Portugal, this “back-to-the-land” movement takes place in the dual context of a crisis of the agricultural sector, and, at the same time, the rise of environmental concerns and of the demand for sustainable and quality food. This paper aims to analyze the role of newcomer farmers on farming system innovations. It is based on a two-months long field work in Southern Portugal’s Alentejo region. The analysis of 27 interviews with farmers and members of agricultural organizations reveals neo-farmers’ contribution to farming system innovations at three scales: the farm scale, the scale of professional networks, and the territorial scale. Neo-farmers’ socio-cultural background and their will to live off the land while preserving the environment drive their adoption of innovative farming and sale practices, often in line with the principles of agro-ecology. Most of them farm organically. They learn through virtual communities and long-distance exchanges with peers, but also exchange knowledge and practical know-how with local farmers. For this reason, they are significant actors of the transition towards agro-ecology, adopting and spreading innovative farming techniques. However, their impact remains often invisible. Neo-farmers are few, scattered, and poorly integrated into food supply chains. Many encounter difficulties to live off the land and achieve an economic viability in the first years of their farming projects.

Keywords: Neo-farmers, back-to-the-land, organic agriculture, innovation

Introduction

Since the 2008 economic crisis, back-to-the-land migration has increased in Western Europe (Poli 2013; Rouvière 2015). Back-to-the-land migration can be defined as an individual’s migration into a rural area followed by the practice of farming as a lifestyle, or as a livelihood and a business. Both people with non-agricultural backgrounds as well as heirs to farming families who temporarily studied or worked in cities perform this type of migration. Though researchers have studied the migratory movements and the individual motivations that fuel them (Halfacree 2007, 2008), few studies have focused on the nature of back-to-the-landers’ farming projects. Little is known about the everyday practices, especially farming practices, which enable neo-farmers to achieve their goals (Trauger 2007; Wilbur 2014). In a context of growing awareness of the benefits of agro-ecology to improve rural communities’ resilience (Altieri et al. 2015), we are questioning the impact of newcomer farmers—also called neo-

farmers—on farming systems and rural development. Are they drivers of agro-ecological innovations?

This paper aims to analyze neo-farmers' practices in order to understand how they may be innovative and play a role in the agro-ecological transition. We will show that neo-farmers' socio-cultural background and their desire to live off the land while preserving the environment drive their adoption of innovative farming and sale practices, in line with the principles of agro-ecology. The impacts of neo-farmers on rural areas are assessed both through their interactions with other farmers and through their market integration.

This paper is based on a two-months long field work in Alentejo (Portugal) with the support of the University of Evora. We conducted in-depth semi-structured interviews with a total of 27 farmers and members of agricultural organizations, using a qualitative approach that places emphasis on actors' perceptions.

After a short description of the existing literature and our study area and methods, our results are exposed in three sections. First, we analyze neo-farmers' practices at the farm scale. Second, we focus on the interactions between neo-farmers and other farmers/local inhabitants. Third, we explore newcomer farmers' integration into local food supply chains. Finally, the discussion section shows that, though neo-farmers are indeed drivers of farming system innovations, their impacts are limited and tend to remain invisible in Alentejo.

A qualitative approach to neo-farmers in Alentejo, Portugal

Neo-farmers as potential innovators for agro-ecology

Literature on the back-to-the-land phenomena dedicates much attention to neo-farmers' motives for migration. Few studies have examined the everyday practices, and especially farming practices, that enable neo-farmers' successful achievement of their projects.

Van der Ploeg's research on the "new peasantry" (Van der Ploeg 2014) exposed the strong resurgence of peasant modes of farming. Though he took into account the role of newcomers within this trend, Van der Ploeg didn't focus on this specific population. Similarly, Leroux (2011) showed how the emergence of organic farming in France in the 1970s was linked to newcomers, but he didn't concentrate on them. Only a few studies dedicated particular attention to neo-farmers themselves as well as their farming, social, and economic practices. In France, Hervieu and Léger (1979) highlighted the dynamizing effects of neo-farmers' presence in depressed rural areas. In the United States, Trauger (2007) demonstrated that economic imperatives could lead to a shift in neo-farmers' agrarian ideal and drive them to adopt more conventional agricultural practices. Still, there is a lack of studies on the farming practices and innovations of neo-farmers and their potential contribution to the agro-ecological transition.

Agro-ecology is "a transversal project" (Leroux 2009) which promotes agricultural practices coherent with environment preservation, food security and sovereignty, human and animal health, social and solidarity economy, and sustainable land planning, landscapes, and lifestyle. Agro-ecological techniques such as agroecosystems diversification (polycultures), agroforestry systems, integrated crop-livestock systems, and water conservation and harvesting are supposed to reduce farmers and rural communities' vulnerability to climate variability and strengthen their resilience (Altieri et al. 2015). Non-conventional farming systems play a role in maintaining a biologically rich and diverse countryside (Bignal and McCracken 1996), featuring a range of landscape characteristics suited to agri-

environmental management (Ribeiro et al. 2016). On the contrary, conventional systems appear less flexible in terms of landscape characteristics, likely promoting regional homogenization.

Padel (2001) has already shown the role of newcomer farmers in the adoption and diffusion of organic farming innovations. According to Rogers (1962), innovators and early adopters of farming innovations have more years of formal education than later adopters. They tend to have more social contacts outside of their local community, especially with other innovators. They favor the diffusion of innovations by making them acceptable by the community. Among organic farmers, there is a high proportion of young and well-educated people, with urban backgrounds and little farming experience (Padel 2001). Compared to established farmers, newcomers are more likely to adopt innovative farming practices. Their lack of integration in the pre-existing farming community facilitates their rejection of conventional methods (Padel 2001). On the contrary, for conventional farmers, the conversion to organic farming requires a deep shift from previously acquired knowledge and practices (Johnson 1992; Morgan and Murdoch 2000). Moreover, neo-farmers may participate in “retro-innovation” processes (Stuiver 2006), such as the reintroduction of local species, which have been neglected during the post-war agricultural modernization (Van der Ploeg 2014).

The opposition between organic and conventional farming styles is also a clash between different forms of knowledge. Wilbur (2014) has shown that individuals from non-agricultural backgrounds who adopt and adapt new farming processes are confronted with the divergence between formal, institutional knowledge about conventional farming and local, indigenous knowledge, which often pre-dates the post-war agricultural modernization. Morgan and Murdoch (2000) characterized agricultural transformations in Europe as a process of knowledge substitution, supported by technological development. In this process, the “local, tacit knowledge is gradually replaced by standardised and codified forms” (p.165) conveyed by the state, the research institutions, and the chemical industry. As the technological innovations came into use, farming practices became disconnected from local ecosystems and local knowledge was neglected. On the contrary, small-scale organic production involves the farmer in a new relationship to local, often tacit, indigenous knowledge (Wilbur 2014). Thus, we will question how neo-farmers innovate, possibly interacting with established farmers.

Following an interactionist and constructivist perspective, we consider that innovation is not only top-down, relying on gradual adoption of expert-produced technology, as presupposed by Rogers. Sociologists have shown that innovations also emerge locally, in a bottom-up trend, within groups of farmers (Chambers et al. 1994; Darré 1996) or communities of practice (Goulet 2013). Innovation, in this case, can be defined as the social process through which a group of individuals adopts an invention. This process often involves the interaction of many actors—even non-humans—as suggests the actor-network theory (Callon 1986; Latour 1986; Akrich 1998). In our study, we will thus consider the role of neo-farmers in the social construction, adoption, and diffusion of innovations favoring agro-ecology. We will focus particularly on neo-farmers’ farming, training, and selling practices as well as their relationships with locally established farmers.

Study area and methods

The region of Alentejo (Portugal), where study field work was conducted, is a rural region with contrasting dynamics. On the one hand, the district of Evora is close to Lisbon (the city of Evora is a one and a half hour drive away from the capital). This makes it an easy destination for inhabitants ready to migrate—or even commute—from Lisbon. Hence, the

municipality of Montemor-o-Novo, located between Evora and Lisbon, has experienced strong residential and agricultural settlement dynamics since the 1990s (Pinto-Correia and Juste 2017). In contrast, the rest of the Alentejo region, except for the touristic coastline, registers low residential densities (24 inhab./km² in average) and a sharp decrease in the rural population.

Alentejo is a highly agricultural region, which harbors both large agricultural holdings (between 300 and 500 hectares) and small family farms (less or equal to five hectares). The large farms, called *herdades*, cultivate vineyards or olive trees. They also breed cattle and sheep and produce cork oak, shaping the typical Alentejo landscape: the *montado*. The small farms produce mainly traditional Mediterranean high-quality products, based on olives, sheep (for meat and cheese production), vegetables, and fruits (Pinto-Correia et al. 2015).

During our two-month long field work in 2017, we conducted in-depth interviews with 20 neo-farmers among which three were at a planning stage, 16 had been established for less than ten years, and one had begun farming 14 years ago. Regarding family backgrounds, seven interviewees had rural backgrounds: five had grandparents who were small farmers and inherited a piece of land, whereas two had fathers who farmed. All the others had more distant or no rural backgrounds. We also conducted additional interviews with two agronomist engineers from Confagri,¹ four locally established farmers, and a professor of agronomy at the university of Evora.

We approached the first interviewees through the WWOOF² network (five interviewees), local food supply networks (three interviewees), and training programs for beginner farmers (three interviewees). Then, following the “snowball sampling” technique, we asked each interviewee if they knew other neo-farmers. We conducted semi-structured interviews according to a qualitative approach structured around four main themes: individual and social history; project and expectations; farming system; and integration into social, professional, and trade networks. All interviews were recorded, integrally transcribed, and later analyzed according to these four themes.

On the one hand, our status as a foreigner in the Portuguese context was a challenge. It created difficulty in accessing people and in understanding hidden discourse meanings. On the other hand, it was an opportunity. Our status of external observer allowed questioning things that might have seemed obvious to locals, hence clarifying some aspects of interviewees’ relationship to their territory and the personal meanings they attach to their actions.

Results

At the farm scale, neo-farmers introduce a diversity of innovative practices often in line with agro-ecology

In this section, we show that neo-farmers have strong environmental motivations, which they reflect at the farm scale both through their farming methods and their way of life. Their

¹ Confederação Nacional das Cooperativas Agrícolas do Credito Agrícola de Portugal. This institution offers training programs called “*Jovens Agricultores*” to young farmers who have obtained financing from PRODER (Rural Development Program)

² World-Wide Opportunities on Organic Farms is a global network of organic farms in which farmers host volunteers to share their know-how and daily lives.

agricultural knowledge and practices are influenced by lifestyle preferences, political and ethical positions, and economic factors.

Back-to-the-land migration: a way to adopt a sustainable lifestyle and activity

For many neo-farmers, farming is more than a job or a livelihood. It enables them to adopt a lifestyle in line with their ethical and environmental concerns, which is also expressed through eating habits or alternative and self-built housing privileging the use of natural materials, green energies and green hygiene equipment. Neo-farmers attach a high value to the quality of the rural environment, which they tie to notions of health, wellbeing, and beauty. This is opposed to urban settings, which, in their view, are characterized by stress, pollution, and insecurity:

The idea was to have a wooden house and... to plant our own food, use sun energy, have a simple life. We have fresh air and silence (...) [in Germany] it wasn't quiet enough for us... we saw the industry, the big firms, the dirty clouds, we heard the street. Mickael and Sandra, organic producers and agroforestry practitioners (self-sufficiency)

Neo-farmers want to participate at individual level to the ecological transition. Farming is presented as a way to steward declining and sometimes ecologically damaged rural territories.

The soils are all poor here (...) I always wanted to rehabilitate the soils that we damaged (...). Here, they ruined everything with wheat, cereals, corn, tobacco (...) but I remain convinced that we can use our intelligence not to damage but to recover. And we'll do all we can to do the right thing. Catarina, fruit producer in permaculture

Rural life and farming are considered physically and psychologically healthy. In particular, neo-farmers express great satisfaction in eating their own—often organic—products.

Eating organic food was a real motivation for me. Living in the countryside, eating organic food, I couldn't do it in Amsterdam. You must earn a very good living to afford it because it is very expensive (...) and, even then, you find products packed in plastic from Paraguay or New-Zealand...it's bullshit! In my garden, I find everything. Miguel, organic producer (self-sufficiency)

All the interviewees expressed great concern for the environment, often citing it as a major motivation to start farming. Logically, they apply these ecological values to their farming practices.

Neo-farmers' farming practices: a laboratory for innovation

The kind of farming that attracts neo-farmers is focused on quality and sustainability. Organic, small-scale agriculture is the dominant model: 17 out of 20 interviewed neo-farmers and aspiring farmers practice organic agriculture and supply primarily local markets.

Many of them put forward health risks associated with the use of chemical inputs and view natural management of soil fertility and biodiversity as the main goal of agro-ecology.

The first thing to do is to get rid of herbicides and to feed micro-organisms. They naturally produce nutrients for the plants; (...) fundamentally, our work is to make sure that they feed the plants. Catarina, fruit producer in permaculture

Some neo-farmers also try to minimize the impacts of farming on the soils. They sometimes refuse to weed or plough, allowing for weed and herbaceous plants to cover the soil, and permitting teeming animal life.

As a rule, you minimize the action on the soil. I chose to put dwarf goats because they are light and don't press the soil. They eat the weeds but they are too small to eat the leaves and the bark. So, I don't need to use machines. Euclides, vegetables, olive oil producer, and herder

Neo-farmers sometimes import innovative foreign methods. For example, a German couple developed an agroforestry system using the *charcoal/biochar* method from Amazonia,³ to rehabilitate the Portuguese soil impoverished by eucalyptus forests.

When we started gardening, we found out... in Amazonia, the native people, they do the soil "charcoal," with compost. So we did it in Germany and it was a success. Now we do it here: under every tree we have this special mix of soil, because the soil is very poor here and rocky. (...) It is a good reason to use charcoal. You burn all the garden waste, so you get the charcoal and fertilize the soil. Here, the farmers use fertilizers on the fields three times a year. Mickael and Sandra, organic producers and agroforestry practitioners (self-sufficiency)

Furthermore, neo-farmers introduce seldom-used types of plants or animals, often in order to take advantage of niche markets and make their small holdings economically viable. An agronomist from the state development program *Jovens Agricultores [Young Farmers]* says:

Either they are in a region with a specific and high-quality production, such as wine in Douro, or olive trees in Alentejo (...), or they aren't and they have a small farm, they produce snails, aromatic plants, prickly pears, blueberries or raspberries. Claudia, agronomist at the Confagri for the Jovens Agricultores program

However, the adoption and diffusion of new crops is sometimes more difficult in declining rural areas. For example, an aspiring farmer failed to set up an organic pistachio nut production in the village of her grandparents, Campo de Viboras (Tras-os-Montes), a declining rural area:

In the village, there are only old people. Almost no workforce, and the workforce that is available is not young... No one knows about pistachio nut. No one could help us plant the trees, so we gave up. The agronomist advised to produce almonds rather than pistachio because they are more acquainted with it. Liliana, ex-designer and aspiring farmer

Liliana's case illustrates two types of challenges in settling in declining rural areas: demographics (the aging population cannot provide labor) and lack of available knowledge and skills (the population, as well the expert agronomist, are less likely to help).

A diversity of profiles and positions: neo-farmers with urban backgrounds are more likely to innovate

Our approach through individual inquiry reveals the plurality of neo-farmer populations. Neo-farmers choose diverse farming practices, give different meanings to their actions, and put forward a wide variety of motivations for farming, matching the diversity of their social and historical backgrounds (Dolci and Perrin 2017).

Former city dwellers with little previous connection to agriculture usually have the most alternative projects, influenced by their system of ethic. Not only do they innovate in farming

³ *Biochar* is a method that consists in carbonizing biomass (charcoal) and applying it to the soil.

techniques, but also regarding the pace of work, network of actors, marketing practices, or mobility practices.

Neo-farmers with agricultural backgrounds, who have returned to rural life following urban work experiences, often express another vision of agriculture. As heirs to family traditions, they stand between continuity and innovation. They experience difficulty distancing themselves from the practices of the elders who have trained them; but are nonetheless aware of the ecological and social issues associated with conventional farming. Compared to neo-farmers with essentially urban origins, they tend to use more institutional programs, such as Confagri's *Jovens Agricultores* program, and to seek funds from rural development institutions.⁴ Not all of them farm organically: two of the three interviewees who participated in Confagri trainings considered organic farming not profitable enough and too risky.

I'm going on training courses (...) because today there is a lot of rules and protocols, and because agriculture is moving towards more sustainable and organic practices. (...) But I don't think I'll change the way I do it right now. We don't do anything that is bad for health, but organic farming is difficult, I won't do it. Antonio, young aspiring farmer from a farming family

To conclude, neo-farmers' innovative approaches to farming are generally guided by ethical and environmental concerns. They seek new ways to integrate farming in the stewardship of the environment and in their lifestyle. However, this is a heterogeneous population with different profiles.

In their social and professional networks, neo-farmers act as local drivers for an agro-ecological transition

In a context of coexistence and opposition of diverse farming styles in rural Portugal, it is not easy for neo-farmers to integrate into the local community and gain farming skills. In this process, interactions with local farmers are crucial as well as long-distance relationships with peers.

Discrepancy between conventional farming and neo-farmers' vision

Neo-farmers are very critical of conventional farming, while conventional farmers usually don't take seriously newcomers' projects.

- Distrust of local people and farmers toward neo-farmers

Back-to-the-land migrations often provoke misunderstandings and skepticism from local populations (Hervieu and Léger 1979; Rouvière 2015). In Alentejo, most villages are located in depressed rural areas with aging populations and a sharp decrease in numbers of active farmers. Small-scale farming is often considered socially as hard and ill-paid work. As a consequence, local inhabitants sometimes mistrust neo-farmers' projects and lifestyles, as these German neo-farmers report:

M (the husband): The "estrangeiros" are special here (...)

⁴ *Jovens Agricultores*, measure 3.1.1. of the PDR (Programa de Desenvolvimento Rural 2014-2020), funded by the European Common Agricultural Policy.

S (the wife): And Portuguese people don't understand why they are here.

M: Everybody (= local inhabitants) wants to go to the city. They don't like here, so they think we are crazy to come.

S: They thought we were planting marijuana (...)

M: In school, they asked how we earn money, but we didn't want to say it, because school doesn't need to know, and we said "we live just from laughter and air;" so they think we grow weed!

Mickael and Sandra, organic producers and agroforestry practitioners (self-sufficiency)

Some farmers with agricultural backgrounds don't take urban migrants seriously because of their lack of experience. In doing so, they maintain the idea that farming is an endogamous activity, only open to their relatives. They see neo-farmers with urban backgrounds as lazy and ignorant, as expressed by this farmers' son in the process of establishing his own farm:

People from the city don't know things (...) they generally do nonsense (...) in agriculture, only experience counts (...). They read books and, when they arrive, they discover it is totally different. Pedro, young farmer from a farming family

Other reports:

Many people come to the conclusion that they can't do it. I know a couple of unemployed city-dwellers who came here at Alvito and found land. They had fruit trees and thought it would be enough to water them to get the fruits. It wasn't well thought out. They quickly gave up and left. Luis, organic asparagus producer

Besides, newcomer farmers can be seen as rivals, responsible for the scattering of public funding, as explains this manager of a large local dairy farm:

I think that Portugal could take advantage of the CAP [European Common Agricultural Policy] not to betray the farmers but to help them (...). The state must support farmers' sons who already work in agriculture, not new people from the city who don't know anything. Aldo, manager of a large dairy farm

Thus, neo-farmers are sometimes ill-considered by locally established farmers who can stand in the way of their integration. On the other end, neo-farmers themselves are critical of others and tend to stay away from established farmers' groups.

- Neo-farmers' harsh criticism of conventional farming

Most of the neo-farmers we interviewed farm organically, reject the standardized methods promoted by agronomic institutions and promote local, indigenous knowledge as essential to develop low-input, organic, and sustainable agriculture. Some of them feel ahead of their time and express their opposition to institutional, standardized knowledge. At the local scale, this manifests through the relationships with neighboring—often conventional—farmers. For example, a neo-farmer points out the unequal power on the market:

The neighbor has 500 cows. He sells to Continente, to Pingo Doce,⁵ everywhere. I have no chance to compete with him. That's why I need to concentrate on quality. Artur, livestock farmer and fruit producer in the process of establishing his own farm

Another one describes the use of chemicals as a vicious circle.

For us, chemicals are the first thing you must suppress (...) We know a big producer of apples and pears. The kind who produces 50 tons per hectare per year. But he always has a lot of problems with diseases. Every year, a new disease appears. This year, he had a mushroom

⁵ Continente and Pingo Doce are the largest supermarket operators in Portugal

invasion and he spent tremendous amounts to get rid of it. But he lost the crop all the same. It is a vicious circle. Catarina, fruit producer in permaculture

Some neo-farmers actually consider organic farming to be industrial when it is practiced according to standardized institutional norms, as it admits monoculture and fails to consider the ethical and systemic aspects of farming.

When EU started to regulate organic farming, it became industrialized agriculture (...) we know an organic carrot producer: it is organic but monocultural, so it is industry. Our vision is different. Catarina, fruit producer in permaculture

- Neo-farmers' dissatisfaction with public agriculture training programs

Many neo-farmers confess initial ignorance about farming and need to attend a training program. Even though some institutional training programs—such as Confagri's—integrate teachings about organic and sustainable methods, there is often an important discrepancy between the institution's agro-technical vision and neo-farmers' projects. Confagri's *Jovens Agricultores* training program is mandatory for farmers to be eligible for European financial support for farm creation. This program however reaches few neo-farmers because it requires having access to land, being registered as a farmer, and cash advances on farm expenses before receiving the money. Besides, the main selection criteria to participate in *Jovens Agricultores* is economic viability of the farmers' project. A high proportion of neo-farmers' projects based on small-scale organic farming are not admitted as viable.

The farmer's project has to be economically viable (...) when he comes to training (...). This not just about having an idyllic idea of farming. We are all tired of the city. Everyone is stressed and wants to go to the countryside. (...) They want to produce organic food, but they must see it as a business to have a balance between sustainability, trade, and production costs in order to be viable. Claudia, agronomist at the Confagri for the *Jovens Agricultores* program

Another reason why few neo-farmers attend this training is the lack of interest for, or opposition to, formal institutional knowledge. For example, a former agronomist highlights the necessity, in her conversion to organic fruits production, to disregard much of the knowledge she had acquired during her studies.

I studied agronomy for years and it was only industrial agriculture. At that time, for people, organic farming meant fruits full of worms (...). Nowadays, universities still teach how to use pesticides (...) but I have always been skeptical of the things they taught me. Catarina, organic fruit producer in permaculture.

In addition, neo-farmers' conception of what innovative farming entails differs from the *Jovens Agricultores* engineer's, for whom innovations such as high-tech equipment are highly valuable.

Young farmers are more likely to organize together, for example with cooperative equipment (...) At the technological level, they can have the best GPS, the most innovative and appropriate technologies (...) they know how to ensure maximal profitability with machines if they are well-trained. Claudia, agronomist at the Confagri for the *Jovens Agricultores* program

Neo-farmers show little interest in such technologies, as they often require important investments and appear more suitable for large farms. Moreover, several interviewees find standardized institutional knowledge difficult to adapt to heterogeneous ecological contexts. As a result, newcomer farmers abandon conventional training structures and seek alternative networks.

Neo-farmers' networks: between local and global

Neo-farmers combine local and long-distance professional relationships.

- Long-distance relationships with peers and virtual communities

Neo-farmers often maintain many contacts outside of the local community. They are generally proficient in the use of new media and online social networks to communicate about their project. They are members of NGOs or informal collectives and communicate with virtual communities of peers through mailing lists, Facebook groups, blogs, and websites. Virtual communities connect neo-farmers, organic farmers, civil society members, and agronomists at regional, national, and international scales. The Internet enables farmers both to communicate about their personal experiences and to maintain contact with consumers.

International networks play an important role in the diffusion and adoption of organic trends (Leroux 2011). For instance, some NGOs provide permaculture or holistic agricultural management trainings at European, or even international scale. Neo-farmers use these networks to access alternative theoretical farming knowledge.

I went to Spain to follow a holistic management training because there aren't any in Portugal. Portugal is late compared to Northern Europe (...) Biodynamic principles come from Austria with Steiner, Germany with Pfeiffer, Switzerland, America.... Catarina, organic fruit producer in permaculture

- Mutual assistance between newcomers and local farmers

Despite frequent initial mutual distrust, neo-farmers usually maintain good relationships with the local farming community. Neighboring farmers—be they conventional or organic—pass on informal and practical knowledge, often playing a key role in the farming training of newcomers. They advise, lend material, give a hand for some tasks, and show the beginners how to proceed:

I talk with the old farmers, I ask questions. Here, if I have a problem, I can ask to the neighbor and he tells me how to fix it (...) and he also comes himself to show me how to do it. Artur, farmer in the process of creating his own farm

Reciprocally, neo-farmers share their knowledge and skills with other farmers. By doing so, they hope to contribute to the agro-ecological transition at the local scale. For example, after their neighbor—a large apple and pear producer—lost his annual crop because of a new mushroom, these neo-farmers organized a training in biodynamic farming:

We tried to help him to solve the problem. We organized a workshop just for him. But it is hard to change mentalities. They [the conventional farmers] see the problem but they are too afraid to change anything, even if they lost thousands of euros. Catarina, organic fruit producer in permaculture

The scope of neo-farmers' action is larger than assistance to an individual neighbor. To ignite change, they hope to diffuse alternative knowledge to other large conventional farmers who experiment the limitations of the conventional model.

(...) It is hard to impose a vision and say: let's stop using this (...) It is much more useful if we help people who already farm. Because our project, it is only 25 ha, but if ten producers come to the training and they represent 200 ha of conventional agriculture, if they decide to change and produce without chemicals (...) it would be a great change in the region and in Portugal

(...). *Maybe people would understand what we came to do here.* Catarina, organic fruit producer in permaculture

To conclude, neo-farmers' organic small holdings and farm-based experimentations contribute to the diversification of local farming systems. At the local scale, neo-farmers and other farmers interact and provide reciprocal support, which can lead to the modification of their farming visions and practices. Yet many challenges remain to scale-up the diffusion of agro-ecological practices.

Limited contribution of neo-farmers to local food supply chains

Neo-farmers are poorly integrated into the conventional producers' sales networks

In Alentejo, we noticed that neo-farmers are poorly integrated into the local food market. Some interviewees refuse to sell their products. They consider farming a personal livelihood and lifestyle, and produce food for the family's consumption with the goal to achieve self-sufficiency. For example, this Dutch neo-farmer explains that he would lose interest in farming and betray his commitment if he were to sell his products:

I can't sell that. I put so much care and time in it! It feels like theft if I sell. From the moment you sell, you have to be a businessman, to have a product line. It is completely different. Miguel, organic producer (self-sufficiency)

For beginner farmers, coordinating production and marketing is difficult. Many neo-farmers initially don't produce enough to be able to sell. This primary stage may last longer for newcomers if they lack experience and make mistakes, and if they invest gradually. On the contrary, some may suddenly produce in excess while still lacking marketing channels, and thus lose part of the excess production. For example, Constança started farming four years ago on one hectare of land rented to the municipality of Montemor-o-Novo. She had no prior farming experience and trained for four years, but still fails to reach market-suited production levels (she sells only occasionally to a local cooperative). She tells what happened when she had an unexpectedly large harvest.

This year, I produced 20 kilos of raspberries. For me, it was a great achievement. But I couldn't sell them because I wasn't prepared. I couldn't get the baskets in time. The raspberries have all been damaged very quickly. Constança, organic vegetable and fruit producer (self-sufficiency)

Neo-farmers are often excluded from conventional producers' sales networks because they grow organic or set too high prices. To cope with this problem, some dynamic newcomers created the Minga cooperative in Montemor-o-Novo. The cooperative boasts social aims, such as making available a direct sales store in a place that did not have any. One neo-farmer, Luis, also opened two stores to sell his organic asparagus, an uncommon product in Portugal:

At the beginning, I thought: the main thing is to produce. And once I did, I asked myself: what am I going to do with it? Go somewhere and ask: do you want some? That's why I created my own organic store. Luis, organic asparagus producer

A limited local market for organic high quality products

Interestingly, we observe that most neo-farmers practice organic farming, but few of them are certified as such. In our sample, only six out of seventeen organic neo-farmers had obtained

the organic certification. One factor of explanation could be that maintaining such certification involves paying annual fees. Another factor may be neo-farmers' weak integration into sales networks.

Indeed, local organic stores have a hard time gaining food market shares. They are often patronized by a limited number of people coming from the same social circle, especially the newcomers themselves.

In rural Alentejo, the local population is aging and generally not very aware of the environmental and social issues linked to conventional farming. Furthermore, the gradual disappearance of small grocery stores, has driven consumers towards large retailers. So, for organic producers, direct farm sales or order-based deliveries are not working well. These German neo-farmers compare the local situation with that of Germany, where the demand for organic products is strong:

S: Ten kilometers from here, there is an organic farm. There is a Portuguese couple and they work very hard and try to survive. But it's hard because they don't have many customers.

M: Not enough. They have to drive, they deliver the vegetables to the consumers and make it very individual, exchanging emails with customers, and it's a mess. Here all the people go to the big supermarket.

S: Always Pingo Doce! They are fond of Pingo Doce.

M: In Germany, many people are tired and bored of these supermarkets. There is one step ahead I think. But here: oh wow, supermarket, perfect food, and they go there.

Mickael and Sandra, organic producers and agroforestry practitioners (self-sufficiency)

Moreover, in Alentejo, many locals produce fruits and vegetables in private gardens. A large part of vegetables, fruits, and olive oil supplies come from the family or friend circle. A neo-farmer relates:

Here, it's not easy to sell because people have a piece of land where they grow a bit of everything, or have animals in the back part of the house. So, they don't buy (...) So, the idea is to sell in the nearest cities, especially Lisbon. Artur, cattle breeder and fruit producer

For Alentejo's organic producers, the main commercial channels are located in the metropolitan area of Lisbon. Alentejo's main cities, like Evora city and its 56 000 inhabitants, otherwise don't offer good marketing channels. Luis, the organic producer of asparagus and owner of the organic store of Evora reports:

In Evora, there aren't many customers, despite the tourists (...). I sell my asparagus in ten organic shops in Lisbon, where they sell very well. Luis, organic asparagus producer

For niche productions, a large part of the output is exported abroad. For example, an organic producer near Evora sells his vegetables in Lisbon yet exports 90% of his production of aromatic herbs abroad in France, Italy, and Germany. While he stopped selling on local markets, his export sales doubled.

Neo-farmers thus encounter significant limitations when trying to enter local sales networks. They are more connected with urban consumers in Lisbon than with the local population who is less likely to buy their products.

Discussion: neo-farmers as drivers of farming system innovations and rural development?

In a context where the transition to agro-ecological farming methods appears key to improve the resilience of rural areas (Altieri et al. 2015), the arrival of neo-farmers could act as a lever for innovation. However, neo-farmers' practices and impacts on rural areas are still under investigated.

Our results confirm, firstly, that neo-farmers are drivers of agro-ecological innovations in agriculture. Our qualitative and micro-local approach centered on individual trajectories highlighted the diversity of neo-farmers' profiles. As predicted by Rogers (1962) neo-farmers in Alentejo are more prone to innovate if they come from a non-farming background. The same conclusions were reached by Leroux (2011) and Lamine (2012) regarding the diffusion of organic agriculture in France. Our previous work on neo-farmers trajectories in Sardinia (Italy) showed a similar relationship between agro-ecological projects and extra-agricultural backgrounds (Dolci and Perrin 2017). Neo-farmers in Alentejo play a key role in the adoption and spreading of innovative agro-ecological techniques such as biodiversification, minimal soil intervention, natural fertilizer use, minimal water and energy consumption, etc. They also « retro-innovate » (Stuiver 2006), by rehabilitating formerly abandoned local agricultural techniques. They adapt and associate old practices with more recent techniques.

Besides, neo-farmers' innovations transcend the farm and reach social and organizational domains. Neo-farmers create, activate, and combine social networks through which they obtain information, support, and a sense of community. They interact with local and global and urban and rural networks alike. These results confirm those of Maïfert (2007) on the importance of online social networks to offset the isolation of alien neo-farmers in France. In particular, our study shows that neo-farmers have long-distance relationships with peers and innovate by using the Internet, virtual communities, and other networks (collectives, NGOs, or movements such as WWOOF). Wilbur (2014) already highlighted neo-farmers' use of personal networks—external to those of conventional agriculture—to access information. He also exposed neo-farmers' difficulty in implementing such theoretical knowledge. In addition, our results show that exchanges with neighboring farmers are fundamental in Alentejo. The opposition between locally established farmers practicing conventional agriculture and newly established agro-ecology adepts is strong in discourses and representations. However, in practice, this opposition is nuanced by hybrid practices. As similarly shown by Lamine in the French context (2012), neo-farmers in Alentejo co-produce knowledge with a wide variety of actors including researchers, agricultural advisors, and extension services. They also interact and exchange knowledge and know-how with locally established farmers practicing conventional agriculture. This mutual support is crucial in learning processes, and enables mutual adaptation and improvement of farming techniques. These findings demonstrate the relevance of studying the diffusion of innovative farming practices using the analytical framework of actor-network theory (Goulet 2013).

Thus, contrary to 1970s studies of neo-farmers (Hervieu and Léger 1979; Rouvière 2015), which emphasized the opposition or conflicts between newcomers and locals, our work highlights the exchanges and points towards a possible hybridization of farming styles. We however lack a long-term vision of these individual trajectories and our results—based only on discourse analysis—must be confronted with field-based observation of farmers' practices. For instance, conventional farmers may actually use endogenous, locally adapted techniques without claiming it in interviews. Similarly, neo-farmers may claim to import sustainable innovations, but the actual environmental impact of their farming practices remains unchecked. Therefore, further investigation is foreseen, including studies based on direct observation rather than interviews only. Such approach will permit a better evaluation

of the success of neo-farmers' projects, a characterization of local networks, and will allow verifying the existence of a hybridization process. We may for example find instances of what the sociologists Hervieu and Léger called « the utopia shifting »(1979), namely how neo-farmers adjust their initial strategies in order to be able to achieve economic viability.

Our study further highlights that while, in some places, literature has clearly identified neo-farmers' role in the development of alternative food networks (Lamine et al. 2012), currently in Alentejo, neo-farmers have minimal impact on local food markets. Though they often attempt to create or favor short food supply chains (SFSC), their integration into the market is limited and they sell little in the rural territories where they live. Lisbon's urban market remains the main SFSC channel.

To conclude, our study of neo-farmers' role in the agro-ecological transition would benefit from an increased pool of interviewees. The difficulty in identifying neo-farmers, however, is the major methodological caveat of this work. Various factors explain this, namely the small scale and progressive nature of neo-farmer's projects, their tendency to delay registration as an agricultural holding, and their marginalization from institutional training programs. Thus, neo-farmers are invisible at a territorial scale because of a triple marginality: numerical (small number), geographical (rural and isolated territories), and administrative (no consideration of this population in programs or statistics). Furthermore, for some of them, marginality is the result of a conscious choice. They don't aim to sell their products nor want to participate to financial support programs, they just want to live a simple life.

Conclusion

The innovation theory informed our initial hypothesis according to which neo-farmers are drivers of farming systems innovations and of the agro-ecological transition.

In the rural context of Alentejo, where agricultural enterprises range from large industrial holdings to small family farms, our results confirm that neo-farmers contribute to the agro-ecological transition both through their individual practices and through their social and professional networks. Neo-farmers' socio-cultural background and their will to live off the land while preserving the environment drive their adoption of innovative farming and sale practices, in line with the principles of agro-ecology. Most of them farm organically and try to sell through SFSCs—though they mainly do so in Lisbon and abroad rather than in Alentejo where such niche markets remain limited. They learn through virtual communities and long-distance exchanges with peers, yet they also exchange knowledge and practical know-how with local farmers. Established farmers and neo-farmers remain very critical of each other. Nevertheless, at the local scale, they interact. This enables mutual adaptation of their farming visions and practices. In this way, neo-farmers are significant actors of the transition towards agro-ecology, adopting and spreading innovative farming techniques and social networking practices. They co-produce innovations with a wide variety of actors, including peers in virtual communities, local farmers, researchers, agricultural advisors, and extension services.

However, their impact remains often invisible in Alentejo. They are few, scattered, and poorly integrated into food supply chains. Many encounter initial difficulties to achieve an economic viability. For some of them, however, marginality is the result of the conscious choice to embrace a lifestyle based on self-sufficiency. Moreover, public policies often fail to support or even consider this new type of farmers, even though demographic renewal of farmers remains more than ever a challenge in Portugal. Institutional programs such as *Jovens Agricultores* do not take into account the needs of beginner farmers who lack initial capital such as land. Hence, newcomer farmers' role in driving an agro-ecological transition is inherently limited by the small scale of their operations and their relative isolation.

In the future, this research aims to be enriched by conducting additional interviews, direct observation of farming practices, and by applying a longer-term perspective in order to better assess the viability, sustainability, territorial impacts of neo-farmers' projects. At a larger scale, the concept of territorial agrifood systems (Lamine, 2012) might support our questioning of the interactions between neo-farmers and other actors of local food systems—not only producers but also other food chain stakeholders, public bodies, consumers, and civil society, who also play an important part in the transition towards agro-ecology.

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