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Converting to organic farming and implementing conservation agriculture techniques in the plains on Limagne: an analysis of farmers' trajectory

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Note to the reader

I carried out my master thesis work within the European research project LIFT- Low-input Farming and Territories. It is funded by the European Horizon 2020 research programme ‘H2020-EU.3.2.11 – Increasing production efficiency and coping with climate change, while ensuring sustainability and resilience’ under the topic “SFS-29-2017 – Socio-eco-economics –socio-economics in ecological approaches”

The goal of this project is to identify how socio-economic and policy drivers impact the development of ecological approaches to farming and to assess the performance and sustainability of such an approach, taking into account different farming systems at farm, farm-group and territorial scales.

The project has five scientific and technical objectives:

1. To investigate the socio-economic and policy drivers that hinder or enhance the development and adoption of ecological approaches to farming.
2. To evaluate and compare the performance and overall sustainability of farming systems across different levels of incorporation of ecological approaches and across different scales (from farms to territories)
3. To propose new private arrangements and new policy instruments which could improve performance and sustainability, and the development of ecological agriculture.
4. To produce comprehensive insights into ecological approaches based on a wide range of case studies and a mix of relevant methodologies (qualitative, quantitative, participatory approaches, modelling) and actors (scientists and a wide range of stakeholders).
5. To achieve targeted dissemination of results with free decision support tools and a massive open online course (MOOC), and reach out to students, policy makers and farm advisory services.

The study I carried was part of the LIFT project’s second work package (WP2) aiming at providing a value chain approach to analysing the exogenous and endogenous influences towards adoption of ecological approaches. It examines the behavioural and perceptual differences between farmers, as well as endogenous (gender, knowledge, acquired skills, generational turnover etc.) and exogenous (agronomic conditions, social spill overs, economic and non-economic incentives etc.) drivers related to the farm and the farmer’s motivation to adopt ecological approaches.

Source: LIFT project Website, <https://www.lift-h2020.eu>

Abstract

The change of western countries' agricultural models is an increasingly needed endeavor. Alternatives to conventional farming practices exist, but only a few farmers have been able to bring about structural change in their farming system. Beyond the technical issue, studies have highlighted the numerous socio-economic barriers farmers may face when envisioning practices change. More precisely, farmers are nowadays at the crossroad of diverse obstacles, visions and interests, indicating that the transition of practices needs to be tackled at a collective level. The present study aims at understanding better how the role of stakeholders of different nature intervenes during the trajectory of farmers who have already engaged practices change. Around thirty interviews of farmers were carried out in the plains of Limagne to assess the territorial dynamics supporting these changes. The results of the study show that the stakeholders involved are slowly shifting in the support given to organic farming conversion while nearly none exist at territory-level when farmers implement conservation agriculture techniques. The local context of the Limagne plains, with the structural presence of Limagrains Company, let foresee long-term lock-ins in the dissemination of more environmental-friendly practices.

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List of abbreviations, definitions, and description of the actors involved

Abbreviations:

OF: organic farming

SCA: (Soil) Conservation Agriculture

MOA: Modes of access

GIEE: Group of Economic and Environmental Interest

PAMP: Production of aromatic and medicinal plants

Glossary:

Modes of access (MOA): Entities or persons with more or less formal status allowing farmers to access the resources needed to change their practices. MOA includes the process through which farmers access the resources by themselves.

Trajectory: "set of facts that have followed one another over a given period of time and which have led to one or more changes in practices". (Lamine and Bellon, 2009)

Sequence: full phase / period lived by the farmer during his trajectory.

Description of the actors involved:

Public and para-public actors

Bio63: non-profit association accompanying producers in the county of Puy-de-Dôme. Formerly known as the GAB (Organic Farmers Group), it is a structure led by organic farmers of the county; the structure employ a team (technicians, facilitators) supporting farmers on administrative, practical and technical aspects.

Chamber of Agriculture: a public institution supporting farmers and more broadly rural areas in their development dynamics.

DRAAF: Regional Administration for Food, Agriculture and Forestry. It is a regional office of the French Ministry of Agriculture.

BASE Association (Biodiversity, Agriculture, Soils and Environment): national association of farmers whose aim is to facilitate the dissemination of Conservation Agriculture practices through farm visits and training. It is an association based in Brittany.

VetAgro Sup: educational and research institution for the training of veterinary doctors, agricultural engineers and veterinary public health inspectors

Cooperatives

Limagrain: cooperative and multinational company specialized in the production of hybrid seeds and crops dedicated to industrial processing. The cooperative recovers almost 80% of the arable land in Limagne (studied territory).

Domagri: former cooperative of the territory, bought by Limagrain in 2012. This cooperative had an organic farming division, sold by Limagrain for the benefit of CizeronBio

Axcéréals: a national cooperative managing a branch in OF. It is also a major buyer of OF production in Limagne.

Businesses

Limagrain-Europe: is a French group specialized in the production of field seeds, vegetable seeds and cereal products. Founded in Auvergne in 1965, the group is based in Saint-Beauzire in Puy-de-Dôme, and also develops its activities abroad. The company employs more than 10,000 people including, in 2016-2017, more than 2,000 researchers in 56 countries. In Auvergne, the cooperative has nearly 2,000 farmer members in Limagne and nearly 1,500 employees in Auvergne.

CizeronBio: is a family-owned, national agricultural trading company specialized in OF. It bought the Domagri organic farming branch from Limagrain, thus creating a local independent OF branch called BioAgri. The latter is today a major buyer of OF production in Limagne.

Celnat: specialized trader in OF located in Haute-Loire County. It is an important outlet for OF farmers located in the south of Limagne.

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1. Introduction

Since the 1950s and the deficiencies of the post-war period, Western countries' agriculture has largely prioritized the maximization of yields by means of a massive use of inputs (chemical fertilizers, phytosanitary products, strong mechanization, genetically selected varieties, etc.), which transformed the agricultural landscape to monocultures and resulted in strong cultural specializations (Francis et al., 2003). These practices today still face many limits that strongly question the sustainability of our production systems from an environmental, economic and social point of view (Rosset and Altieri, 1997). They show a strong "path dependency," as they are interwoven with the global technical-social and political system (Vanloqueren and Baret, 2009), which hinders the possibility of a broad-based change.

In response to these multiple limitations, agroecology is attracting increasing interest from different spheres: scientists, farmers, policy makers and within civil society (Wezel et al., 2009). Agroecology can be defined as "the integrated study of the ecology of the entire agro-food system, including an ecological, economic and social dimension" (Francis et al., 2003). From a purely technical point of view, new practices have emerged at the crossroads of traditional knowledge and current science with the aim of reducing the use of inputs, enhancing local resources and stimulating biological processes on farm land, while maintaining long-term agricultural yields (Wezel et al., 2014). In the agricultural landscape, among the discourse of farmers and other stakeholders, these practices have taken different forms and names; organic farming, conservation agriculture, and integrated-farming are all different techniques inspired by the technical principles associated to agroecology. Beyond its technical aspect, Francis et al. (2003) use agroecology to open the field of agronomy to the analysis of the agri-food system in its entirety. Therefore, this approach leads to include the issues related to processing, marketing, and consumption while simultaneously considering the fundamental importance of human behavior our energy resources, waste management and the backdrop of change climate.

These diverse considerations now lead us to consider at a collective level "a change [of our agricultural practices] from one state to another", which we associate more commonly with the concept of "transition" (Lamine and Bellon, 2009). Nevertheless, it is clear that the diffusion of new practices is not a generalized process. A minority of farmers are trying to make changes in practices while others still face many obstacles, internal and external to their farming system, which slows down their ability to change practices. The study of limiting determinants as well as factors favoring the diffusion of new practices has become in recent years a growing field of study in the scientific sphere related to the socio-economic study of agricultural development (Fairweather, 1999; Dupré et al., 2017; Lamine, 2017). Their purpose lies mainly in understanding why the "trajectory" of some farmers

To understand practice change processes, some studies focus on the farmer's decision-making process at the individual level (Sutherland et al., 2012; Xu et al., 2018). Others have been interested in the essential role played by third parties, particularly that of farmers' groups in the design and dissemination of new

practices (Darré et al., 1989; Goulet and Chiffolleau, 2006; Goulet et al., 2008; Compagnone, 2014; Derbez, 2018). Beyond this, some authors have looked at the role of more peripheral stakeholders such as civil society and local institutions (Méndez et al., 2013; Wezel et al., 2016) and some others have underlined the essential role of companies in supporting changes in agricultural practices (Meynard et al., 2013, 2017).

In line with these studies, I carried this work within the framework of the European LIFT research project –“Low Inputs Farms and Territories”. The latter presents multiple objectives (see Note to the reader page 2). On the one hand, evaluating the performance of more environmental-friendly practices within farming systems. On the other hand, identifying and evaluating, through thirty case studies spread across the continent, the determinants that drive or hinder farmers to tend toward practices considered more virtuous for the environment. The determinants are diverse and the methods in which to analyze them is today a field of study in itself.

My interest especially lies in the study of the role of all agricultural actors (including farmers) in determining the processes surrounding changes in practice.

Thus, my study aims to understand through which pathways, by whom, by which institutions, by which *modes of access* (MOA), farmers have access to the resources necessary for their change of practice. The methodological framework I use employs analysis that concerns the intersection of farmers’ individual trajectories and the actors involved in that trajectory. I am looking to find out if there are identifiable trends in the processes for accessing resources. I try to observe if there has been some evolution in the kind of people/institutions that farmers solicit during their transition (for the conversion to organic exclusively). Finally, given the plurality of possible changes in practices implemented by farmers, I am curious to know if the different agricultural actors tend to facilitate different changes in farming practices.

1.1 Rational of the study

This work is rooted in the study of agriculture change. It is following the approach of agroecology, which broadens the study of changes in farming in practices to a multi-actor lenses view. The change in practice is primarily a process experienced by farmers. However, it engages at the same time several stakeholders.

1.1.1 Agroecology: an inclusive approach to the concept of "transition"

Agricultural techniques developed since the 1950s in Western countries today face numerous environmental, economic and social limits (Rosset and Altieri, 1997). These limits require all stakeholders in the agricultural and agri-food sector to find solutions in order to maintain the quality of our common goods (water, air, climate), to secure the yields of agricultural production towards more autonomous farming systems in a context of probable restrictions on mineral resources (potassium) and energy (petroleum) and climate change (Francis et al., 2003; Field et al., 2014).

Agroecology is an alternative approach that encapsulates different disciplines (agronomic, social, economic, political, etc.) (Méndez et al., 2013) and envisages the overhaul of our agricultural practices

through "the integrated study of the ecology of the entire agro-food system, including an ecological, economic and social dimension "(Francis et al., 2003). It is an approach that postulates the interweaving of our ways of producing, living and doing society together. Agroecology thus seeks to open the field of agronomy to the analysis of the agro-food system in its entirety and tries to include the issues related to processing, marketing, consumption while considering in parallel the fundamental importance of human behavior, our energy resources, waste management and backdrop, climate change (Francis et al., 2003)

This approach attracts the interest of a large number of actors: farmers, scientists, political decision-makers and civil society (Wezel et al., 2009) and suggests the possibility of a real "transition" brought up collectively. The principle concern is that farmers take a large part of the responsibility for this necessary transition. While some of them have experimented and implemented alternatives to so-called "conventional" practices, others do not seem able to change their practices (or only in a residual way) given the many obstacles they face. The study of limiting determinants as well as factors favoring the diffusion of new practices has become in recent years a growing field of study in the scientific sphere linked with the socio-economic study of agricultural development. Determinants are of multiple natures and are studied at different scales: at a micro level, the determinants may be internal to the farmer and reflect ethical and behavioral dimensions (Fairweather 1999, Xu et al. 2018). Determinants can also be analyzed at the farm level, as shown by Dupré et al. (2017) who point out the importance of different external and internal factors to the farm: namely the type of marketing chains that the farmer uses, his/her environmental objectives, and his/her economic behaviors. Meynard et al., (2017, 2013) note the importance of factors that are mainly external to the farms. They underline in particular the lack of opportunities given by downstream actors to farmers so that they can really envisage a change of their practices. Thus, the field of study of the determinants that facilitate or hinder the diffusion of new practices is a salient area of research and different ways of supporting their analysis have been used.

1.1.2 The study of practices change through the analysis of farmers individual trajectories

The study of change in agricultural practice was partly based on an analysis of the individual trajectories of farmers. By trajectory I mean "the set of facts that have followed one another over a given period of time and that have led to one or more changes in practices". (Lamine and Bellon, 2009). When capturing the process of change in practice the concept of trajectory is very helpful. It postulates that change in practices is a "step-by-step" process lived by farmers. It is the result of a mixture between "the implementation of various technical practices and continuous adaptation to political, social and economic contexts" (Chantre et al., 2015). Thus, many studies have focused on farmers' individual pathways to understand the processes attached to them. Sutherland et al., (2012) conceptualizes the farmers' trajectory as beginning after the occurrence of a triggering event. They then suggest that changes in farming practices are cyclical processes during which the farmer goes through successive phases of "active assessment", "implementation" and "consolidation" of her/her new practices. Other research analyzes the trajectories of change in practices while trying to evaluate aspects that are more technical. Chantre et al. (2015) analyze farmers' trajectories

by looking at the level of "agronomic coherence" that they reach along their trajectory. Chantre and Cardonna (2014) put the farmers' trajectory in the light of their technical progress and their global strategy as an individual. This research, supported by the ESR framework of Hill and MacRae (1996) (further explanation below), seeks, among other things, to assess the "transition level" achieved by farmers in their trajectory. This approach helps to understand how some people change their practices completely, while others change their practices only partially.

1.1.3 The role of collective action in disseminating new practices

Beyond the analysis of individual trajectories, many studies have emphasized the importance of collective action in farming practice change processes. As early as the 1980s, Darré et al. (1989), note the driving force that farmers' groups generate in the creation and diffusion of knowledge within farming communities. Goulet et al. (2008) note the ability of farmers to bring technical innovations by and for themselves. Other research explores the processes of knowledge production within farmer groups around particular practices such as farm seed production (Derbez, 2018) or no-till practices (Goulet and Chiffolleau, 2006). Collective action also takes broader forms, encompassing all actors in agriculture and agri-food systems, but including engagement from other spheres of society. The actors within agricultural councils, both public and private, are an integral part of the agricultural landscape in Western countries (Rémy et al., 2006). Nowadays, they strive to define their new role in a context of profound questioning of the agricultural profession (Lemery, 2003). Their approach of support, more or less "framing," is an integral part of the reflection led around the processes involved in change of farming practices and on the "negotiated" conception of agriculture development (Compagnone et al., 2008; Compagnone, 2011). Beyond this, the coordination of territorial agents, companies, local institutions (such as national parks) and schools also play a central role in the development of territories capable of supporting the implementation of new farming practices (Wezel et al., 2016).

Thus, changes in farming practices have been the subject of comprehensive studies. Beyond a limited vision at the individual or farm level, some studies suggest the importance of an integrated analysis of the transition process that includes all actors in the agri-food system. This is the approach I am trying to follow in this work. It echoes the definition of agroecology chosen above (Francis et al., 2003). Such an approach does not, however, deprive farmers of their central role in the transition, hence my interest in a combined analysis of farmers' individual trajectory with that of the role of third parties involved in their practices change processes.

1.1.4 The "modes of access" used to reach resources needed for change

In order to engage in a comprehensive analysis of the processes involved in change of practices, the methodological work of Grossetti et al. (2011), addressing the study of business creation processes, was an essential support to my work. The methodological approach of this work identifies both the type of actors used to help access the resources necessary for company creation (friends, colleagues, banks etc.) and the

nature of the resource used during this solicitation (funding, skills, a workplace ...). My work was strongly inspired by this approach, yet instead of addressing the process of "business creation" I focus on the process of "changing practices" in agriculture. The desire to use this approach in an agricultural context is best justified through the following: farmers (French) are more and more likely to consider or want to engage in a change of practices, but they will only do so they have access to the resources needed for this change. In addition, given the fact that the (French) farmer is placed at the crossroads of the interests and will of multiple actors (Lemery, 2003), I found the methodological approach of Grossetti et al. (2011) very useful in analyzing the role played by these actors in the process of accessing the resources needed to change agricultural practices. Nevertheless, the approach of Grossetti et al. (2011), seeks primarily to analyze a process lived commonly among the respondents: the creation of a company. For my part, I focused on the analysis of an uncommon but relatively similar process for each farmer: the change in practices experienced at the farm level. This micro approach required us to draw on other methodological approaches. The work done by Cloutier (2014) concerning the trajectory of individuals during the process of invention was very also inspiring to my study. In a manner similar to Grossetti et al. (2011), Cloutier (2014) addresses the trajectory of individuals by identifying the MOA (people, institutions, etc.) used to acquire the resources necessary for the invention process. Cloutier (2014) deepens her analysis by looking at the MOA used during different phases of the invention process (commitment, routing, and formalization). I therefore incorporated this type of analysis in my approach.

1.1.5 French agricultural and agri-food context

Over the last fifty years, farmers' professions in France have largely developed in parallel with the evolution of the structures that regulate and accompany their activity (Lémery, 2003, Rémy et al., 2006). The limits that agricultural systems face today encourage farmers to "negotiate with more and more diverse partners" and "break the co-management framework" associated with this profession (Lémery, 2003). Echoing the scientific literature stressing the importance of an overhaul of agriculture through inclusive dynamics of farmers and other spheres of society (Méndez et al., 2013; Lamine et al., 2019), law n ° 2014-1170 supporting the Agroecological project for France tries to facilitate some of these inclusive processes to accompany the change of practices. "Fermes Dephy" financing programs launched in the early 2010s, same as the Ecophyto30000 program and the creation of the GIEE (Economic and Environmental Interest Group) are all programs aimed at supporting these collective dynamics via the financing of various structures: public and/or non-profit (Chamber of Agriculture, Bio63, agricultural associations etc.).

At the same time, it is clear that French public opinion is increasingly moving towards a precautionary principle with regard to the agricultural techniques currently in place (particularly with regard to the use of chemical products). These stances push many consumers to change their purchasing behavior, and therefore also incentivize farmers to change their farming practices. Moreover, many public structures (national parks, communities, etc.) as commercial ones (traders, wholesalers, etc.) tend to adopt new positions themselves through the support, creation or redesign of some of their sectors. The creation of OF-sector,

and / or the adoption of new specifications (HVE label and other private specifications) are increasingly part of their strategy. The (still partial) reorganization of the value chain is pushing some of these private and public structures to engage in new forms of support for farmers. This changing context of the "co-management framework" (Lémery, 2003) requires more and more from the stakeholders of the entire food system to opt for co-designing production methods (Méndez et al., 2013, Meynard et al., 2017); this work seeks to highlight some mechanism of this mutation.

1.1.6 The Limagne plains Context

I carried out my work in the Limagne plains in the county of Puy-de-Dôme in France (see map, appendix 1). This territory shows interesting characteristics in terms of the actors involved in the development of local agriculture. Especially, the presence of the French multinational company Limagrain seems to shape the territorial dynamics.

Soil-climate context

The plains of Limagne shows soil-climate peculiarities, which shapes the territorial crop specialization. First, it is located in a valley in the middle of four main mountain massifs: the Combrailles massif, the massif of La Chaîne des Puys, the Livradois massif and finally the Bois noirs massif (see appendix 2). Given this terrain, which keeps the clouds from advancing from the west (it is called the "foehn effect"), the plain records only very low precipitation rates (less than 600mm / year) which places the territory rainfall close to the Mediterranean regions one. The terrain generally records very dry springs and summers. Secondly, the soils of Limagne are mainly of sedimentary nature and have a high agronomic potential. A minority of surfaces (less than 5%) have soils of volcanic nature, making plots concerned, some of the most fertile in France (Agreste, 2018).

The agricultural economic context

Since the 1960s and 1970s, this soil-climate context, in parallel with the generalized development of intensive agriculture and the internationalized model of the agri-food system, has pushed the farmers of the territory to organize themselves collectively. It was at this time that the Limagrain cooperative was created and the choice of cultural specialization towards cereal production emerged (see appendix 3). Following a strong economic expansion the multinational company associated to the cooperative, Limagrain, is today one of the largest seed companies in the world; and the cooperative attached to it is currently recovering nearly 80% of the cultivated area in the plain of Limagne (source: interview with Limagrain ex-president).

Cereal crop farmers belonging to Limagrain cooperative produce nowadays three main crops presenting high benefit potential. These crops, which adapt particularly well to the climatic and geographical conditions of the plain are the following: the soft cover wheat with high gluten values develops very well in dry conditions during the ripening phase. Hybrid maize variety for an international valorization of the seeds. And finally, another hybrid maize variety which has the particularity, just like the cover wheat, to supply industrial bread and cracker production facilities (Jacquet brand). These three productions are

easily exportable (the seeds and processed products keep very well). This allows Limagne and Limagrain, though they might be based far from international ports, to economically expand abroad.

Yet the structural overlap between agricultural systems and the existing industrial facilities raises questions about the firm's ability to support new agricultural production methods (such as OF or others). The company and cooperative face today big challenges in terms of marketing strategies when envisioning the dissemination of new practices. Facilitating the diffusion of more environmental-friendly practices and especially crop diversification does not seem on the companies' agenda. Nowadays still, Limagrain has not created or invested in any OF division. The company had bought another emblematic cooperative in Limagne, called Domagri, which had an OF division. At the time of the acquisition, in 2012, Limagrain sold Domagri's OF segment to CizeronBio, a trader specialized in OF products.

Thus, the Limagne territory is in a particular situation with the structural presence of Limagrain. The cooperative/company sets up a strong cultural specialization on the territory that allows farmers of the region to produce crops showing high added value. However, its presence potentially hinders the potential of environmental-friendly practice dissemination at the territory level.

Source: multiple interviews with researchers, farmers, and especially with the former President of Limagrain-Europe.

1.1.7 New practices in cereal production systems

This very particular context shaped my willingness to engage in a study of the determinants that shape field-crop farmers' trajectory on the Limagne Plains. Given Limagrain's reluctance to facilitate change in practices, if farmers have already engaged a change on the territory, I was interested in understanding who facilitated these processes.

Despite the diversity of techniques and principles that underlie changes in practices around the world (Wezel et al., 2014), I decided to focus on two main types of practice changes: the conversion to Organic Farming (OF) and the establishment of Conservation Agriculture techniques (SCA). Even though, changes in practices in Limagne may take other forms, I made this choice because these two main changes enable us to capture two different phenomena (Rega et al., 2019). On one hand, the conversion to OF is firstly experienced by farmers as a radical change in their practices (Bellon et al., 2007; Lamine, 2011). Also OF is now not only about farming practices, but also about an identified and recognized sector with official requirements specification and increasing businesses. On the other hand, SCA practices relate to a process of simplification and optimization with investments in machinery. Farmers generally do not perceive it as radical as the conversion to OF. It does not have any formal specification nor commercial valuation.

Organic farming corresponds to the establishment of crops without recourse to mineral fertilization or chemical products (herbicides, pesticides, fungicides) corresponding to the specifications of OF at European and French levels. It requires the use of organic fertilizers (types of manure, compost) and usually requires crop rotations. The techniques of the SCA however do not correspond to any official specifications

at national or European level. The techniques associated with SCA fulfill a main agronomic objective: the maintenance of long-term soil fertility through the maintenance of the physical structure of soils and their organic matter content. These techniques include: no-till techniques including SCT (Simplified Cultivation Techniques) and direct seeding, cover cropping permanently or between two main crops, main crop straw maintenance on the soil, etc.

1.2 Research questions

The literature concerning change in practices refers to a “step-by-step” process that farmers experience individually and/or surrounded by others peers and stakeholders. In France, various stakeholders are often involved in agricultural processes. However, the Limagne plains are today experiencing the structural presence of Limagrain that seems to hinder the diffusion of more environmental-friendly practices. Still, some farmers on Limagne plains have already changed their practices, suggesting that they have been able to access the resources needed for this change. Some farmers have converted to OF and others have implemented SCA techniques. My study aims to understand through which pathways, by whom, and by which institutions (by which *modes of access* (MOA)) these farmers have acquired the resources necessary for their change in practices even though the territory shows a certain lock-in situation due to the presence of Limagrain.

The state of the art and the local context of my master thesis research work bring me to express the following questions (in relation to the conversion to OF and the implementation of SCA techniques):

- What are the modes of access used by farmers to access the resources necessary for their change in practices?
- Do farmers solicit different modes of access at different stages of their change trajectory?
- Do farmers use different modes of access depending on the type of change (OF or SCA techniques) they implement?

My hypotheses are the following: First, the farmers get access to these resources by soliciting people and/institutions around him/her. He/she can also access these resources by him/herself. Second, the farmer accesses the resources not all at once, but by soliciting different modes of access at different stages of his/her personal trajectory. Third, farmers’ trajectory (including sequences and modes of access) are dependent on the farmers’ attributes and the root determinants of his/her change in practices. Finally, given the difference of technical approach and level of engagement needed between OF and SCA, I postulate that the actors involved in facilitating these change vary.

The work will first develop the methodological framework whose substance was born at the crossroads of an iterative process and bibliographic review. Then I will present the results from the analysis of 31 semi-structured interviews with farmers who have implemented changes in their practices in their field cropping system. Then, I will discuss the results by analyzing them in the perspective of the geo-socio-

economic context of the study area and the existing scientific literature. Finally, I will conclude and discuss the limits and possible implications of my work.

2. Material and methods

In this part, I will first present the way I collected the data for later analysis. I determined the sampling from my interest in the local context of Limagne plains, which led to interviews with field-crop farmers who have implemented OF or SCA techniques. I collected data by questioning them about their individual trajectory. My findings led me to develop a methodological framework enabling me capture the trajectories of farmers by defining sequences with each of them. In parallel, I developed methods to grasp the MOA used by the farmers during the sequences of their trajectory.

2.1 Criteria for selection and sampling methods of the farms surveyed

The sample was formed through successive strategies. The first was to make contact with experts who are more or less directly linked to farmers' groups. I met Annick Jordan from la DRAAF. She is head of the Agroecology project, referent of PRDAR (Regional Program for Agricultural and Rural Development) and RID (Research Innovation and Development) within the Auvergne Rhône-Alpes region. She is in charge of the allocation of grants in support of the creation of farmers' groups willing to initiate changes in practice. Thanks to her, I quickly made contact with bio63 - departmental association that accompanies organic producers. This organization facilitates the operations of several of these groups of farmers collectively organized under the GIEE status. I was first able to meet a group of about fifteen farmers, some of which who were already practicing organic farming. Thanks to their technician-facilitator I had the opportunity to participate in some collective observation and reflection days called "Bout de champs" ("piece of land"). It was both the opportunity to meet farmers and observe how their collective approach works. Following the first meeting, I got access to a list of 200 farmers referenced by bio63. I then repeated the process of '*participation in a group day => collection of contacts*' three times. Following several invitations from some of the farmers I managed to meet other farmers' groups' events. In the end, while taking advantage of a "snowball effect" by collecting new contacts during the interviews, I managed to reach a variety of farmers.

My first priority was to make contact with farmers producing exclusively cereals. But my first contact with a mixed crop-cattle farmer and the interview I carried out with him raised my interest for this kind of system. They show interesting peculiarities in terms of production system: by managing organic matter and crop rotation nearly like organic farms do (with the inclusion of pastures, grain production for their livestock) it made it easier for them to convert to OF (according to farmers' interviews). Assuming that they would then probably use different trajectories and modes of access, I decided to include them to my sampling.

2.2 The sample

The farmers interviewed are all farmers whose farm is located in the Plains of Limagne. Given the content of my interviews and my analytical framework, I decided to focus exclusively on the analysis two sub-categories of farmers' trajectories: the ones of farmers who have converted or are converting to OF and the ones of farmers having put in place SCA techniques. I considered that a farmer was in the "SCA" category when he / she regularly sets up or attempts to implement one or more of the following practices: direct seeding, cover cropping, the drastic reduction in the use of plowing (no less than 80% of the land area) and the regular use of simplified cultivation techniques. For the sake of simplification I did not consider OF farmers setting intercrop covers as part of the SCA group. However, a farmer belongs to the two categories if their trajectory of change was made in two distinct stages (establishment of no-till first, then transition to OF).

Table 1: Final sample of farmers and their basic attributes

Nature of practices change	Number of farms	Way to set up in farming	Type of production	Farm size
Conversion to OF	22 farms (10 converted to OF before 2011, the rest after 2011)	- 17 took their family farm over (including 2 organic farms) - 4 non-family setting (including 1 from outside agricultural setting) - 1 not specified	-10 exclusive grain crop production farms - 5 mixed cereals-cattle farms - 7 grain crop farms including another workshop (chicken, medicinal herbs, or mushrooms production)	from 49ha to 128 ha
Implementation of SCS techniques	9 farms	- 5 took over their family farm - 1 non-family setting - 3 not specified	- 6 exclusive grain crop production farms - 1 mixed cereals-cattle farms - 2 grain crop farms including another workshop (chicken or medicinal herbs)	from 65ha to 130 ha

2.3 Data records

2.3.1 Individual semi-structured interviews

I conducted a total of 31 face-to-face interviews, 29 live and two over the phone. I noted data for the writing of this work in parallel with the administration of a questionnaire developed as part of the European research project LIFT- "Low Input Farms and Territories". This questionnaire requires nearly one hour and fifteen minutes to be filled in and it is entirely composed of closed questions (checkboxes and numerical data): this largely constrained my interview frame. The individual interviews required by the administration of the LIFT questionnaire led us to choose an appropriate methodological framework: the analysis of individual trajectories. The advantage of individual interviews for the analysis of individual trajectories is that they avoid mimetic behavior or any type of psychological pressure present in group interviews, which

may interfere with the veracity of the information collected; they also guarantee more spontaneity and freedom of expression on the part of the interviewee (Kling-Eveillard et al., 2012). In our case, it has sometimes happened that the interview included another farmer, usually in the case of family farms. I conducted qualitative semi-structured interviews in such a way as to allow farmers to express themselves freely on the themes brought in, without being constrained by a framework of predefined answers (Kvale and Brinkmann, 2009; Kling-Eveillard et al., 2012). The topics were predefined in advance, but the way in which they were brought depended largely on the answers given by the farmer. In addition, I preferred conducting face-to-face interviews when it was possible so I could submit the discussion support (the timeline) to the farmer to facilitate the sharing of his life story.

2.3.2 The interview guide with farmers

As mentioned above, I conducted semi-directive interviews in parallel with the European survey of the LIFT project. I chose to carry out the qualitative interview before the European questionnaire in order to guarantee a time of dialogue and open discovery. Starting with a questionnaire including exclusively closed-ended questions for one hour and fifteen minutes would not have allowed the farmer to feel at ease and this would have skewed his story. The interview began with a series of follow-up questions for the farmer to understand the approach to my work. The questions were:

“Tell me about your farm. When did you start? What changed? Could you identify key milestones / events in your career? During these different stages, do you identify key people (and institutions)? “

In parallel with these questions the farmer could see my notepaper on which was drawn a long arrow evoking a chronological timeline. This timeline allowed the farmer to understand that I was looking for a chronological description of his career. It also helped him to locate events more easily in time. Throughout his story I wrote the corresponding information around the timeline. Occasionally the farmer would intervene in the transcript to notify us of an error in the chronological sequence: I could then add the necessary corrections (see figure 1, in red). During the transcription, I organized farmer responses around two main themes. First, I insist on identifying the key people associated with the steps / events / changes that were mentioned by the farmers. Then I relaunched questions to them so they could describe more precisely the acquisition process of the resources needed to change their practices. To do so, I clearly mentioned the resources: the technical reference acquired, the new skills and the outlets associated with change.

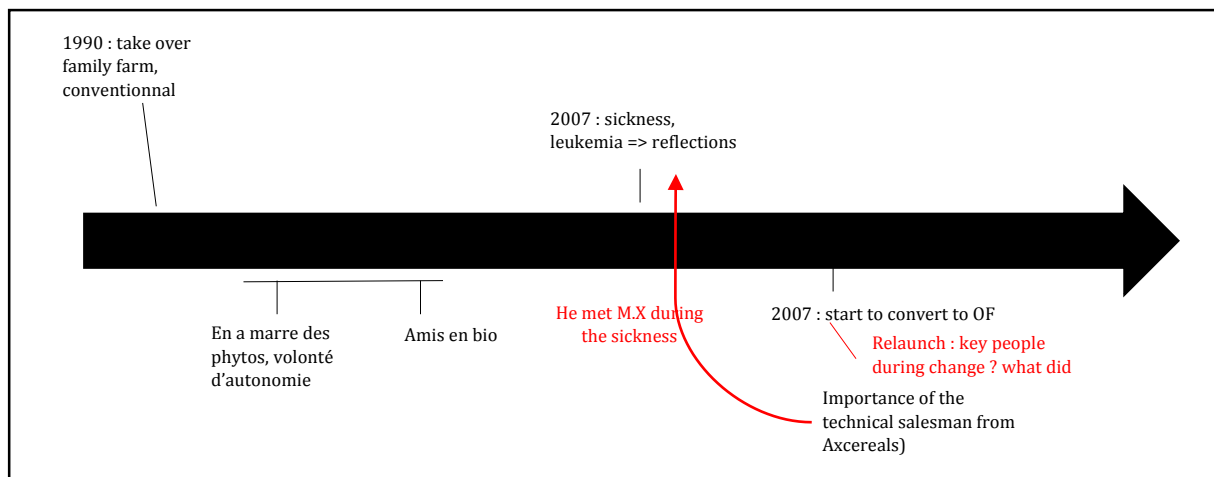


Figure 1: Timeframe in support of my note taking during the semi-directive interview

2.3.3 Semi-structured interviews with key stakeholders

The interviews with the farmers were a fulcrum to identify certain actors considered as key in their individual trajectory or in the transition dynamics at territory scale. In order to refine my analysis of the support process and the transitional phenomenon at the territorial level, I chose to meet them in order to gather their vision on the issue. These interviews were also qualitative and semi-directive, but each of the interview guides was adapted to the respondent's profession.

2.3.4 To connect the life stories

The interviews with these crosscutting actors and telephone reminders to farmers were conducted after all interviews with farmers. They were an opportunity to submit some points from the cross-analysis of life stories to them in order to verify their relevance (Grossetti et al., 2011).

2.4 The analytical framework

I developed the analytical framework of my study in order to test the hypotheses I made. Therefore, this frame means to help me identify the modes of access farmers have used to gather the resources needed for their change. I developed this frame in order to be able to capture the process of accessing resources throughout the farmers' trajectory. Finally, I tried to build an analytical frame for the analysis of initial determinants pushing farmers to change, in order to deepen the study of trajectories and mode of access used.

2.4.1 The choice of the resources-oriented approach

First, it seems important to justify one of the first postulates I express in my work: "farmers change their practices if they access the resources needed for this change". This assumption is critical in my analytical framework, because it is the process of accessing resources that builds in the end my analytical framework. This "resources approach" is inspired by business creation approach. When farmers actually engage change, and especially structural change, they have to build up a new business model, and for this new business

model, they need to plan and gather the resources they need. This approach in analyzing the progress of a change process is inspired by the work of Grossetti et al. (2011), which focuses on resources that individuals gather during the creation of a business. In my work I decided to focus on three main resources: the technical references, the skills, and the new outlets. This choice was made because I considered most important to analyze the resources needed at the very moment of the practices change; these which are required by the farmer. Other resources like seeds, machinery, fertilization etc. seem more secondary to me.

2.4.2 Individual trajectory analysis: identification and formulation of sequences

This part of the analytical framework aims at deepening the analysis of trajectories to identify the modes of access associated to the different phases farmers live during their trajectory.

This part of the analytical framework aims at deepening the analysis of trajectories to identify the modes of access associated with the different phases farmers experience during their trajectory.

I conducted the analysis of the individual trajectories of farmers by identifying first similar phases - also called *sequences*. I will now explain the iterative process through which I carried out this part of the methodological work. First I carried out a refined reading of the farmers' life stories. The sequences were identified by the analysis of the farmer' state at each of their trajectory. To support my analysis, a graph (Excel type) was completed in which the farmer's trajectory is represented on one or more lines (representation similar to a timeline), whose chronological dimension is represented by the columns: one column corresponds to one year. Our time scale goes from 1990 to 2021 (see figure 2 next page) The raw graphic representation of this work tool is inspired by statistical tables - also translated as "stacked trajectory chart" (French Robette and Center on Population and Development, 2011) - used in some sociological studies analyzing the life course of individuals living a relatively similar process (Mercklé and Zalc, 2014). The construction of this graph followed an iterative logic. First, I filled it in with a limited number of farmers', using related dates to quickly identify similarities among the successive states by which each farmer passes along their individual trajectory. Each of the phases associated with a state of comparable nature was given a color code and labeled with the MOA used during each particular phase. To code these MOA, I used letters or abbreviations.

Example of coding from a raw quotation (methodological inspiration: Grossetti et al (2011)):

"I mean, I already had quite a few friend from the farmers' union who were producing organically, so I had a glimpse of what it was"

"I had a glimpse of what it was" → I observe here that the farmer got a fairly distant perception of OF, the farmer is in an observant position. "What it was" suggests that the farmer could have access to technical overviews of OF production. It is therefore a phase where the farmer has access to one of the necessary resources for change: technical reference(s). I then associate this phase to the "Recognition" sequence (that I associated with the acquisition of previews, references, explanations) that I coded in blue (other sequence are coded in other colors).

“friends from the farmers’ union” → “farmers’ union” is a space where the exchanges are of an ambivalent nature. It is a formal organization, but still it consists of farmers that are already friends. I decided anyway to associate this interaction with the use of a formal mode of access that I called “Syndic” (abbreviation of Farmer’s union in French).

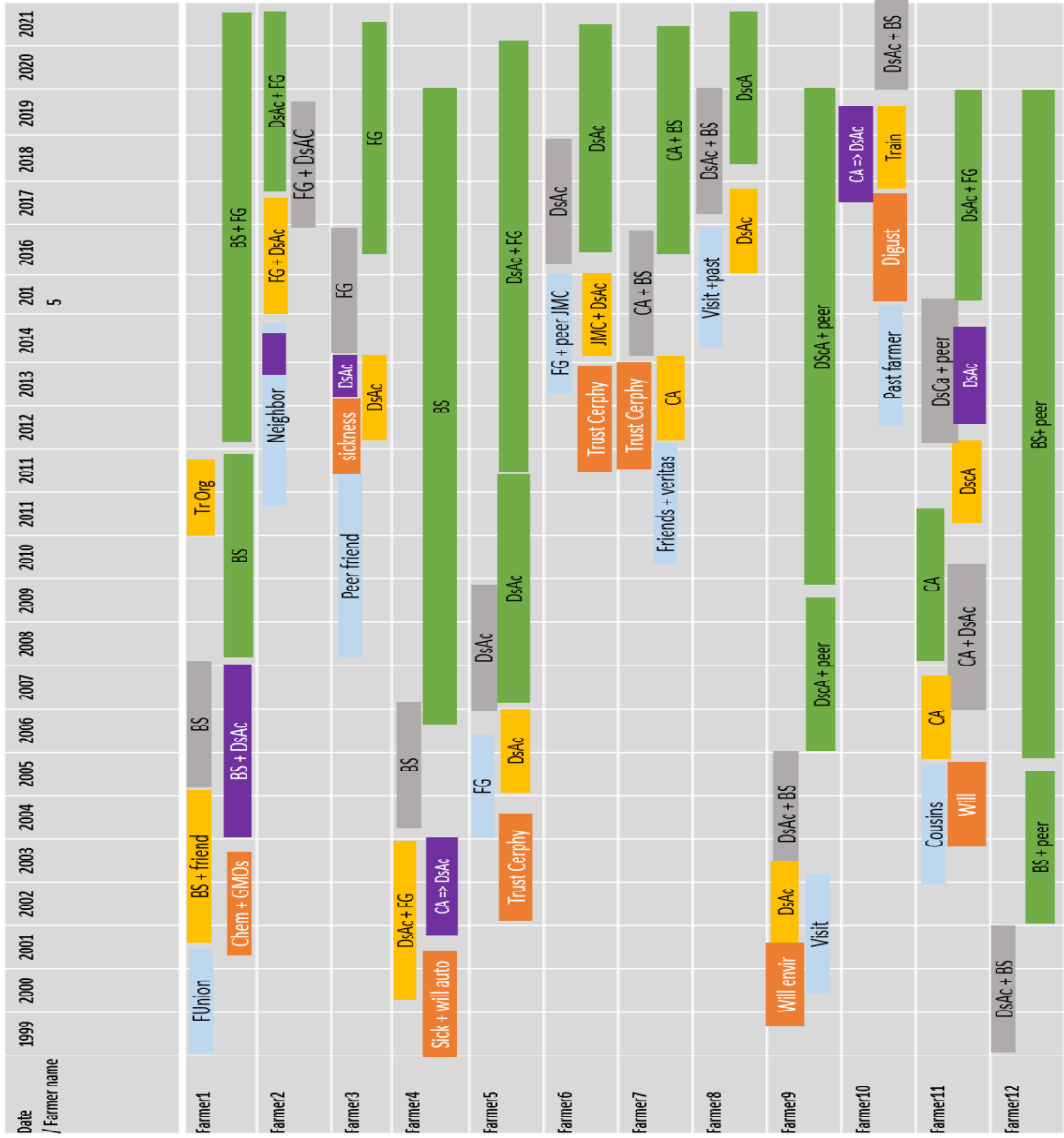


Figure 2 : Insight of the dataset document underlying the trajectory analysis (note: each color equals a sequence)

In parallel, I attributed a first name and a first description to each similar phase identified – the sequences. Subsequently, the sequences (their color and description) were helpful to facilitate the filling of the graphic document with the other individual trajectories. The description of each sequence was gradually refined throughout the work. It is only after multiple readings of the farmers’ trajectory and following the advances in data processing that I have been able to stabilize the name and the description of the sequences. In parallel with this exploratory work, I used some literature to refine the name of sequences and the MOA used. For example, the name for the "consolidation" phase was retrieved from the work of Suntherland et al. (2012)

to replace the name of a phase I called "reinforcement" whose connotation did not suit the description of the phase concerned. In the end, I ended up with five distinct sequences: the Disruption, the Recognition, the Preparation (which I divided in two to distinguish two processes: the acquisition of skills and the reaching of new outlet), the Implementation and the Consolidation ⁽¹⁾. See table 2 below with the description of each sequence and their associated resources.

Table 2: Identified sequences within the trajectories of practices change and their associated resource(s)

Name of the sequence	Disruption	Recognition	Preparation	Implementation	Consolidation
Description	The farmer is breaking with his way of farming. An event or an evolution of the context pushes him to move towards change.	The farmer takes his first steps in understanding the production system (OF, SCA) envisaged. It is a phase of discovery, of general information gathering.	The farmer has decided to set up the change. It is in a change-planning phase and is trying to gather the resources it lacks to set up the change.	The farmer is in a phase of operational implementation of the change. He is trying to establish his new techniques in the production system.	The farmer sat down a number of techniques. He now wants to perfect them or try to set up others through (individual or collective) experimentation
Resource(s) associated with the sequence	No objective resources associated	Technical overviews and/or technical references, administrative information, keys for identification	Initial skills and outlet opportunities necessary for change	Technical skills	Technical reference, technical skills

One of the challenges of the "sequencing" work has been distinguishing sequences from each other. Indeed, given the overlapping nature of sequences, it has sometimes been difficult to grasp the type of phase the farmer was situated within. For example, it is sometimes difficult to distinguish the recognition phase from the preparation phase because a farmer may acquire practical resources (for example, the telephone number of a buyer) during his/her both phases; therefore, there is often an overlap in denotation. In addition, certain phases are clearly mentioned by the farmers, but remain part of a vague temporality. For example, if the farmer says that he/her acquired technical references from friends from the same farmers' union, I face here a long and vague process of acquisition. It was thus my responsibility to decide and distinguish one phase from the other for each of the trajectories according to the farmer's discourse in order to facilitate my analysis. Consequently, I decided to associate each sequence with a type of resource (sometimes several) to which this particular sequence gives access.

I included a phase of "Disruption" among the sequences identified in order to facilitate identification of certain points along the trajectory analysis. This phase, which infers the "root determinants of change", is of a different nature compared to other phases in a sequence. It can spread over time and / or be a singular event. For some farmers' stories, it is difficult to talk about a specific phase of "disruption", especially for farmers who have moved to OF after seizing a commercial opportunity. This leads us to distinguish it

⁽¹⁾ I divided the sequence Consolidation in two for the farmers who converted to OF after 2011 (phase 1 – phase 2). In this way I could observe some evolution in the type of MOA used throughout their entire trajectory by these farmers. Phase 1 refers for these farmers to the consolidation experiences before 2011 and Phase 2 refers to the consolidation experienced after 2011. For farmers who converted to OF after 2011, they have lived only one phase of consolidation (Phase 1).

largely from other sequences in some parts of my work on trajectory analysis. However, given the meaningful substance of the “Disruption” phase, I highlight it in regard of other sequences throughout analysis.

2.4.3 Sequences and modes of access used

The methodological framework associated to this part means to help me test the hypothesis: *Farmers access the resources not all at once, but by soliciting different modes of access at different stages of his/her personal trajectory*

The work I have done on identifying the MOA used by farmers for the acquisition of key resources during their trajectory was done in parallel with the formulation of the sequences that structure their trajectory. Through the review of the interviews and the recorded statements, I was able to identify the different MOA (see table 3). See example of the identification process in the section Identification and formulation of sequences.

Table 3: Modes of access used by farmers during their trajectory

Interpersonal relationships	Peers
	Others – agricultural
	Others – non agricultural
Formal arrangements	Downstream commercial branch (product buyers)
	Upstream commercial branch (input sellers)
	Private technical institute
	Farmers’ group – Farmers association
	Chamber of Agriculture
	Training organization
	Farmers’ union
	Accountant
By him/herself	By him/herself

For facilitation purposes, it has sometimes been necessary to assimilate certain processes, although different, into the same mode of access. For example, when the farmer says he or she has conducted readings during his/her first steps towards SCA (Recognition sequence) I code for "By his/herself" for this sequence. When another farmer who converted to organic says he or she has experienced this recognition by experimenting trial and error processes, I also code “By his/herself” The process during the Recognition sequence is not the same, but the two farmers used an MOA that I coded under the same name: " By his/herself ".

As a background and following this clearing work, I have sought to bring each of the MOA under a common category. I have relied in particular on the work of Cloutier (2014) to guide this work. I ended up distinguishing the MOA into three categories: the use of "Formal Arrangements", "Interpersonal

Relationships" and finally "By his/herself" (see table 3). "Formal arrangements" refers to all legal entities farmers solicit. If the farmer solicits a specific person from these entities, I considered it as the solicitation of a "formal arrangement". "Formal arrangements" refers to all legal entities that farmers solicit. If the farmer solicits a specific person from these entities, I considered it as a "formal arrangement". Once this categorization was done, I carried out coding using Excel, allowing us to count the number of times that farmers cite this or that mode of access during this or that sequence. When I identified one or more MOA during a sequence, I coded +1 for the mode of access used. This allowed us to quickly formalize the results in graphical form (see graphs 9 to 15) and to perceive trends throughout each sequence. When I made the accounting, I decided to take into consideration all the MOA mentioned by the farmer, without prioritizing their importance thanks to a more complex accounting method. This choice comes first from the fact that farmers tend to have difficulty classifying in order of importance the persons/institutions they have approached during their journey. Moreover, by classifying and eliminating the MOA considered secondary, a significant proportion of the MOA used by farmers would be excluded and the presence of certain actors would not be identifiable. I have therefore not made a distinction based on the importance of the MOA, but I take the time to make this distinction when reading some of the graphs because it allows us to identify certain nuances in the results.

A major challenge in identifying and accounting for the MOA has been my ability to interpret farmers' discourse. For example, when a farmer claims to have solicited "guys from the farmers group" during his consolidation sequence, I counted this solicitation within "Peer farmers" and not within "Farmers 'group'" because the farmer actually claims to contact the farmers directly (and not the group as a formal arrangement). Similarly, for the solicitation of a particular person, I have sometimes coded the mode of access as a "formal arrangement" even though I had the quotation of a specific person. This is the case, for example, for the solicitation of M. X, who is a technical sales representative for a cooperative.

With regard to the management of the results obtained regarding the MOA and their interpretation, an important part of my analysis was distinguishing different categories of farmers. First, I distinguished between farmers who converted to OF and those who had implemented SCA practices. I made this choice for two main reasons: first, their technical approach is very different despite certain points of convergence; second, their dissemination throughout Limagne is very uneven (according to the statements of the farmers in ACS interviewed). These two characteristics have aroused my curiosity about the differences between the networks that support the implementation of the two types of practices in question. Despite strong distinctions within the trajectories of these two groups, as OF conversion is often considered as radical transition unlike the implementation of SCA techniques, I have chosen to use a common analytical framework for analyzing access patterns over the different sequences. Thus, even if some sequences tend to be repeated for some farmers in SCA (for example, the latter experience two phases of Recognition and two phases of Implementation) I have chosen to count the MOA associated with each of the same type of sequence by adding them together.

Then, I created two subgroups of farmers among the farmers who converted to OF: farmers who converted to OF before 2011 and those who converted after 2011. I made this choice following the cross-referencing of different farmers' stories citing a key event in 2011. They believe that this event would have generated a more sustained momentum within the farmers' group led by bio63. This distinction within the groups is therefore intended to help us perceive, if it exists, an evolution in the nature of the MOA used by farmers who converted to organic during the two periods. Beyond that, I also wanted to distinguish among farmers who converted to OF after 2011, those who have recently settled from those who have been settled longer. I have considered a recent installation to be recent if it was within the last 5 years. This choice is the result of my desire to perceive differences within the data, since the attributes and modes of operation between these farmers are often different (personal perception since my interviews).

2.4.4 Analysis of the root determinants of change

Analyzing of the root determinants of change is meant to help me deepen the analysis of trajectories and the modes of access used by farmers. This analysis is more a secondary part of my results aiming at supporting the others.

This part of my work was based on the existing literature regarding the analysis of transition processes (Fairweather, 1999; Chantre and Cardona, 2014, Dupré et al., 2017,). This type of analysis takes an in-depth look at the attitude of the farmers surveyed in order to bring out classifications. Despite my interest for the analysis of the trajectories as a whole, I have not conducted extensive work on the analysis of behaviors that root the change in practices. No qualitative questionnaire supported this part of the work – I defined, listed and classified the root determinants from the semi-structured interviews.

The existing literature on the analysis of determinants regularly distinguishes farmers so-called opportunistic behaviors from others considered to emanate from the deeper values of the farmer when changing his/her practices. In addition, the literature related to the analysis of so-called "agroecological" transitions emphasizes the importance of governance of practice transitions (Lamine, 2019). That is first to know which actors have actually initiated the change and second to assess the more or less desired nature of the change implemented by the farmer. This is why I have decided first to classify the root determinants of practice change according to their nature: more or less "suffered" and more or less "intentional" (see table 4). In the case of determinants of "suffered" nature, I have distinguished between determinants showing gradual traits from those showing suddenness. In the case of "intentional" determinants, I have distinguished "proactive" determinants (the farmer shows proactivity) from "opportunistic" (the will is the result of an external opportunity) ones.

Table 4: Root causes of farming practices change, chosen classification

Intentional determinants	Suffered determinants
Proactivity	Gradual disruption
Opportunism	Sudden disruption

In order to deepen my analysis on the root determinants and their place in the farmers' trajectory, part of my work has been to draw links between these determinants and farmers characteristics (only with farmers who converted to organic). I carried out this work with simple percentage calculations and found significant results by looking at some specific comparison criteria. I were interested in three main criteria. First, the dates of change in practices. I distinguished these dates over three periods: from 1999 to 2007, from 2008 to 2013 and from 2014 to 2019. This distinction is the result of a finding I made from the raw data. Proactive behavior (and in particular the desire to reduce environmental impact) comes from farmers who have converted to OF at the earliest stage and from those who have been settling in at the latest. This echoes the literature highlighting the emergence of OF precursors for personal reasons of environmental awareness. These results also reflect the more recent literature on the behavior of farmers recently established in OF, who are clearly aware of environmental stewardship. I looked at another criterion: the nature of the production systems. The raw data indicate that mixed crop-cattle systems do not experience the transition in the same way (particularly in terms of technical flexibility during change and access to markets). In addition, it was of interested to distinguish between full-time cereal farmers and those who also have a secondary occupation due to their interactions with the outside world. For the latter, their resilience to changes in external conditions (climatic variations, economic instability) is often considered superior (Lin, 2011). Finally, I wanted to see if the fact that farmers have had past work experience (off family farms), which could potentially broaden their perspective on several issues, has an influence on the type of determinants he/she quotes.

3. Results

The results are articulated in the following way: first I introduce the structure of farmers' trajectory and I deepen the analysis of the root determinants. Then I go through the analysis of the MOA used by farmers during the sequences of their trajectory by giving explanations on the different processes underlying the MOA solicitation.

3.1 Sequences within the farmers' trajectory

Farmers experiment different types of trajectories due to multiple factors, including the root determinants of their willingness to bring about change.

3.1.1 Different chain of sequences within the trajectories

It appears from my interviews that the individual trajectories of farmers follow different sequences. Within a trajectory, some sequences may be multiple and may be located differently from each other. I identified five different sequences (figures 3, 4, 5, 6, 7).



Figure 3: Type 1 trajectory: "Accumulation" trajectory

During this type of trajectory, the farmer experiences the Recognition phase before the Disruption phase. Farmers who generally have a part of their network who have already put in place the practices that they decided to implement later experience this type of sequencing. The farmer knows a neighbor who has converted to OF, sometimes shares equipment, or knows another farmer who rolls his crops straw after harvest to do direct seed drilling. The farmer may also know farmers who have already converted to OF within the farmers' union. Finally, the farmer may also have been exposed to technical standards associated with his change of practices during past professional experiences (former agricultural mechanic, former worker or agricultural service provider). In this type of chain, the type of root determinant is usually the result of a gradual accumulation.



Figure 4 : Type 2 trajectory: "Abrupt reaction" trajectories

During this type of trajectory, the farmer is not normally exposed to any outside network that would help him/her discover the type of practices he will implement later. This situation is generally that of farmers who have reacted to a strong event (such as poisoning with chemical products or a disease associated with their use, or soil erosion). This disruption can also be the result of a gradual accumulation, which is sometimes followed by an event that finally pushes the farmer to react. During this trajectory, the farmer takes his first steps towards the change of technique after triggering events.

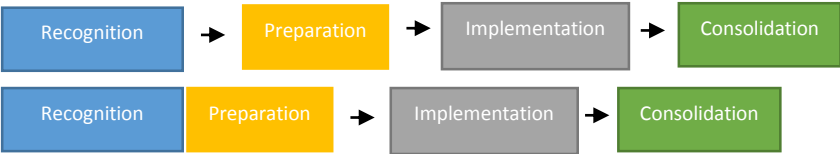


Figure 5 : Type 3 (and 3a) trajectory: "No-disruption" trajectory

During these types of trajectories, the farmer did not experience a disruption, strictly speaking. This is the case of a farmer who has converted to OF in order to seize the opportunity to ensure higher value-added production. This is also the case for farmers who have taken over a farm already producing organically without necessarily having experienced a "Disruption".



Figure 6 : Type 4 trajectory: "One foot in" trajectory

During this type of trajectory, the farmer experienced the change in practice in two stages. The farmer has previously changed in practices that would facilitate a second change. This is particularly the case for farmers in mixed crop-cattle farming system whose system had already evolved towards a reduction in fertilization and optimized management of rotations for cereal production. This is also the case for a farmer who has converted part of his farm in OF during a diversification processes towards the Production of

Aromatic and Medicinal Plants (PAMP). Subsequently, a triggering event (intoxication with chemical products) can finally convince them to convert entirely to OF.

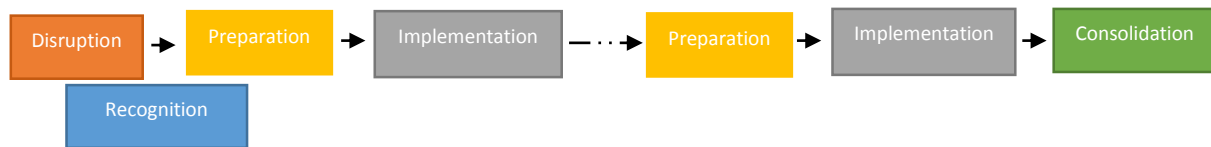


Figure 7 : Type 5 trajectory: "SCA" trajectory

This type of trajectory is associated with that of farmers who have implemented conservation farming techniques. Some of them experience a real disruption when they observe a strong erosion of their soils. Others experience a disruption of a different nature: the fortuitous discovery of the agronomic principles of the SCA. This disruption has the particularity of being experienced by the farmer during the Recognition sequence. It is the discovery of the SCA techniques, and the insight the farmers gain from them, that triggers a change of practices. Secondly, I note that changing practices is generally experienced as a sporadic process for these farmers; they experienced through in several stages. This is not a radical change as is usually the case with the transition to OF.

Farmers' trajectories show many differences, depending on the social network there are embedded in, on the type of farming system they run, but it depends importantly of the type of determinants which initiate their will for change.

3.1.2 Root determinants of change

The initial determinants were fourfold. For some, they are the result of an evolutionary or sudden change in the context experienced by the farmer: "event causes" and "evolutionary causes". The others emanate from the farmer's will, either during a personal voluntary change process or during the proactive seizure of an opportunity. The root determinants are gathered and classified in Table 5.

Table 5: Summary table of the root determinants that prompted the farmers interviewed to convert to Organic farmers and implement Conservation Agriculture techniques

Nature of determinant	Root determinant	OF	Total	SCA	Total
Sudden disruption determinants	Intoxication/sickness	4	9	//	9
	Loose of trust from counselor	3		//	
	Burt-out	//		//	
	Change in regulation (restrictions, subsidies)	1		//	
	Soil Erosion	//		2	
	GMO Tests	1		//	
	Agronomic Discovery			7	
Gradual disruption determinants	Economic difficulties	8	17	//	4
	Yield cap	3		//	
	Ineffectiveness of chemicals	1		//	
	Disgust from chemicals	2		2	
	Change in regulation	1		//	
	Soil degradation	//		2	
	Social identification	2		//	
Proactive determinants	Willingness to reduce environmental impact	6	13	//	1
	Willingness to change life	1		//	
	Willingness to reduce worklad			1	
	Willingness to be autonomous	6		//	
Opportunism determinants	Search for added value	2	9	//	0
	Access to financial assistance	3		//	
	Diversification opportunity	1		//	
	Appearance of a promising outlet	3		//	

Root determinants when converting to organic farming

Among the 22 farmers who converted to OF, there is a slightly higher proportion for the determinants. Ten cited sudden event as root determinants of their change in practice; 18 cited evolving causes; 13 stated that their change was the result of a proactive desire and 9 cited the seizure of an opportunity as a trigger for their conversion to OF. The vast majority of farmers cite several determinants that motivated their conversion to OF. Among them, almost all cite determinants of a different nature. Four farmers cite only one initial determinant: one claims his conversion to be the result of added-value search. Another considers the loss of trust with his counselor during a specific training at the cooperative. The remaining two are farmers recently set up in OF systems and both claim to want to reduce their environmental impact.

In order to further the analysis of the root determinants, I examined whether links can be made between the nature of these determinants and certain attributes of farmers (see Appendix 4).

Proactive endeavor

I observed that the majority of farmers claiming to be proactive are farmers who converted to OF before 2007. They represent 54% (see Appendix 4) of the farmers who have claimed such a desire, yet they

represent less than a third of the sample. Farmers citing the willingness to reduce their environmental impact converted to OF over the period 1999-2007; the others (three of them) are very recently established farmers, two of whom were directly installed in organic farms. Each of the farmers claiming such a willingness had professional experience outside their farm before settling down. The desire for autonomy comes from six farmers who have experienced a feeling of rupture with regard to the technical support provided by advisory structures such as their cooperative or the Chamber of Agriculture. Two cite direct conflicts with downstream actors. One says he is fed up with the "orders" sent by the cooperative and two cite the Certiphyto training course. This training (organised by their cooperative) aimed at training farmers in the management of chemical products and notifying them of the legal obligation to invest in a technical room dedicated to the storage of products and to provide themselves with protective suits and masks during handling. "It showed that it was dangerous," said one farmer. "It wasn't to train us, it was to take responsibility away from the chemical sellers, so the responsibility goes to the farmers," said another. The last of the six, who converted to OF in 1999, claims to have converted to OF following a series of tests he conducted with the Chamber of Agriculture over a three-year period in the mid-1990s. The tests were conducted on three different plots: one plot was managed with minimal use of chemical products, another with "average" use of products, and the last with significant use. The test results concerned the calculation of profitability over an entire production cycle. The farmer says the results were clear: a system with minimal input use is the most cost-effective. Observing that communication on these results were limited (or even non-existent), he said he lost confidence in conventional support, and decided after a few years to convert to OF. It should be noted that of the six farmers, four are "pure grain farmers" and 2 are mixed crop-cattle farmers.

The case of mixed crop-cattle farmers

The determinants driving crop-cattle farmers to turn toward OF are of a different nature. Apart from the desire for autonomy mentioned twice, if we look more closely, we see that the set of determinants driving the mixed crop-cattle farmers to convert to OF are related to their ability to be economically viable. In that matter, they cite the following determinants: economic difficulties, yield ceilings, the ineffectiveness of chemical products (no longer allowing them to achieve satisfactory yields), and the reduction of CAP subsidies for those determinants that are both sudden and progressive in nature. They also cite added value search in the sale of their products, access to certain specific financing (such as CTE), and the emergence of promising outlet. In fact, they are two mixed crop-cattle farmers who cite the opportunity to move towards high VA production as the initial determinant for their conversion. Of the three farmers citing yield caps, two are mixed crop-cattle farmers. In addition, I observe that no event-driven determinants have influenced their trajectory, unlike pure grain farmers and farmers in diversified systems.

As a final interesting result, three farmers who converted to OF after 2014 cite yield caps as initial determinants. One of them also points to the increasing ineffectiveness of chemical products, whereas no farmer cite this reason from the other two time periods.

Root determinants of farmers' change to SCA techniques

Interviewed farmers who implemented SCA techniques cited two main initial determinants. The first one is revealed in the sequence we call Recognition. Generally, he/she discovers the techniques of SCA after having received advice from a third party who suggests a reading (Lucien Seguy, C. Crovetto). He then gains access to agronomic knowledge that was previously unknown. This process is very different from the one experienced during the Recognition sequence during a conversion to OF. This discovery during the Recognition phase is a trigger for change.

The second is of a different nature, one is an event suffered that acts as a deep rupture and as an initial point to their desire for change: soil erosion (due to wind and/or water). SCA techniques were considered later via a meeting or throughout personal research (on internet), and were then regarded as an obvious solution (erosion control is one of the primary functions of this type of agricultural technique).

Finally, it should be noted that no farmer highlights the emergence of an opportunity as an initial point for the implementation of SCA techniques; this is partially because it is nearly impossible to commercially value to the effects of SCA implementation.

3.2 Modes of access used by farmers during their conversion to organic farming

3.2.1 Evolution of the mode of access used during the conversion to organic farming

We first studied the evolution of the MOA during farmers' trajectories by referring to the common nature of these MOA, i.e. "interpersonal relationships", "formal arrangements" and "by his/herself". This was a way to have a general idea of the MOA used by farmers who have converted to OF, and then to identify probable evolutions in the dynamics of support for the conversion to OF before and after 2011. After that, I will show further results by referring to all modes of access.

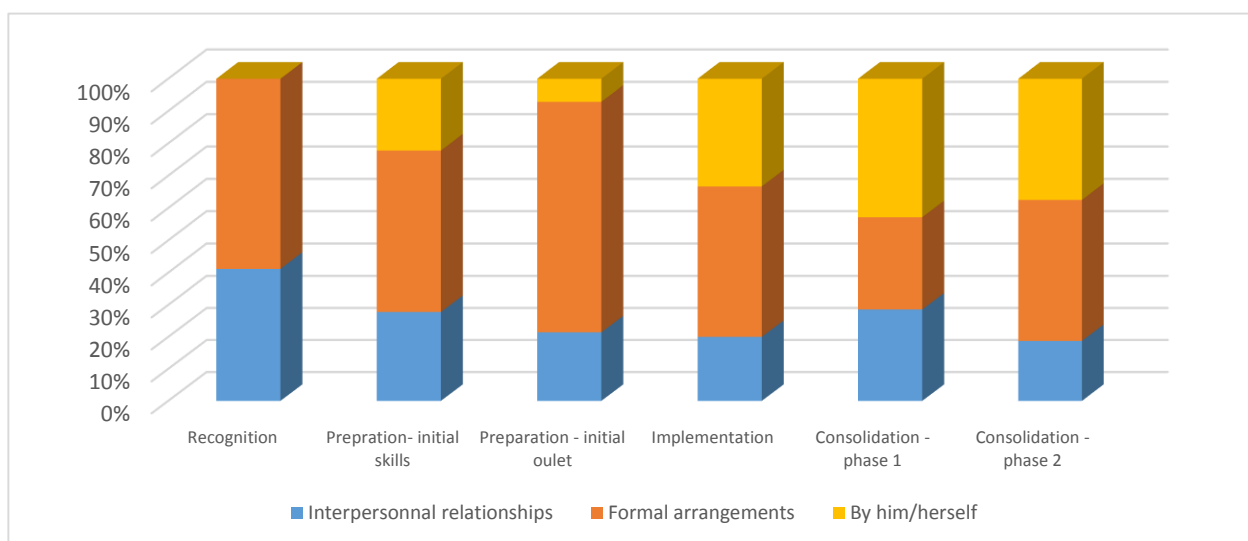


Figure 8: Modes of access used during each of the sequences along the trajectory of practice change by farmers who converted to OF before 2011

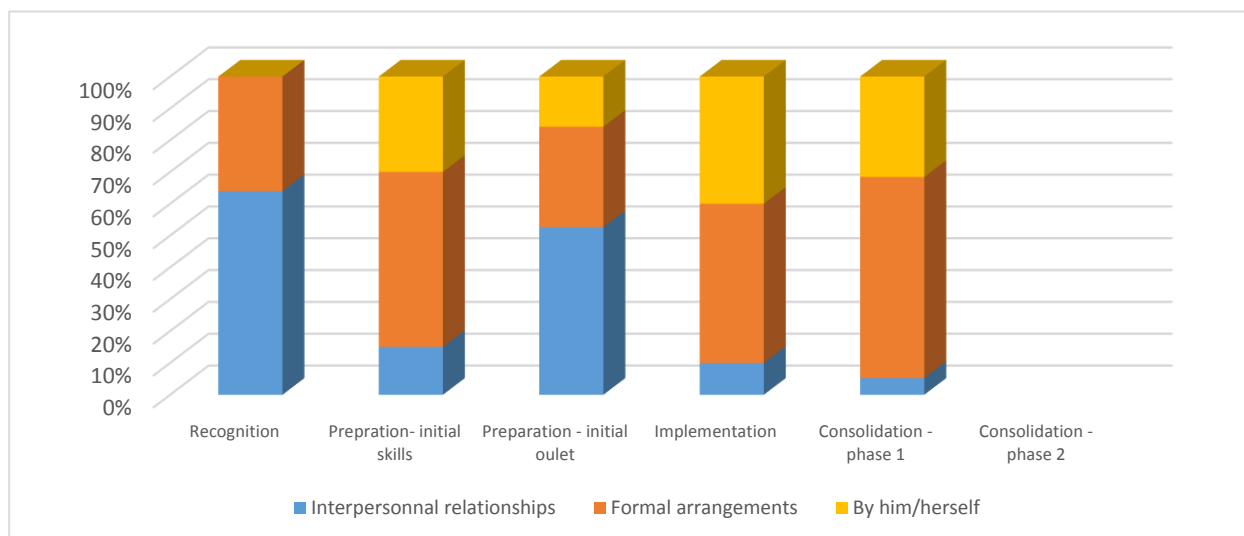


Figure 9: Modes of access used during each of the sequences along the trajectory of practice change by farmers who converted to OF after 2011

Reading: "Among all the MOA used during the recognition phase by farmers who converted to OF after 2011, 64% were interpersonal relationships and 36% were formal arrangements. No individual action is taken during this sequence for farmers who converted to OF after 2011".

The graphs above show all the MOA to resources that farmers have used during each sequence of change. Quite strong trends emerge for each of the sequences. There are also some changes in the nature of the MOA used between before 2011 and after 2011.

Farmers who have converted to OF before, as after 2011, exclusively mention the solicitation of third parties when describing their Recognition phase. There is no individual pathway for this sequence. This can be explained in two ways. First of all, it is a phase that, by its nature (for some but not all farmers), emerges from interaction with one or more third parties. The recognition phase is done because they have met someone related to OF systems. This is particularly the case for farmers who have experienced their recognition phase before their Disruption phase. Secondly, the implementation of OF is experienced as a structural change, especially for cereal growers. Thus, it seems that in the absence of relatives already practicing OF, an essential step is also to go and see what is being done elsewhere.

Between the two periods, there is a notable difference: farmers who converted to OF before 2011 cite, principally, the use of formal arrangements more than farmers who converted to OF after 2011, who cite, principally, the use of interpersonal relationships rather than formal arrangements. This is explained by the attributes of some farmers who converted to OF after 2011. Indeed, among these farmers, two took over their father's farm who was already producing organically. I considered for the latter that the recognition phase was naturally done with their family with whom they still interact today. In addition, three of the farmers who converted to OF after 2011 say they had access to OF standards through past work experience. I considered the solicitation of mode of access to be of an interpersonal nature because they interacted directly with farmers they knew (they were generally their clients). These farmers needed to use only interpersonal relationships during the Recognition phase.

For the preparation-skills phase, there was no significant difference in the nature of the mode of access used over the two periods. There is a slightly higher proportion for the use of interpersonal relationships for the pre-2011 period compared to the post-2011 period. We only observe a higher proportion of the individual approach for after 2011.

The nature of the modes of access that were used during the preparation-debate phase has changed significantly between the two periods. I observe that formal arrangements (like sectors) represent a significant proportion (71%) of the MOA used over the period before 2011 compared to after 2011 (32%). This is largely due to the development of the OF cereal sectors in the early 2000s within the cooperatives of Puy-de-Dôme but also to the strong doorstep selling of some traders. The lower proportion of the mobilization of formal arrangement for after 2011 is explained in particular by the conversion to OF of a significant number of farmers belonging to the Limagrain cooperative, which has not yet developed an OF sector. Thus, farmers who converted to OF used interpersonal relationships to access new opportunities.

There are no major differences in the nature of the MOA used during the implementation phase for the pre-2011 and post-2011 periods. On the other hand, I note significantly a change in the nature of MOA for the phase Consolidation 1. In fact, the formal arrangements are much more present among the MOA used for the farmers who converted to OF after 2011. This is to be read in parallel with the consolidation phase 2 experienced by the farmers who converted to OF before 2011. I note that the solicitation of formal arrangements has slightly increased during this phase 2 which indicates a growing trend in the solicitation of formal arrangements after 2011.

This can be explained firstly by the fact that bio 63 succeeded in 2008 in creating a position via a reorganization of their human resources, aimed exclusively at supporting a group of organic field crop farmers in the Puy-de-Dôme. Some farmers underline the lack of a dynamic group before 2011 - "*I was struggling, the technician had too much responsibility and worked in parallel with the Chambre [of agriculture],*" says a farmer. The date of 2011 is a date considered as key by several farmers. It corresponds to the participation of a large number of them (and others coming from neighboring counties) in an training workshop facilitated by Vincent Lefèvre, working on behalf of VetAgroSup. This individual was conducting a study, as part of his PhD work, aiming at co-designing innovative farming systems with a focus on no-till techniques. Organic farmers experience this work as the first intense period of working together, as they were only gathering a few times a year before that. Thus, beyond the convivial nature of the meetings held between organic farmers organized by bio63, this joint work allowed to put the foot in the stirrup to the group and to create stronger interactions between peers. Note that the solicitation of peers is more pronounced during the consolidation phase 2 than during the consolidation phase 1.

3.2.2 The analysis per sequence of organic farmers trajectory

The analysis per sequence intends to be more complete and more thorough than the previous analysis, which intended to be general in order to identify main trends. Thus, this part does not stop at an analysis of

the nature of the modes of access; I seek to go into more detail in the identification of MOA used and try to describe the processes.

The “Recognition”

The recognition sequence is lived by farmers through the solicitation of third parties. None of them discover the OF by themselves only.

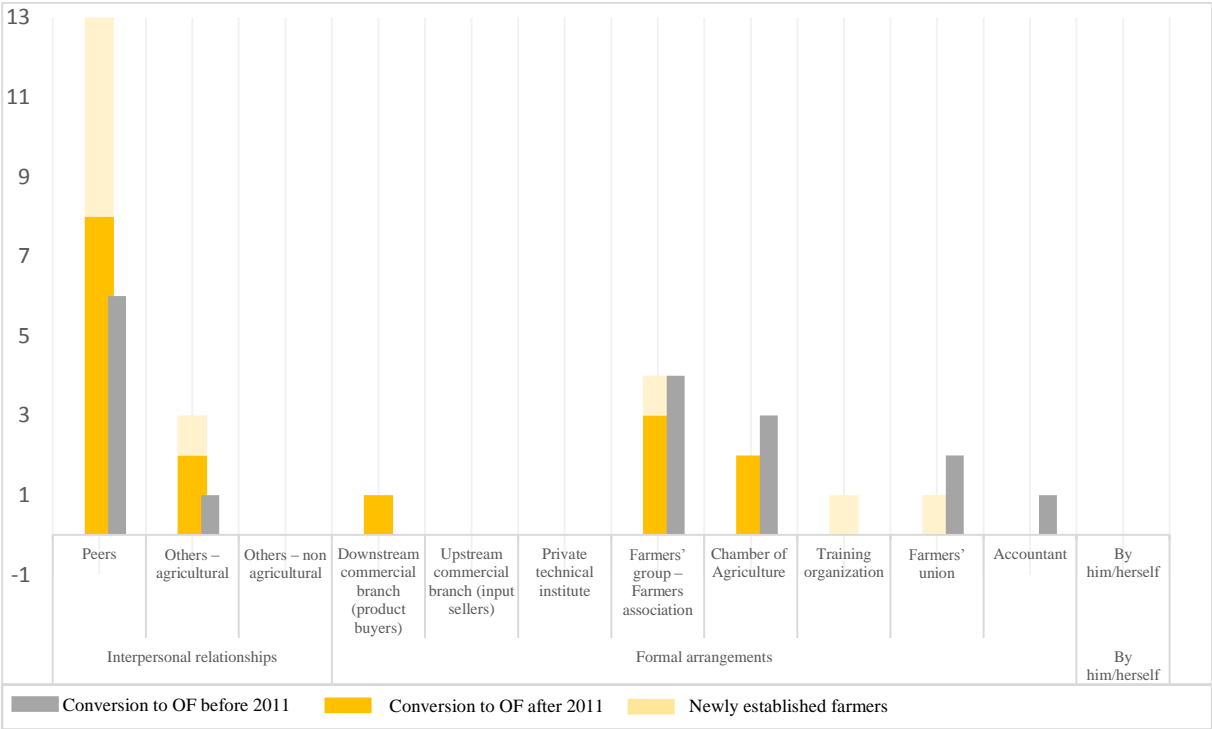


Figure 10: Mode of access used by the farmers converted to OF during the sequence "Regognition"

Reading: (First two graphic bars): "Among the 10 farmers who converted to OF before 2011, the solicitation of a peer during the recognition phase was cited 6 times. Of the 12 farmers who converted to OF after 2011, the solicitation of a farmer peer during the recognition phase was cited 13 times; among these 13 times, 5 were cited by farmers newly established"

During the recognition phase, a first significant result emerges for the period before 2011 as for the period after 2011: the solicitation of peer farmers. Indeed, of the 22 organic farmers interviewed, 16 indicate that they have asked another farmer (who is already producing in an OF system) during their first steps towards OF. This solicitation takes two forms: (1) unintentional solicitation, where the farmer is in contact with farmer friends, neighboring farmers, or family that already produces organically (this is the case of 8 of the 16 farmers); and (2) proactive solicitation, where the farmer contacts a farmer whom he does not know (or knows indirectly) in order to meet him and visit his farm (this is the case of 7 farmers out of 16). The farmer often combines these two forms of solicitation but farmers who do not have the appropriate network engage exclusively in a process of proactive solicitation.

Farmers attach great importance to visiting organic farms close to their geographical location. It is a process through which they can evaluate (discreetly) the system in question. This meeting between peers is first a way to discuss with the other farmer social and socio-economic criteria. The personality of the person being visited is a crucial aspect in the assessment of the system as a whole. There is also an assessment of

the more objective characteristics of the farm visited, such as the size of the farm, its level of diversification, the farmer's family situation, or the fact that the farmer exercises his or her agricultural activity under the same conditions (existence of a second occupation for example). In addition, this meeting presents itself as a means of evaluating the agronomic performances of the system envisaged by the visitor. In this respect, even if the question of yield reduction is addressed, the weed pressure level observed in the fields is a central evaluation criterion. Indeed, I have found that in the vast majority of the interviews (with organic and non-organic farmers) that the pressure level of weeds in cereal crops is a primary criterion for evaluating the credibility of the system visited. It is a criterion that makes it possible to evaluate both the legitimacy of the farmer's discourse, his level of technicality and rigor, and his way of managing farm work on the whole farm. When some farmers describe their recognition phase, some do not hesitate to say that they associate themselves or not with certain organic farmers given their "level of technicity." This phrase essentially means whether or not the farmers are capable of managing weed pressure. In Limagne, it became clear that one outstanding farmer is cited many times as the OF reference of the territory. He was formerly a farmer that practiced so-called "conventional agriculture". He arises as well as a technical reference for all the farmers having mentioned his name, as in reference in the management of exploitation, of business and marketing channels. Indeed, he manages one of the largest farms in the territory (with nearly 300 hectares) whose level of diversification is notable compared to the standards of the region (field crops, livestock cattle, pigs and PAMP). He employs several workers full-time (five according to farmers surveyed) and manages a very large portfolio of clients exclusively in direct sales. This wide range of activities and outlets makes him a reference for both grain growers and breeders producing cereals assessing applicability of these practices in their own systems.

For MOA associated with formal arrangements, bio63 and the Chamber of Agriculture were mentioned a significant number of times. Typically, the farmer contacts these entities by telephone or meets with representatives at home or at the entity's premises. The farmer sometimes refers to having traveled to participate in a general training on the conversion to OF. I note that the four farmers who made contact at this phase with bio63 before 2011, did so in large part to receive help in setting up a file for a grant application specifically allocated to OF farmers. They did it unlike farmers converted to OF after 2011 who do not report the use of grant financing. For the rest of the farmers, these entities are asked for access to general information on administrative aspects, but not technical. It is often the case that farmers gather ideas and even contacts for the outlets for their future organically-produced crops. Note finally that three farmers cite the farmers' union (the Confédération Paysanne) as a key MOA in their recognition phase. I consider this MOA of a formal nature. However, I emphasize its ambivalent nature because the farmers' union is a sphere that facilitates informal dialogues between peers - *"I had friends at the Confederation who were already doing OF"*. It is a context where farmers share their political and sometimes philosophical vision of agriculture and the farmer's profession. Farmers consider this place as an "open" context, from where emerges a climate of trust opening the way for some farmers to think about

changes in practices. At the same time, the union is a social sphere that can be a source of influence, which I list among the root determinants of change.

“Preparation – Acquisition of the initial skills necessary to carry out the conversion to organic farming”

The sequence of preparation is a phase during which the farmer to lead the change gathers a considerable number of resources. I focused primarily on two acquisition processes: the acquisition of initial skills necessary for the change and acquisition of new outlet opportunities.

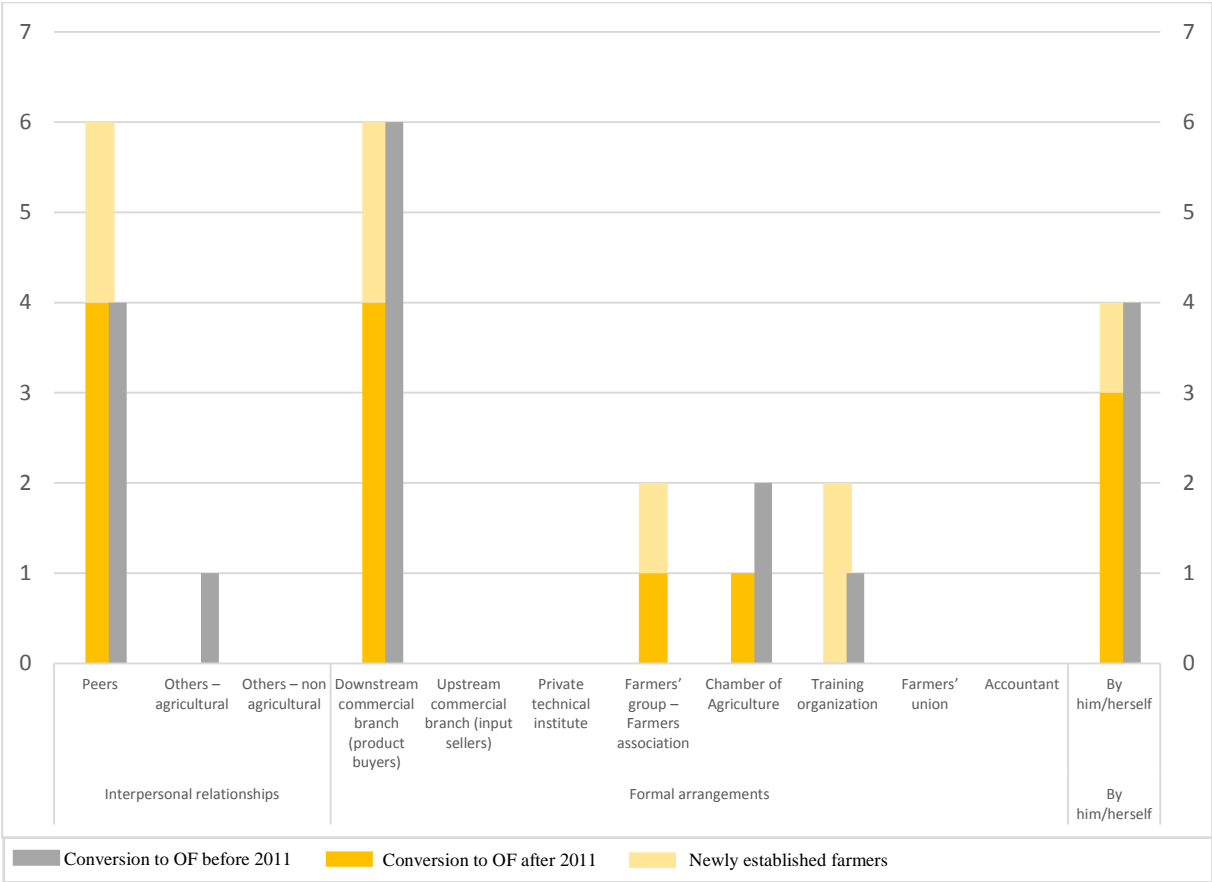


Figure 11: Mode of access used by the farmers converted to OF during the sequence "Preparation-Skills"

Reading (First two graphic bars): "Among the 10 farmers converted to OF before 2011, the solicitation of a peer during the Skills-Preparation phase was cited four times. Of the 12 farmers converted to OF after 2011, the solicitation of a farmer peer during the Skills-Preparation phase was cited 6 times; of these 6, 2 were cited by newly established farmers.

The individual move plays an important role in the skills-preparation phase, both for the period before 2011 and after 2012. It corresponds to a "trial-and-error" process farmers often associate with the expression "wipe off plasters". It is important to note, however, that this result does not mean that these farmers are hermetic to external MOA or have not relied on any of them, rather that they have personally experienced this period as mainly an individual approach. "I took what could be taken here and there," says a farmer to emphasize that external solicitation was necessary but was experienced as a process of effort emanating from his own will, without outside support. I also observe the significant importance of the individual approach for farmers who converted to OF after 2011. This trend corresponds to some farmers claiming to be independent in their work and / or disinterested in the collective approach due to the disadvantages they

sometimes generate: "*There are farmers who annoy me*" says a farmer by evoking the strong personalities of the group while insinuating its solitary character. Two of them with a long agricultural career behind them (aged 57 and 60, respectively), point out that their experience is substantial enough to use very few external MOA. Other farmers say they have made technical advances on their own due to lack of support from the structures in place. A farmer claims he had to advance by himself because he didn't come "*at the right moment for Bioagri*": this means that at the time of his conversion to OF (in 2015), he considered that technical support from the downstream actors was not in line with his needs. He informed us that the support seemed to him more commercial than technical, which led him to lead the change on his own.

Peer solicitation in the acquisition of initial skills is important. Farmers evoke it during both conversion periods; however, it appears that the nature of the solicitations is quite distinct between the two periods. In fact, farmers who moved to OF before 2011 say they relied on each other and emphasized the role of key support for precursor farmers in OF. The "reference" farmer mentioned above as a MOA for the "recognition" phase, is cited several times for this phase of acquiring initial skills given. He is a technical leader. He is not the only one, because other precursors are quoted (according to the date of farmers' conversion to OF) during the interviews. By asking peers that already produce organically during this phase, the farmer acquires technical skills via a regular contact (telephone) and / or via sporadic informal meetings to take advice, gather the answers he needs before launching the operational implementation of change. For farmers transitioning to OF after 2011, peer solicitation is of a different nature. Firstly, it includes the direct solicitation of the family (farmer's father) in the acquisition of initial skills. In addition, it includes the solicitation of peers from past professional experiences related to agricultural techniques (agricultural mechanics, agricultural work). Finally, it also includes the solicitation of an older family knowledge that also comes from inter-generational exchanges. Two farmers (who grew up on the family farm) cited their parents and grandparents as indirect MOA, saying, "*At that time, they were already running things organically*". The two farmers in question are actually two farmers managing a mixed crop-cattle system, continuing the system of their ancestors. Therefore, farmers say they have been exposed in the past to some technical references of OF (long rotations, hoeing ...) allowing them to quickly understand the OF requirements. Thus, it appears that peer solicitation during the skills preparation-acquisition phase took different forms in both periods: before 2011, farmers seem to have been more proactive in researching and sharing skills, while for the post-2011 period, peer solicitation seems to have been more the result of an unintentional process.

The solicitation of formal arrangements during the skills acquisition sequence took a slightly different form depending on the two periods, but the downstream actors seems to have played a predominant role for the latter two. The downstream actors are cited in particular in the name of a specific technical-salesman having worked for several years in different downstream entities (cooperatives, traders) having OF sectors, in the Limagne territory and beyond. First, farmers converted to OF in 2002 and before do not mention him. This is consistent with our information, since the individual in question took office in 2001 for one of the territory's organic sectors. He is mentioned as a person usually met at the very beginning of the

preparation sequence after the farmer has generally obtained his contact via one of his peers or via bio63 during the recognition phase. Farmers citing him say that they have used his help *"for crop rotation"* meaning that they especially obtained help from him for managing the diversification needed in OF. (Appendice 5, give explanations about the technical-salesman working approach with farmers)

Among the eleven farmers citing the name of the technical-salesman as a MOA during the preparation phase, two profiles seem to emerge. Seven of them consider his support as primary in this phase, while four of them consider it secondary. It is interesting to note that among the four farmers considering him as a secondary mode of access, three cited the desire for autonomy as one of the initial determinants of their conversion to OF (three of a total of six, among all organic farmers surveyed). Also, among these same four, three also consider that they have lived almost every phase of their trajectory of change as a mainly individual process (except during the consolidation phase n°2 for one of them), which indicates their willingness to long-term autonomy. In addition, when I take a closer look at the types of market outlet they use to sell their products, two of them sell less than 20% of their production to organic products traders, one sells them to 40% of its turnover and the last does not work with traders in AB. On average for these four farmers, the sector represents only 17.5% of their outlets. Among the other seven farmers who cited the technical-salesman as a key MOA during the preparation phase, none claim the "desire for autonomy" as an initial cause for their conversion to OF. Of these seven, five sell 64% of their production to organic products traders (knowing that, on average, OF farmers surveyed sell 43% of their product to traders). The other two are currently in their first year of the conversion to OF, so they do not sell their products under the OF label. They cannot be counted in the calculations. It can be seen here that a link can be made between the farmer's "initial will", the nature of the MOA he/she uses during his preparation for change and the way in which he/she manages his/her farm. Especially the way in which he manages his/her marketing channels and therefore the species he / she cultivates.

These data are consistent with the redundancy of some farmers' discourses with regard to the associated, and sometimes criticized, role of the technical-salesman. Indeed, it is clear that many farmers claim they felt cheated at least once when selling a product to a salesman. I have not identified the number, but this is a point that I regularly raise during the interviews, especially when we discuss questions about the relationship they have with their buyer(s) (during the LIFT questionnaire). Two of the farmers who claimed a strong desire for autonomy clearly expressed their distrust of their relations with certain downstream actors. One of them says *"I am starting to trust nobody"* during a meeting between farmers when the issue of buying seeds from the seller (and buyer) is discussed. Another, irritated by a commercial dispute over the purchase and resale price of one of his productions, said on the phone that *"his role [that of the technical salesman] is only to sell."* On the contrary, farmers who have considered the role of technical-salesman as key in their preparation for change seem satisfied with their commercial relations with him, and trust his willingness to support their technical advancement. This is a key point in understanding the role of this MOA. Indeed the technical-commercial aspect of the sector is as much a technical support as a guarantee to have access to seeds and outlets during the change of practices, which tends to satisfy the expectations

of certain farmers. Conversely, for the farmers who considered it as a secondary MOA and claim a strong desire for autonomy seem to have found the initial meeting as a useful but non-fundamental, since they sought to be autonomous in their way of setting up their rotation of crops (and therefore in the purchase of seeds) and in their way of managing their marketing channels.

Finally, during the skills-preparation phase, few farmers cite the role played by more traditional support structures such as the Chambre d'agriculture or bio63. Three farmers cite the Chamber of Agriculture as a key MOA, but these are three mixed crop-cattle farmers. They considered the technical support of the Chamber of Agriculture (Puy-de-Dôme and Brittany) as important especially for the management of forage crops (grazing management, alfalfa and meslin), whose knowledge was then already known and disseminated in the networks in support of farmers. The solicitation of bio63 appears for the period after 2011, but remains low. It concerns in particular two of the three farmers who are currently converting to OF. These two last ones have recently joined (by apparent affinities) the “field crops” group and regularly participate in the visits "bout de champs" organized by bio63. Finally, three farmers mention the participation in a long-term training before their conversion to OF; two by following engineering courses and one by taking passing an adult training course offered by some specific French agricultural arrangements.

To conclude, the acquisition of the initial skills needed to carry out the conversion to OF required many farmers to individually seek different learning process. Farmers who converted to OF before 2011 did it mainly through “trial and error” processes whereas I noted that many farmers who converted to OF after 2011 utilized previous experiences. Moreover, the role of a specific technical-salesman from downstream entities has played an important role for many farmers; especially for the farmers considering his help indispensable for the acquisition of skills and the acquisition of new outlets.

“Preparation - Acquisition of the new outlets necessary to the conversion to organic farming”

The phase of new outlets acquisition corresponds to the solicitation the MOA. Most of farmers solicit external stakeholders, and few of them find new outlets by themselves.

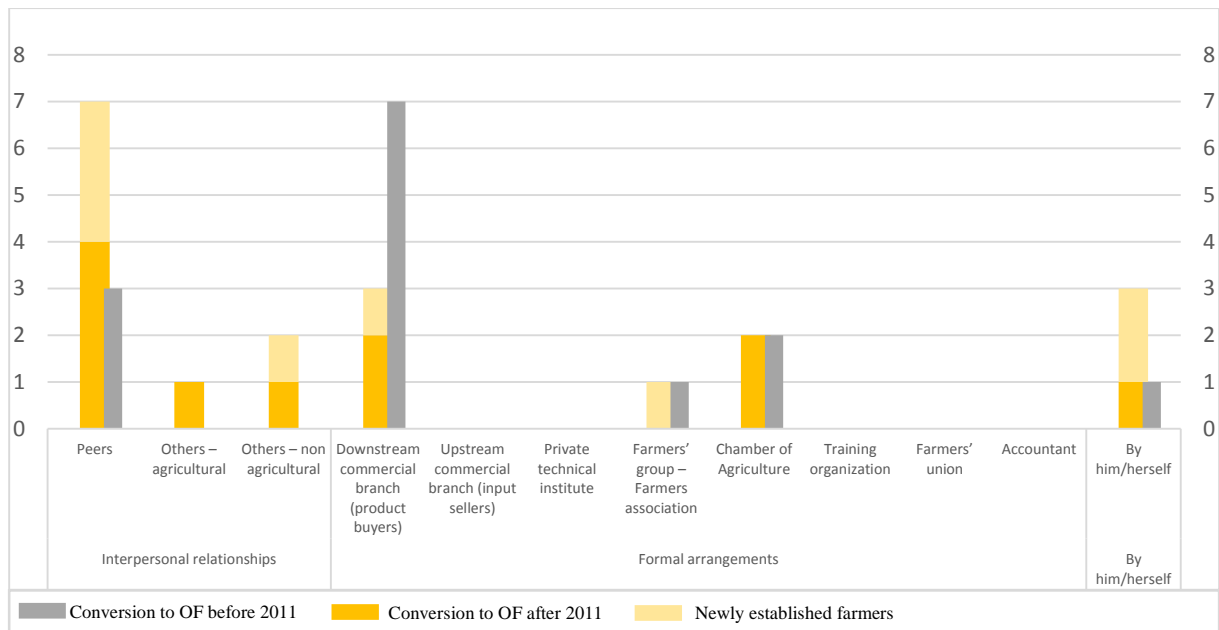


Figure 12: Mode of access used by the farmers converted to OF during the sequence "Preparation-Outlets"

Remember that the MOA used for the acquisition of new outlets correspond to the MOA that made it possible to access the contact of the future buyer.

First of all, I note that 7 of the 10 farmers that had converted to OF before 2011 asked directly (among others) the buyer with whom they were already working or, alternatively, were directly solicited by their buyers to convert to OF. These seven farmers are exclusively grain producers. Three of them converted to OF in the three years following the creation of an OF sector within their cooperative. This is the case of two farmers who were working at the time with the Domagri co-operative which created an OF sector in 1999. The others converted to OF four to eight years after the creation of the OF sector by their former cooperative Thivat (now owned by Axéréals). There is therefore no obvious conclusion to draw on the attractiveness of the creation of an OF sector at this time. Farmers who cited the solicitation of their downstream partners during the post-2011 period are in fact exclusively mixed crop-cattle farmers whose majority of the turnover is made on the sale of milk and / or meat. In this respect, the dairy and beef-meat organic sectors have in fact developed only recently in the Puy-de-Dôme area. It developed around 2010 for the milk, and very recently for the meat. A link between the conversion to OF by these farmers and the development of OF sectors for animal products is still not very obvious but is more observable from the interviews with them than with grain farmers. "[...] and Covid0 had launched its organic sector" explains a cattle farmer who states that the creation of the organic sector was a key determinant in the change. Another evokes "the milk crisis" as an important causal factor in the process of change. Finally, almost all of the cattle farmers surveyed (four out of five) converted to OF after 2009 - the fifth did not sell their cattle, they had their animals boarded for other farmers.

Conversely I note that all of the grain farmers who converted to OF after 2011 (there are 9, not counting the takeovers of organic farms) did not use the commercial structure with which he/she worked to obtain outlet opportunities in OF. All of them were working with the Limagrain cooperative, which still does not

offer any purchase contracts for organic products. These farmers could not rely on the creation of organic product outlets from Limagrain, so they had to find other MOA to access new outlet opportunities, such as soliciting their peers.

The acquisition of new outlets is indeed largely through proactive research, including the solicitation of peer farmers. Ten of the twenty-one farmers surveyed say they had access to at least one of their first business opportunities through the solicitation of a third party. Among them, the solicitation of a peer gave nine of them access to the contact of a merchant; only one quotes access to a transformer. I thus observe in none of the cases, this type of solicitation gave access to cooperative contacts, outlets for direct sales or any contact with farmers for the sale of forage-grain. These types of opportunities are made more accessible by soliciting other MOA. First, solicitations of interpersonal relations, whether or not derived from agriculture, enable farmers to access different types of outlets. The three solicitations of this kind allowed farmers to get access to direct sales outlets (direct to consumers or breeders). Second, I observe that for the four individual access processes gives access all to outlets for direct sales; two of the four also cited access to outlets from a processor (a mill) and a retailer. Finally, the solicitation of the Chamber of Agriculture or bio63 gives access, to all the farmers citing them, to traders and / or cooperatives offering organic product outlets. Thus, different MOA may give access to different types of outlet opportunities.

Finally, I want to emphasize that the access to new outlet opportunities is associated in my analysis with the preparation phase, but as stated above, it is a resource often acquired during the recognition phase. In fact, six of the ten farmers citing peer solicitation mention access to markets during their recognition phase. It is also during their recognition phase that farmers reach outlets through the Chamber of Agriculture or bio63.

In conclusion, accessing the outlet necessary for supporting the conversion to OF takes different forms over time. Many farmers converting to OF before 2011 accessed their outlet thanks to their previous downstream partners whereas the farmers of the post-2011 period accessed them mainly thanks to interpersonal relationships, given that Limagrain isn't offering any organic outlet opportunities.

“Implementation” of organic farming practices

The implementation of OF techniques is a practical endeavor. Farmers do implement change by themselves, but they may be supported by some stakeholders.

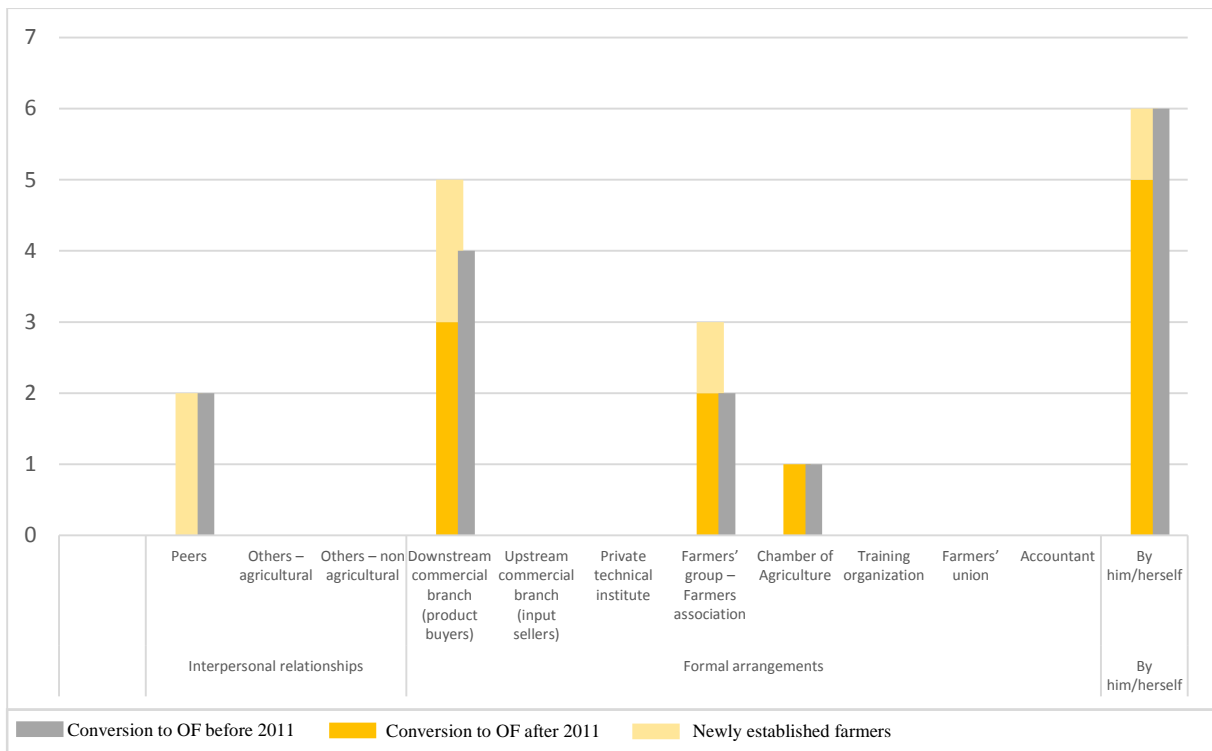


Figure 13: Mode of access used by the farmers who converted to OF during the sequence "Implementation"

First, there is less diversity in the MOA used during this phase. The farmers "got started". It is no longer a question of multiplying opinions, of gathering a maximum of resources, but this is an operational implementation. Thus, during this phase, we observe a weak and / or at least targeted interaction with external MOA.

12 of the 21 farmers surveyed say this phase was an individual initiative. Of these, eight claim to have experienced this phase exclusively by themselves. This is the case of four farmers who converted to OF before 2011 who underline for each of them the lack of real technical support during this period. Note also that among these four, three claim the desire for autonomy as the initial cause of their conversion to OF. For the post-2011 period, four farmers who implemented OF practices claim to be very professionally independent in general. They all mention this independence during the preparation phase. As mentioned above, this independence is the result of three different attributes. Two of the four farmers say they rely on their long experience in agriculture to implement practices. Two affirm their individual personality and their dislike of too many outside interactions - "*in organic we know the main lines*" affirms one of them to underline the repetitive aspect of the days of technical sharing between farmers. Finally, I wish to underline that among the twelve farmers emphasizing their individual approach during this phase, we find the four mixed crops-cattle farmers.

Farmers citing the facilitation from the downstream actors (i.e. technical salesmen) during the implementation to OF is a significant result. Of the four farmers who converted to OF before 2011, three point out a particularly close relationship with the technical salesman mentioned previously (see previous section). His solicitation during this period corresponds to the extension of work carried out during the preparation phase (and which in fact continues for the three farmers for their consolidation phase). It

indicates a relationship of trust. It is interesting to note that at the moment of the implementation, the four farmers in question mainly trade with the cooperative for which the sales technician works. Among the farmers who implemented OF practices post-2011, two cite the importance of technical salesman, but they also mention the importance of the person who replaced him. The latter retired in 2015 but still accompanies, in an official way (providing services directly or under the aegis of the Bioagri trader) and unofficially, some farmers. Two farmers (in mixed crop-cattle system) cite the solicitation of downstream actors to support the establishment of alfalfa in their rotations. Note that the two farmers soliciting the Chamber of Agriculture during this phase also sought support for the establishment of forage crops such as alfalfa (but also for the establishment of meshes).

Furthermore, for the two periods of conversion to OF, bio63 is quoted a significant number of times. I note that it is during this phase of establishment that bio63 is quoted for the first time as a technical support resource among the farmers who converted to OF before 2011. In fact bio63 is mentioned by farmers who converted late in the period before 2011 (respectively in 2009 and 2011 for the two farmers who mention soliciting bio63) showing the increasing role of bio63 over time. In addition, I can highlight another significant fact: the solicitation of bio63 during this phase is constantly cited alongside the solicitation of the technical salesman. "*Technician's name' was always there at the group meetings,*" says a farmer. This fact highlights the existing collaboration between the commercial entities and bio63.

Finally, the solicitation of peers during this sequence is quite weak. This interaction is of two natures. It is, for the two farmers converted before 2011, the extension of a joint work with the farmer reference in OF of the territory, and that since the phase of recognition. For the two recently established farmers (in OF), this interaction is the result of joint work with their farm partners.

In conclusion, the implementation of OF is mainly an individual process. Still some farmers having close relationships with external actors tend to rely on them to receive continuous support during the implementation.

"Consolidation" of practices

This part of the results is meant to capture the different MOA that farmers have solicited during their consolidation phase. However, given the lack of significant differences with the previous sequence "implementation", I chose to focus only on the analysis of observable differences between the phase 1 and phase 2 of the farmers who converted before 2011 (see note ⁽¹⁾, page 24). Essentially, I examine if there was a change in the MOA used by farmers before (phase 1) and after 2011 (phase 2).

- Phase 1 -

The nature of MOA solicited during consolidation phase 1 is very close to those requested during the implementation phase. It is always a phase of operational management when change is carried out. The MOA used do not tend to change radically. The farmer takes his habits in terms of crop management and generally continues to the MOA he/she considered key in previous phases.

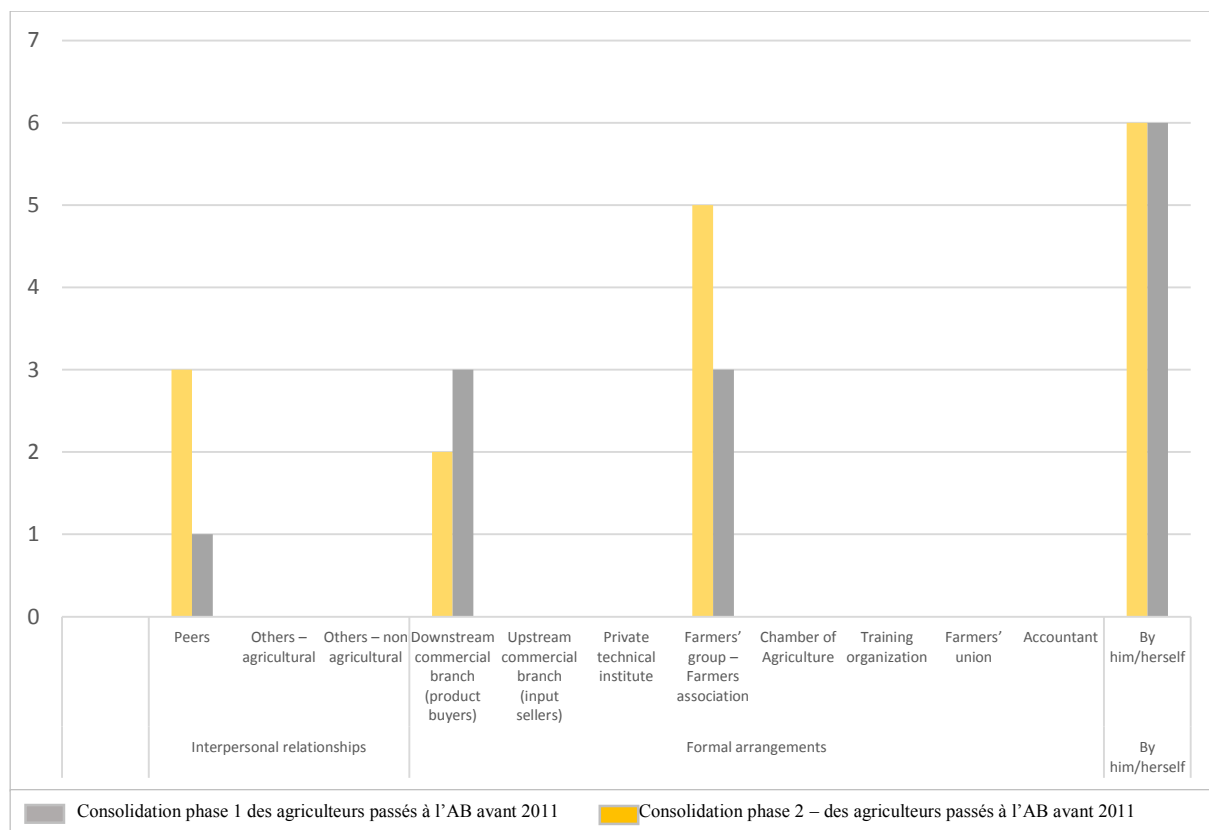


Figure 14: Modes of access used during the sequence "Consolidation 1 and 2 for farmers who converted to OF before 2011"

Reading: "Among the 10 farmers who moved to the AB before 2011, the solicitation of a peer during consolidation-1 was mentioned once. During consolidation-2, the solicitation of a peer was cited three times.

Two main evolutions emerge. First, among the ten farmers, five mention bio63 as key MOA for the consolidation phase after 2011, compared to three before 2011. During the interviews, several farmers note a significant evolution of bio63 in the support provided by the association since 2011. This echoes to the event farmers mentioned as a key switch in the farmers group dynamics (see Methods section). This switch was the results of farmers' participation to a common training, which revitalized group dynamics.

When looking at how these details have evolved before and after 2011, there has been a slight increase in the solicitation of peers. This increase is linked in part to the increase in the solicitation of bio63, which allows some farmers to get to know each other better and potentially to work together outside the formal setting of meetings facilitated by bio63.

3.3 Modes of access used by farmers who have implemented Conservation Agriculture practices

The MOA used by farmers who have implemented conservation agriculture techniques are less diverse than for farmers converting to OF. Their limited number enabled me to gather them in on single graph (see table 15). In addition the associated process to each solicitation from SCA farmers is usually of a different nature compared to the solicitation process carried by organic farmers. Please note that there is a missing

bar “Preparation-outlet”. This is due to the fact that farmers practicing SCA techniques did not change their outlet to carry out change.

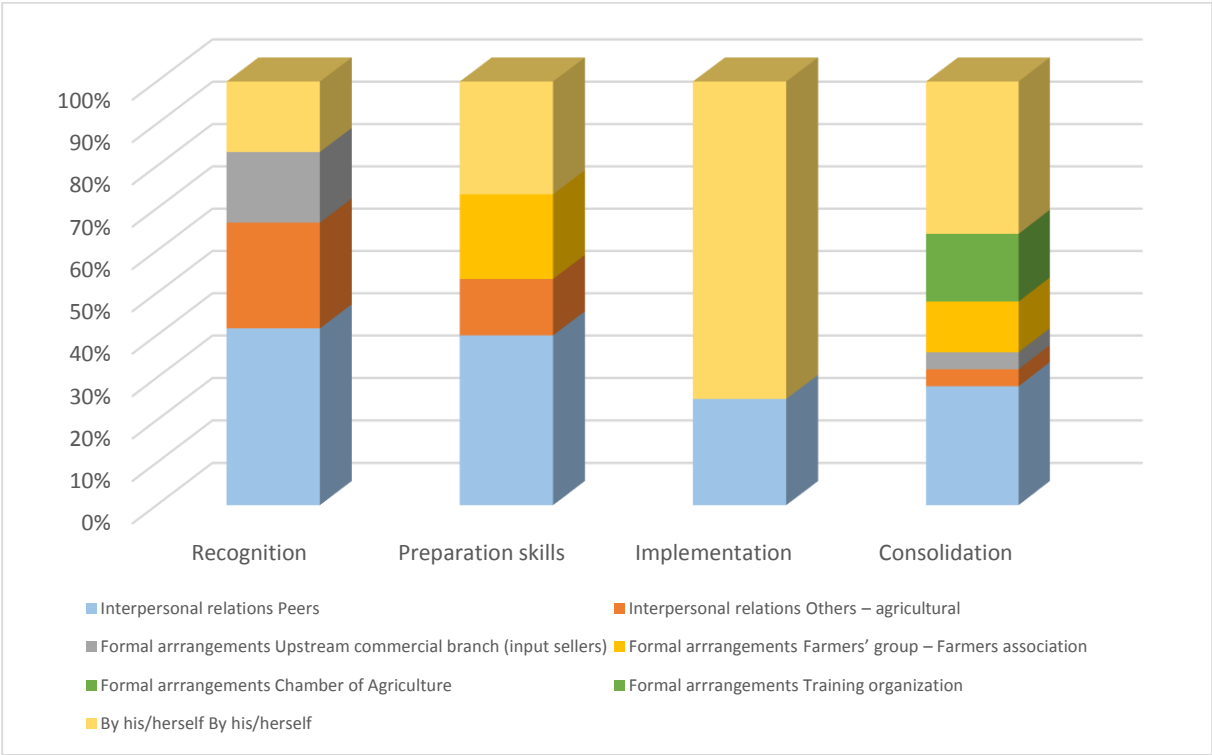


Figure 15: Modes of access used by farmers who implemented conservation agriculture techniques during each sequence of farmers' trajectory

3.3.1 Recognition phase

Farmers’ recognition of SCA techniques refers to a very different process in comparison to the recognition of OF practices. This solicitation occurs usually by chance and the first steps of the farmer are of discovery nature. The farmer hears about conservation agriculture without ever having heard of it in the past (unlike OF, which is generally known, at least schematically, by farmers). This phase of discovery echoes the analysis of sequence chains: the recognition phase acts as a trigger for change - the discovery of the agronomic principles of soil conservation sounds like an obvious gain. "And there, I realized" says a farmer commenting the discovery of the SCA techniques.

This discovery happens through the solicitation of different MOA. Two farmers mention having already been looking for technical solutions on their own. They were facing a serious issue (erosion, disgust for chemical products) pushing them to look for solution by themselves. After some research, they came across the SCA techniques. Otherwise, a third of the farmers who have implemented SCA techniques are going through their recognition phase by meeting a peer who already practices SCA. The meeting occurs often during trips (personal or professional) as farmers meet other farmers using the techniques of the SCA. Two farmers mentioned that they discovered SCA techniques while travelling abroad (Argentina, Brazil) and one says having travelled to Australia to deepen his knowledge after discovering SCA by himself. Other farmers highlight their chance the encounter a person from the agricultural world who already had some

knowledge about SCA. They met a technician, a researcher or a student who makes them discover the techniques, suggest readings, and sometimes accompanies them in the implementation of tests.

Finally, two farmers say they first heard of SCA during a commercial solicitation (upstream actor) for the purchase of fertilizer and / or amendments - the two companies are located outside the territory of Auvergne (Western France region). Following this meeting, the two farmers are invited by the salesman to meet a recognized farmer in the field of SCA, Frederic Thomas (editor of the agricultural magazine "TCS" for *Simplified Cultivation Techniques*).

Thus, the recognition sequence sounds, for all the farmers interviewed, as a fortuitous discovery unlike the recognition phase experiences by farmers who converted to OF.

3.3.2 Preparation-skills

The sequence of preparation of farmers who have implemented SCA techniques only concerns the process of skill acquisition. The acquisition of skills is done for the vast majority of them via the solicitation of a peer. This solicitation is of a more or less formal nature, depending on whether the farmer has passed through an identified network or whether he is in direct contact with a farmer in the network in question. Thus, for two of the farmers interviewed, the solicitation is made at the invitation of the salesman of which I mentioned previously. For the others, the solicitation of peers is following a training conducted by the network of farmers called BASE (Biodiversity, Farmer, Soils and Environment) located in Brittany. Finally, other farmers do not openly mention the network but cite farmers or technicians (that I considered of "other-agricultural" nature) identified as belonging to the network: Frédéric Thomas, Hubert Charpentier, Konrad Schreiber (former farmer). I should underline that the vast majority of farmers who are solicited by the farmers I interviewed have their farms located outside Limagne. Thus, given the lack of locally-based support, some farmers claim having experienced the preparation by themselves, passing again through readings and the establishment of tests. Finally, I would like to note that farmers have continually stressed the lack of support from the cooperative to which they belong (Limagrain) during this phase of acquiring the initial skills needed to change practices. I therefore observe a deep gap of support provided by the downstream actors between the preparation of OF conversion and the preparation towards SCA techniques implementation.

3.3.3 Implementation of SCA techniques

The sequence of implementation is a phase experienced individually by all farmers. This is a phase whose duration is not easily identifiable given the iterative nature of the implementation of these techniques. As farmers all point out, it is the techniques of the SCA that require them to adapt to the nature of their soil, and the reactivity of the latter, following the introduction of new SCA practices. Given the fact that they are usually best placed to know their soils and to observe the reactions, it seems logical that this sequence is mainly experienced by the farmers themselves. Three farmers mention in parallel their individual work, a work done jointly with another farmer who supports them in setting up new techniques. The latter is

usually a peer located nearby who also practices SCA techniques. He/she can then discuss practices face-to-face with this person. Other times, these types of exchanges are done with a remote farmer (telephone contact). For these two situations, farmers seem to share a friendly relationship and seek to develop their expertise together.

3.3.4 Consolidation phase

The consolidation sequence for farmers implementing SCA techniques is a phase whose beginning and end are difficult to identify, since the introduction of new practices and tests is usually irregular and iterative. However, following the implementation of specific practices and their basis, farmers search for deeper learnings and therefore solicit third parties. The role of peers and participation in the BASE farmers' network trainings are still cited as an important means of access to strengthen their farming techniques. In parallel, what I observe quite clearly the emergence of the role of the Chamber of Agriculture, cited by four farmers. The mobilization of this MOA is done through the participation in trainings / meetings organized by the Chamber around themes related to the principles of the SCA: management of crops auxiliaries, optimization of fertilization, setting up of cover crops and intercropping. This is a completely new role for the Chamber of Agriculture according to the farmers. I also participated in a meeting aimed at co-developing with farmers experimental protocols for the establishment of rapeseed and leguminous intercropping. This meeting was the first of its kind and for the first time the company Limagrain-Europe was invited to provide seed to farmers in order to carry out their tests (the company seeking to have its hybrid seeds tested by the same occasion).

To conclude, it seems that the trajectory of farmers implementing SCA techniques is quite different from the one experienced by OF. Some MOA are similar, but the ones used by SCA farmers are in limited number showing in some ways the weakness of the networks accompanying SCA farmers. Also, the process associated to the solicitation of the MOA are very different and tend to show that implementing SCA requires mainly from farmers to be autonomous.

4. Discussion

The work I have done is intended to be a continuation of the studies that seek to understand why some farmers have managed to make changes in their farming practices, while others have engaged in very few, if any. The goals were especially to understand better the individual trajectory of farmers by having a closer look at the third parties and institutions they solicit to bring about change. My results showed the diversity of the modes of access (MOA) that farmers use throughout their trajectory. They also showed that farmers use different MOA depending on the stages of their trajectory change. Finally, the third hypothesis I made was also verified: farmers use different MOA depending on the type of practice change they implement. The approach of my work, enabled to capture individual trajectories of farmers through an eminently collective angle. Cross-analysis of the individual trajectories and the solicited MOA makes it possible to

observe certain trends in the evolution of how changes in practices are facilitated and to provide a more holistic view of the support network in the territory of Limagne.

4.1 Accompanying the conversion to organic farming: recent emergence of an inclusive network in Limagne

Organic Farming is an alternative agriculture that presents a singular particularity: farmers say they know OF, at least conceptually, before even considering it as an option. They have heard about it, know some general principles or usually know another farmer who is already producing under the principles of OF. This is a very important initial point in my view as this largely influences the trajectory of farmers converting to OF. In comparison with SCA techniques which appeared to farmers as a discovery, OF is a concrete and observable alternative on the territory. As I pointed out, during their recognition phase, farmers who have converted to OF solicit, for the vast majority of them, another farmer in order to obtain reference points in technical and commercial areas. This observation phase, if it is positive for the farmer, plays a dual role: that of giving the farmer access to certain resources necessary for change (insights, reference frames) but also that of introducing the farmer into the wide community of OF producers. This community is in motion: it is not a static structure in which the farmer enters according to certain criteria and no longer comes out. The farmer enters through a complex process that Wenger (2010) associates with a learning process. In this work, Wenger (2010) highlights the production of a social structure through this learning process. According to him, "a community emerges when participants define [...] a set of criteria and expectations by which they recognize their appurtenance to the group." The first steps that the farmer makes towards OF (Recognition phase) and in particular, the first OF farm visits that he conducts, are moments where the farmer submits these expectations (technical but also socio-economic) to the reality organic farming. During this visit, the farmer understands what it means to be an organic farmer. He is from that point in contact with the community via a peer and can potentially envision a commitment thereafter. Finally, he now has access to resources accumulated by the OF community (knowledge, ways of transforming a farm system, etc.). In the words of Wenger (2010), the farmer has entered at this moment the "skills regime" of the "community of practice".

This entry, even partial and sometimes difficult for some farmers whose approach is largely individual, is a way for farmers to consider later meeting with other farmers and actors in OF. These meetings will allow them to multiply the possible means of access for the accession to other resources necessary for their change of practices.

Our results permit us to perceive different dynamics within the OF community over time in Limagne. The farmers group who converted before 2011 does not show strong interlinking. Farmers interact with each other, especially bilaterally, without there being any real collective cohesion within the community. In addition, the downstream actors, which I include in the wider community of OF, play a key role, but it appears that the support provided by the technical-salesman is also done exclusively bilaterally. There does

not seem to be any unifying actor of the OF community. Farmers who converted to OF before 2011, although they interact with each other, seem quite isolated during the first part of their trajectory.

After 2011, the dynamics of the OF network change little on paper. My results show that the actors involved remain largely the same: the evolution of the MOA solicited does not reveal a significant difference between the two periods. Only the in-depth reading of my results and the explanation of the processes of solicitations make it possible to identify an evolution in the dynamics of the OF community of the territory. To this end, bio63, the departmental support structure of the OF, increasingly plays a unifying role. As I explained in the results, a group of organic grain farmers emerged from a training workshop led by a researcher from VetAgroSup. This training allowed the organic farmers of the territory to meet more regularly, and create a mutually beneficial group dynamic. Following this, farmers wanted to continue their momentum by solidifying the group "field crops" led by bio63. The creation of a full-time position for the management of the group followed by the creation of a GIEE and the accession to Ecophyto30000 funding have kept the group dynamic running until today. This evolution has allowed in recent years to create regular interactions between OF farmers but also with farmers considering the conversion to OF. As for Goulet and Chiffolleau (2006) in the case of farmers setting up SCA techniques, I have identified a sociotechnical network now structured around OF in Limagne. This network, in which bio63 plays a central role today as a facilitator, involves farmers as well as downstream actors. I was particularly surprised by the presence of the company Bioagri (organic products trader) during a group-day in the fields. This is normal practice according to the bio63 technician who considers the importance of "*working hand-in-hand*" with downstream stakeholders. In some ways, these invitations are an attempts to define a "community of practices" in a wide perspective.

We therefore see the emergence of a farmers' circle, which, although small, shows a strong dynamism. This circle broadens its working themes: accounting, marketing strategy, and tries to be as inclusive as possible with outside farmers. A day organized between the Dephy group, the Chamber of Agriculture, the GIEE, and led by bio63 reflected this inclusive dynamic. In addition, the downstream actors seem close to the farmers for addressing their challenges and are now well established. Bio63 has just recruited another technician to support the transition to OF in the territory. The willingness of actors to engage in a "community of practices," unifying together a large number of diverse stakeholders, suggests the initial phase to a wider diffusion of OF practices on the territory. Nevertheless, there are still relevant reservations to be had about the diffusion potential of the OF in Limagne; there are limitations as long as the parapublic structures, like the Chamber of Agriculture, and the dominant cooperative of the territory, Limagrain, continue to avoid playing a driving role in the diffusion of OF practices in Limagne.

4.2 The absence of a local network in the accompaniment and dissemination of the conservation agriculture techniques

The study of networks supporting the establishment and dissemination of SCA practices has already been conducted at the level of certain territories. Goulet & Chiffolleau (2006) have notably raised, in their work

carried out in France, the existence of structured socio-technical networks in the accompaniment and dissemination of these practices.

My results are indicative of the past and nowadays residual existence of such a network in Limagne. The majority of farmers led the implementation of the SCA techniques by themselves despite some bilateral solidarity between farmers. The slow diffusion of practices in Limagne has largely been dependent on the importation of technical references and principles of SCA from other French territories but also and especially from other territories abroad: from Argentina, Brazil, and Australia in particular. The most local network that seems to have most widely supported the diffusion of SCA in Limagne comes from the Breton association BASE (Biodiversity, Agriculture, Soils and Environment) which gathers (or at least gathered) the precursors and iconic personalities of the SCA: Frederic Thomas, Konrad Schreiber, Christian Abadie etc. The role of these personalities in the diffusion of SCA techniques in Limagne is quite evident. All the farmers I met mention at least one of their names. At the beginning of their trajectory, they were nearly all of them exposed to evidence that a change in their practices was needed, that the way they did their job was no longer the right one. They usually realized their tillage practices or their use of chemical products was too detrimental. In a symmetrical way, they seem to have stumbled upon the evidence that SCA practices were the best way to improve their production system. "*And there I realized*" reflected one of the farmers interviewed. This process echoes to the diffusion of "innovation by withdrawal". In that matter, promoters of SCA have developed an effective methodology for the dissemination of the practices. They base their argumentation precisely on farmers' willingness to withdraw from their previous practices, while proposing a concrete alternative to their problems. This approach is very well illustrated by the work of (Goulet and Vinck, 2012) highlighting the principle of innovation "by withdrawal" in the implementation of SCA techniques.

This innovation dynamic "by withdrawal" through the implementation of SCA techniques is today not a generalized process in Limagne, especially considering the fact that the farmers of the Limagrain cooperative are still today doing very well from an economic point of view. This tends to place farmers who have implemented SCA techniques in a situation of particularly strong isolation on a technical level. Note that despite the emergence of a working group within the Limagrain cooperative whose aim is to disseminate some SCA practices and the evolution of some specifications (authorizing the practices of no-plowing on the culture of maize seeds in particular), farmers insist on the lack of credible support coming from the cooperative.

4.3 The structural presence of Limagrain at the center of the dynamics of environmental-friendly practices in Limagne

It must be emphasized that 80% of Limagne farmlands produce crops managed downstream by the cooperative Limagrain. Cultures have high potential in terms of added value which, according to the farmers and experts I met, strongly limit the farmers' willingness to consider a profound change in their practices. Limagrain currently offers no commercial opportunity to its farmers so they can consider a move

to OF. Beyond the eminently ideological conflict and the foresight, claimed by farmers, of drastic reduction of agricultural yields with a generalized transition to the OF, the diversification needed during the establishment of the OF techniques remains the biggest obstacle to its diffusion in Limagne. The cultivation and sale of maize seeds, as well as the production of processed products from existing industrial devices, present margins today allowing the company and the farmers to prosper economically. It appears that the establishment of new crops in the classic rotations of Limagrains co-operators would require the company to manage a broader product portfolio that is, in fact, less profitable. According to the former President of Limagrains that I interviewed, this diversification would jeopardize the profitability of the industrial devices of the company, today exposed to international competition.

On the other hand, conservation agriculture has interesting characteristics and its diffusion potential seems much more important than that of OF. Indeed, the techniques associated with this agriculture do not reverse the rotation of farmland, which would allow Limagrains to maintain specialization of cultivations within the territory. Moreover, all the farmers I interviewed using SCA techniques were all producers for Limagrains. One of them clearly told me that they had been tempted by SCA practices because "*they did need [him] to change everything*" in terms of farming operations.

Still, implementing SCA techniques requires an effort from farmers, especially in the acquisition of new resources: namely skills, machinery and cover crop seeds. Thus, given their still economically viable business model, I doubt that the Limagrains farmers would promote the diffusion of SCA practices in Limagne as long as they are not incentivized. Only the farmers facing a dead-end, pushing them to innovate "by withdrawal", have now changed their practices (both towards SCA and OF). This state of immobility in environmental-friendly practices diffusion will not change until farmers really face irreparable issues in production or demonstrate willingness for more autonomy in farming operations. These findings echo the analysis made by Meynard et al., (2013, 2017), who highlight that the major obstacle to the diffusion of more environmental-friendly practices remains today the lack of opportunities offered by the downstream actors to farmers, especially in diversifying their crop rotation which is a fundamental principle when envisioning more ecological farming systems.

5. Limits and perspective of the study

The work I carried out shows several limits. Some are inherent to study conditions. It would have been for example interesting to acquire a wider sample and especially to carry out more interviews with farmers who implemented SCA techniques so as to get an equal sample to that of organic farmers. Some others are related to the methodological framework I designed. Indeed, the practice change analysis I conducted required that I narrowed down and simplified certain aspects of farmers' pathways in order to obtain a satisfactory analytical framework adequate for comparisons across categories. This approach has tended to suppress or obscure some significant information that is not reflected in my work. However, I think have a dataset to deepen and complicate the analysis of change trajectories.

5.1 Distinguish the sequences from each other

During the process of identifying farmers' typical trajectories, I notably worked on distinguishing sequences from each other. This is a particularly important approach in research studies seeking to analyze the processes of change of practice (Sutherland et al., 2012, Cloutier, 2014). Only my approach is strictly linear, which does not allow to perceive the recurring superimposition of the sequences, nor their possible redundancy. Indeed, I have developed the names of the sequences and have associated a substance by relying heavily on the desire to conduct change analysis practices as one or two major changes. This is quite applicable for the conversion to OF, which represents a radical change for the farmer, but seems quite questionable for the establishment of the SCA techniques. I believe that a change in practices, even in the case of a conversion to OF, remains an iterative, back-and-forth process, which requires farmers to "*implement various technical practices and continuous adaptation to the political, social and economic context*" (Chantre et al., 2015). Thus, it was particularly difficult for me to carry out the analysis of the sequence "Consolidation", which remains a rather vague sequence that induces many more changes than I have highlighted in my work. I have considered this sequence in a linear way by spreading it over the rest of the farmer's trajectory after the implementation sequence. However, in my opinion, the Consolidation phase induces a large number of potential practice changes and resources acquisition processes. But these changes therefore require the farmer to discover them during another "recognition" phase, and that he/she again conducts new learning, leading to new Preparation phases. I think it would be interesting to carry out a less linear analysis of trajectory trajectories, taking into account the diversity of changes that the farmer experiences, even after the "main" ones. A methodological framework for a circular analysis of change, as conceptualized by Sutherland et al. (2012) in his work, could lead to an even more dynamic analysis of changes in practice. In order to distinguish the nature of the changes in question and their degree of importance, it seems to me that the ESR framework developed by Hill & MacRae (1996) would be a good support. Broadening the analysis through non-technical dimensions, as I have attempted to do with the analysis of access to new outlets, would also be an interesting approach in my opinion. It would make it possible to analyse the process of changing practices in a comprehensive way as envisioned by the agroecology approach. For this purpose I consider the conceptual framework of Théron et al. (2017) as an interesting entry point considering their combined analysis of technical approaches with territorial anchor dimensions and business strategy.

5.2 Opacity of the processes of accession to the resources necessary for change

Another aspect of my work that could be deepened, and which is consistent with the previous remarks, is the analysis of the processes of access to the resources necessary for change. During the iterative process of my analytical framework design, I decided to associate a type of resources with each of the sequences of the trajectory. For many sequences experienced by farmers, this association works quite well, but it appears that for some, this association disagrees with the facts. The example of accessing the skills needed for change is indicative of the limitations of my analytical framework. This process is actually a continuous

process for the farmer, who as I said in the previous part, experiences the change in a dynamic and iterative way. Thus, it is possible that the farmer can access the skills necessary for change both in the recognition phase, during a thorough visit of the OF system of a peer for example, as in the implementation of the change or even during the consolidation phase. This "volatility" of the "skills" resource has led us to focus, for the sequence analysis, on the accession of "initial" skills, and in the case of business opportunities, to the accession of new outlets. This choice was made while being aware that the accession to skills and outlet is not limited to a fixed time in time because these resources are constantly evolving. I would be curious to explore these aspects by looking at all the processes of access to resources necessary for the plurality of changes experienced by farmers throughout out their entire trajectory.

Furthermore, the identification of the MOA associated with the sequences has likewise been simplified. In this work, I focused on identifying the last link in the "relational chain" as suggested by the analytical framework developed by Grossetti et al. (2011). In other words, I have tried to identify the actors who give access to the resources needed for change without looking at the access methods used by the farmer so that he can solicit the actor. The solicitation of a technician during the preparation phase is a good example. The farmer solicits a technician to acquire skills but he/she also solicits a person or institution before that which allowed him/her to access the technician's contact. I have not taken a closer look to these "relational chains" even though they show interesting improvements for the methodological framework.

6. Conclusion

My work aligns with socio-economic studies that seek to understand why and how some farmers engage in a major change in their production system while others are still making few, if none.

My methodological approach, seeking to understand the role of third parties in supporting farmer practice changes, has various interests. First of all, it helps identify the actors involved in the support of the change in practices and to evaluate their level of commitment. Then, it makes it possible to perceive, with the help of a chronological comparison, the evolution of the role of these accompanying networks. This is my principle tool for the comparison that I have made between phases of the organic farming network in Limagne. Finally, thanks to a comparative analysis of the trajectories of farmers who converted to organic farming (with the one of farmers practicing conservation agriculture techniques), I was able to observe that these changes in practice are supported differently and by different stakeholders. In Limagne, I found that support networks have been strengthened in recent years for OF; a real unifying sociotechnical network now exists for any farmer wanting to set up OF in Limagne. Conversely, the support networks in the implementation of conservation agriculture techniques are now residual despite, in my opinion, a strong potential for their dissemination in Limagne. The structural presence of the cooperative and multinational company Limagrain suggests that the cultural specialization of the territory faces strong inertia, leaving no opportunity for farmers to diversify their production. In such a context, only slow and gradual changes of

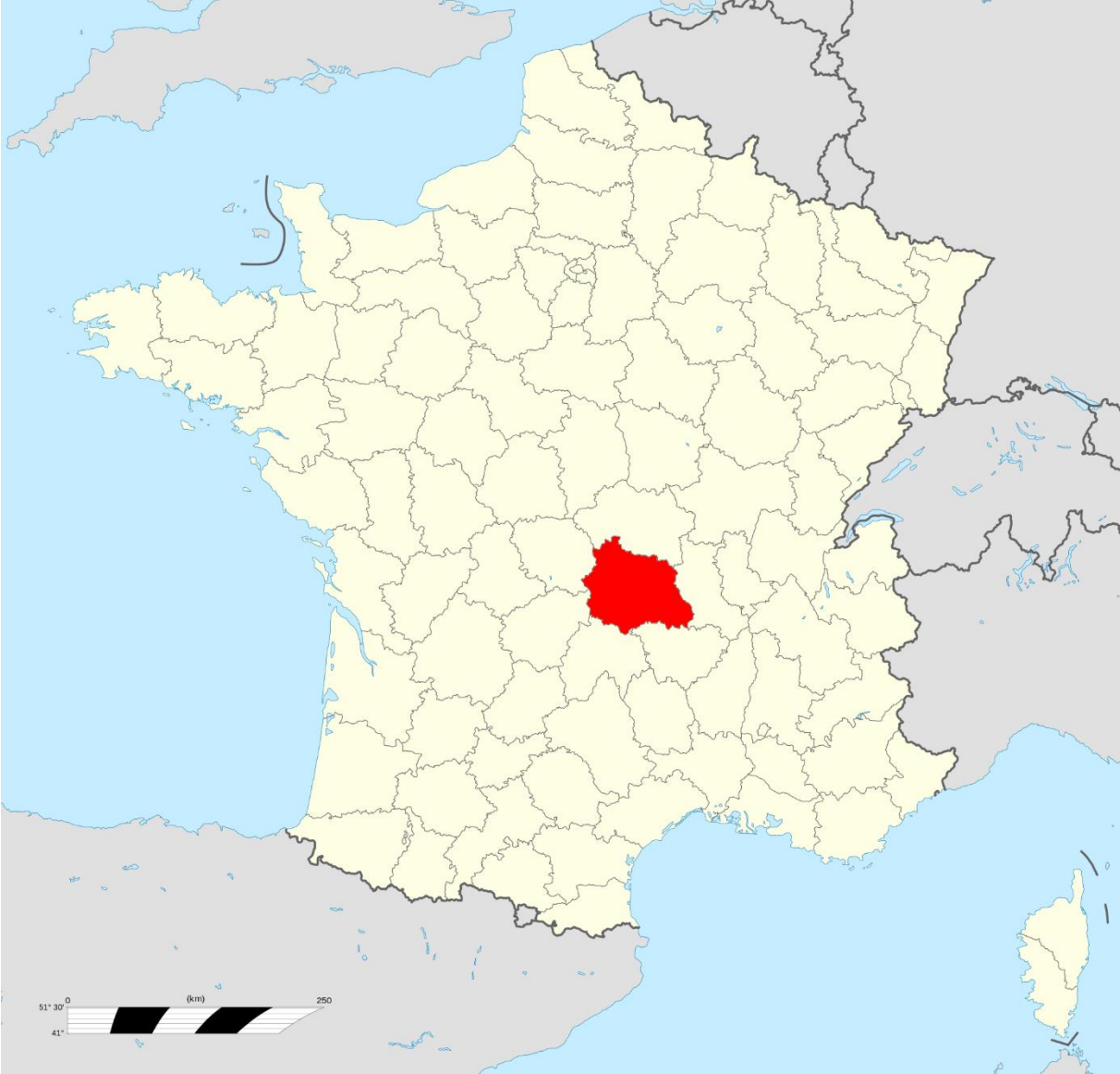
practices seem conceivable for a large part of agricultural land in Limagne. Only real support, incentives or constraints emerging from Limagrain could, in present context, facilitate the widespread dissemination of environmental-friendly practices.

References

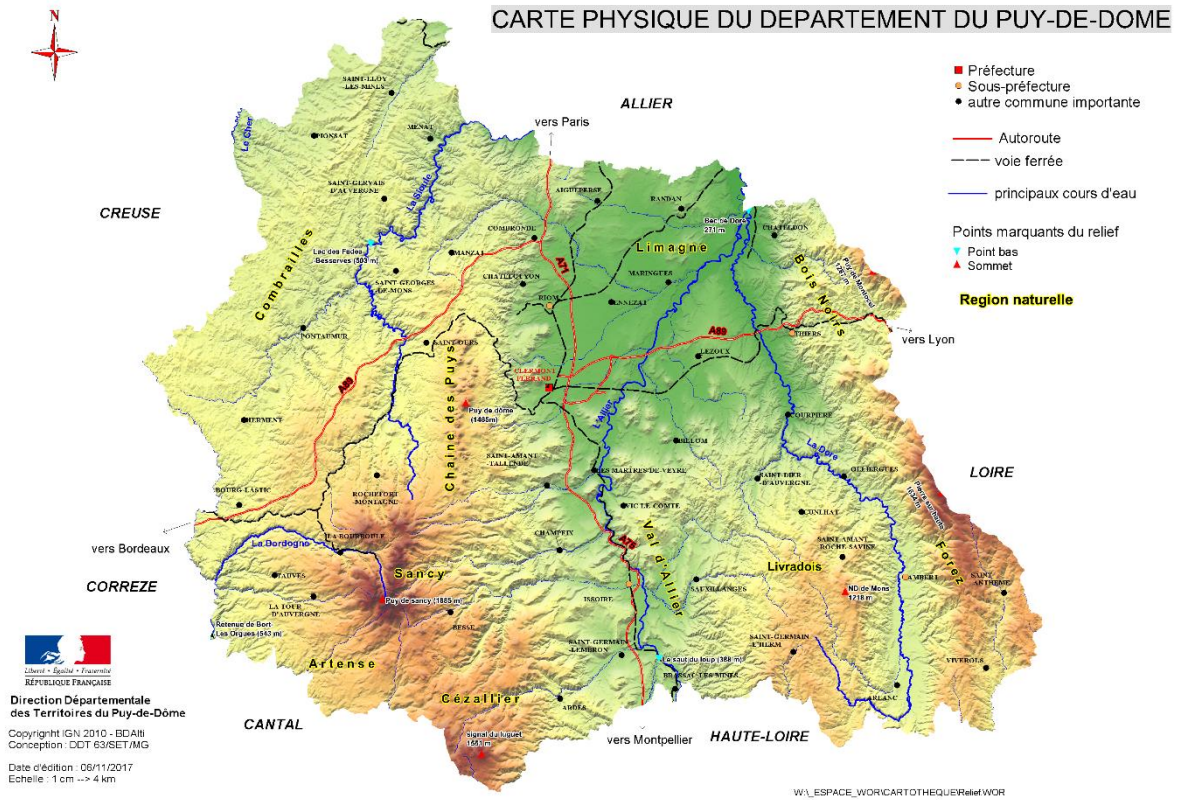
- Agreste, 2018. Portait agricole des Territoires - Auvergne Rhône-Alpes [WWW Document]. URL http://agreste.agriculture.gouv.fr/IMG/pdf/R8418A16v2.pdf?fbclid=IwAR1WKVe7VE6JXI_LkoO304riM8qL0lptHWJ6PxuAlh14xk84aHyX_2gfPWQ
- Bellon, S., Perrot, N., Navarrete, M., Fauriel, J., Lamine, C., 2007. Converting to organic horticulture as socio-technical trajectories. Presented at the 22. Congress of the European Society for Rural Sociology : Mobilities, Vulnerabilities and Sustainabilities: new questions and challenges for rural Europe.. 2007-08-202007-08-24, Wageningen, NLD.
- Chantre, E., Cardona, A., 2014. Trajectories of French Field Crop Farmers Moving Toward Sustainable Farming Practices: Change, Learning, and Links with the Advisory Services. *Agroecol. Sustain. Food Syst.* 38, 573–602. <https://doi.org/10.1080/21683565.2013.876483>
- Chantre, E., Cerf, M., Le Bail, M., 2015. Transitional pathways towards input reduction on French field crop farms. *Int. J. Agric. Sustain.* 13, 69–86. <https://doi.org/10.1080/14735903.2014.945316>
- Cloutier, L., 2014. La fabrique d'une invention : parcours d'inventrices/inventeurs autonomes en France et au Québec.
- Compagnone, C., 2014. Les viticulteurs bourguignons et le respect de l'environnement: Réseaux de dialogues professionnels et dynamiques de changement. *Rev. Fr. Sociol.* 55, 319. <https://doi.org/10.3917/rfs.552.0319>
- Compagnone, C., Petit, S., Lémery, B., 2008. A new role of mediator for extension services: a challenge for the chambers of agriculture in France 8.
- Darré, J.-P., Le Guen, R., Lemery, B., 1989. Changement technique et structure professionnelle locale en agriculture. *Économie Rurale* 192, 115–122. <https://doi.org/10.3406/ecoru.1989.4004>
- Derbez, F., 2018. D'un maïs, l'autre: Enquête sur l'expérimentation collective d'agriculteurs rhône-alpins autour de variétés de maïs population. *Rev. Anthropol. Connais.* 12,2, 259. <https://doi.org/10.3917/rac.039.0259>
- Dupré, M., Michels, T., Le Gal, P.-Y., 2017. Diverse dynamics in agroecological transitions on fruit tree farms. *Eur. J. Agron.* 90, 23–33. <https://doi.org/10.1016/j.eja.2017.07.002>
- Fairweather, J.R., 1999. Understanding how farmers choose between organic and conventional production: Results from New Zealand and policy implications. *Agric. Hum. Values* 16, 51–63. <https://doi.org/10.1023/A:1007522819471>
- Faure, G., Compagnone, C., 2011. Les transformations du conseil face à une nouvelle agriculture. *Cah. Agric.* 20, 321-326 (1). <https://doi.org/10.1684/agr.2011.0523>
- Field, C.B., Barros, V.R., Intergovernmental Panel on Climate Change (Eds.), 2014. Climate change 2014: impacts, adaptation, and vulnerability: Working Group II contribution to the fifth assessment report of the Intergovernmental Panel on Climate Change. Cambridge University Press, New York, NY.
- Francis, C., Lieblein, G., Gliessman, S., Breland, T.A., Creamer, N., Harwood, R., Salomonsson, L., Helenius, J., Rickerl, D., Salvador, R., Wiedenhoef, M., Simmons, S., Allen, P., Altieri, M., Flora, C., Poincelot, R., 2003. Agroecology: The Ecology of Food Systems. *J. Sustain. Agric.* 22, 99–118. https://doi.org/10.1300/J064v22n03_10
- Goulet, F., Chiffolleau, Y., 2006. Réseaux d'agriculteurs autour de l'agriculture de conservation en France : échanges de savoirs et identités [WWW Document]. Trois. Rencontres Méditerranéennes Semis Direct Actes Third Mediterr. Meet. No Tillage Proc. URL <http://agritrop.cirad.fr/552917/> (accessed 4.16.19).
- Goulet, F., Pervanchon, F., Conteau, C., Cerf, M., 2008. Les agriculteurs innovent par eux-mêmes pour leurs systèmes de culture 16.
- Goulet, F., Vinck, D., 2012. L'innovation par retrait. Contribution à une sociologie du détachement. *Rev. Française Sociol.* Vol. 53, 195–224.
- Grossetti, M., 2011. Les narrations quantifiées. *Terrains Trav.* n° 19, 161–182.
- Hill, S.B., MacRae, R.J., 1996. Conceptual Framework for the Transition from Conventional to Sustainable Agriculture. *J. Sustain. Agric.* 7, 81–87. https://doi.org/10.1300/J064v07n01_07
- Kling-Eveillard, F., Frappat, B., Couzy, C., Dockès, A.C., 2012. Les enquêtes qualitatives en agriculture : de la conception à l'analyse des résultats, Méthodes & Outils. Institut de l'élevage, Paris.

- Kvale, S., Brinkmann, S., 2009. *InterViews: Learning the Craft of Qualitative Research Interviewing*. SAGE.
- Lamine, C., 2017. *La fabrique sociale de l'écologisation de l'agriculture*, Edition la Discussion. ed, Science, Nature, Environnement. Marseille.
- Lamine, C., 2011. Transition pathways towards a robust ecologization of agriculture and the need for system redesign. Cases from organic farming and IPM. *J. Rural Stud.* 27, 209–219. <https://doi.org/10.1016/j.jrurstud.2011.02.001>
- Lamine, C., Bellon, S., 2009. Conversion to organic farming: a multidimensional research object at the crossroads of agricultural and social sciences. A review. *Agron. Sustain. Dev.* 29, 97–112. <https://doi.org/10.1051/agro:2008007>
- Lémery, B., 2003. Les agriculteurs dans la fabrique d'une nouvelle agriculture Farmers in the making of a new agriculture. *Sociol. Trav.* 17.
- Lin, B.B., 2011. Resilience in Agriculture through Crop Diversification: Adaptive Management for Environmental Change. *BioScience* 61, 183–193. <https://doi.org/10.1525/bio.2011.61.3.4>
- Méndez, V.E., Bacon, C.M., Cohen, R., 2013. Agroecology as a Transdisciplinary, Participatory, and Action-Oriented Approach 18.
- Meynard, J.-M., Jeuffroy, M.-H., Le Bail, M., Lefèvre, A., Magrini, M.-B., Michon, C., 2017. Designing coupled innovations for the sustainability transition of agrifood systems. *Agric. Syst.* 157, 330–339. <https://doi.org/10.1016/j.agsy.2016.08.002>
- Meynard, J.-M., Messéan, A., Charlier, A., Charrier, F., Fares, M., Le Bail, M., Magrini, M.-B., Savini, I., 2013. Freins et leviers à la diversification des cultures : étude au niveau des exploitations agricoles et des filières. *OCL* 20, D403. <https://doi.org/10.1051/ocl/2013007>
- Rega, C., Paracchini, M.L., McCracken, D., Saba, A., Zavalloni, M., Raggi, M., Britz, W., Frappier, L., 2019. Review of the definitions of the existing ecological approaches 59.
- Rémy, J., Brives, H., Lémery, B., 2006. *Conseiller en agriculture*. Educagri Editions.
- Rosset, P.M., Altieri, M.A., 1997. Agroecology versus input substitution: A fundamental contradiction of sustainable agriculture. *Soc. Nat. Resour.* 10, 283–295. <https://doi.org/10.1080/08941929709381027>
- Sutherland, L.-A., Burton, R.J.F., Ingram, J., Blackstock, K., Slee, B., Gotts, N., 2012. Triggering change: Towards a conceptualisation of major change processes in farm decision-making. *J. Environ. Manage.* 104, 142–151. <https://doi.org/10.1016/j.jenvman.2012.03.013>
- Thérond, O., Duru, M., Roger-Estrade, J., Richard, G., 2017. A new analytical framework of farming system and agriculture model diversities. A review. *Agron. Sustain. Dev.* 37. <https://doi.org/10.1007/s13593-017-0429-7>
- Vanloqueren, G., Baret, P.V., 2009. How agricultural research systems shape a technological regime that develops genetic engineering but locks out agroecological innovations. *Res. Policy* 38, 971–983. <https://doi.org/10.1016/j.respol.2009.02.008>
- Wenger, E., 2010. Communities of Practice and Social Learning Systems: the Career of a Concept, in: Blackmore, C. (Ed.), *Social Learning Systems and Communities of Practice*. Springer London, London, pp. 179–198. https://doi.org/10.1007/978-1-84996-133-2_11
- Wezel, A., Bellon, S., Doré, T., Francis, C., Vallod, D., David, C., 2009. Agroecology as a science, a movement and a practice. A review. *Agron. Sustain. Dev.* 29, 503–515. <https://doi.org/10.1051/agro/2009004>
- Wezel, A., Brives, H., Casagrande, M., Clément, C., Dufour, A., Vandenbroucke, P., 2016. Agroecology territories: places for sustainable agricultural and food systems and biodiversity conservation. *Agroecol. Sustain. Food Syst.* 40, 132–144. <https://doi.org/10.1080/21683565.2015.1115799>
- Wezel, A., Casagrande, M., Celette, F., Vian, J.-F., Ferrer, A., Peigné, J., 2014. Agroecological practices for sustainable agriculture. A review. *Agron. Sustain. Dev.* 34, 1–20. <https://doi.org/10.1007/s13593-013-0180-7>
- Xu, Q., Huet, S., Poix, C., Boisdon, I., Deffuant, G., 2018. Why do farmers not convert to organic farming? Modeling conversion to organic farming as a major change: XU ET AL. *Nat. Resour. Model.* 31, e12171. <https://doi.org/10.1111/nrm.12171>

Appendices

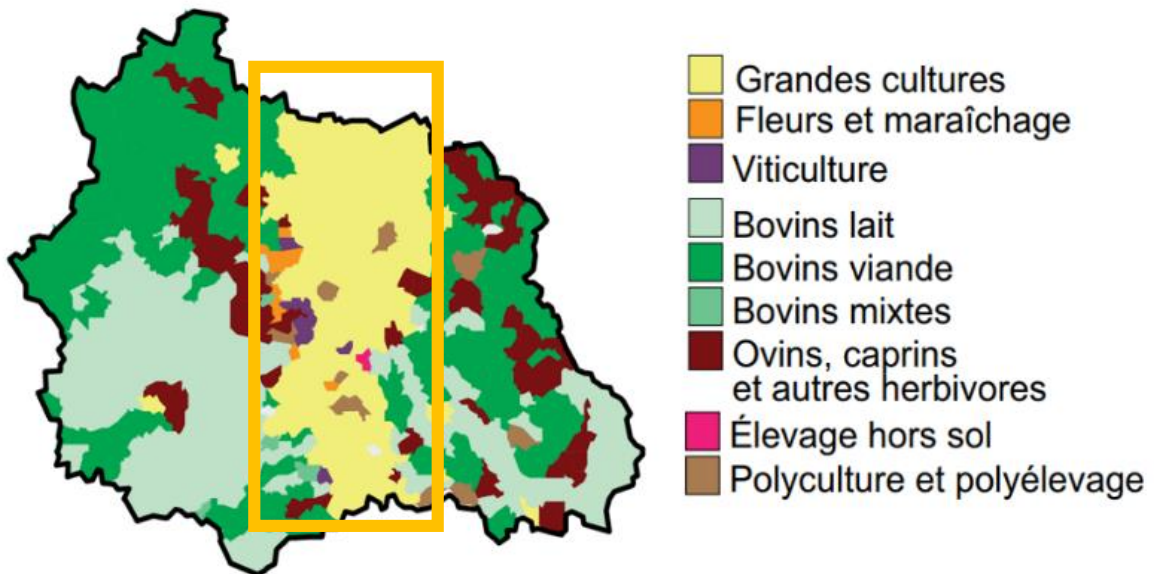


Appendix 1: Location of the Puy-de-Dôme in France




 Direction Départementale
 des Territoires du Puy-de-Dôme
 Copyright: IGN 2010 - BDAlti
 Conception: DDT 63/SET/AMG
 Date d'édition: 06/11/2017
 Echelle: 1 cm → 4 km

Appendix 2 : Physical map of the Puy-de-Dôme department. Source: DDT, Puy-de-Dôme



Appendix 3: Map of the Technico-Economic Orientation of the Exploitations in the Puy-de-Dôme by communes. Adapted from: Agreste, Census of Agriculture 2010

Appendix 4: Linking the initial determinants of transition with certain characteristics of organic farmers

% de la catégorie au sein de l'effectif total		27%	18%	55%	45%	23%	32%	45%					
Catégories		1999- 2007	2008- 2013	2014- 2019	Céréaliers exclusif	Polyculteurs bovins	Système diversifié	Expérience passée (oui)					
Démarche proactive	Volonté de réduction d'impact environnemental	50%	54%	0%	0%	50%	46%	67%	69%	15%	33%	15%	100%
	Volonté de changement de vie	100%		0%	0%	0%	100%	100%	0%	0%	0%		100%
	Volonté d'autonomie	50%				50%	67%	67%	33%	33%	0%		67%
Cause événementielle	Intoxication/maladie	50%		25%	25%	25%	100%	100%	0%	0%	0%		-
	Perte confiance conseiller(s)	33%		25%	25%	25%	50%	50%	0%	0%	25%		-
	Burt-out	0%	44%	0%	22%	0%	33%	0%	78%	0%	0%	0%	-
	Changement législation (restrictions, aides)	0%		0%		100%	100%	0%	0%	0%	10%	22%	-
	Erosion du sol												-
	Test OGM	100%		0%		0%	0%	100%	100%	0%	0%		-
	Intérêt agronomique												-
Causes évolutives	Difficultés économiques (et anticipées)	50%		0%		50%	50%	50%	38%	38%	13%		-
	Plafonnement rendements	0%		0%		100%	0%	0%	67%	67%	33%		-
	Inefficacité phyto	0%		0%		100%	0%	0%	10%	41%	0%	18%	-
	Dégoût phyto	50%	35%	0%	6%	50%	65%	50%	0%	0%	50%		-
	Evolution législation	0%		0%		100%	100%	0%	10%	10%	0%		-
	Dégradation du sol												-
	Identification sociale	50%		33%		0%	0%	67%	0%	0%	0%		-
Opportunisme	Recherche de VA	0%		50%		50%	0%	0%	10%	0%	0%		-
	Accès aides financières	33%	35%	0%	11%	33%	56%	33%	67%	67%	0%	22%	-
	Opportunité diversification	0%		0%		100%	100%	0%	0%	0%	10%		-
	Apparition d'un débouché porteurs	33%		0%		67%	67%	0%	67%	67%	33%		-

Following the repeated quotation of the key role of the commercial technician of the AB sector, I decided to meet him in order to better understand his role and his way of doing things during the phase of "preparation" lived by the farmer. In the first place, he considers that his work is primarily based on technical and non-commercial aspects. Despite a sometimes contrary perception from farmers, considering him as a commercial before being a technician, this technical approach is very appreciated by the practitioners

First, it moves automatically on the farm and generally passes, during the first meeting, a whole day with the farmer, which allows to discover in depth the farming system and establish a bond of trust with the farmer. The initial work he is doing with farmers who want to convert to OF is done in several ways: the soil analysis of different plots (laboratory analysis is sometimes conducted but rarely) and a retrospective of the most recent crops grown. It is a base work to get an idea of the types of soils present on the farm, and an idea of their overall fertility (structure, mineral content, organic matter content, etc.). Then is conducted an identification presence of weeds. Using the identification book for plants "bio-indicating" plant, he identifies with the farmer the weeds present and establishes a diagnosis (at least partial) of the state of the soil and pressure (potential) weeds present and future. According to him, this diagnosis is a crucial moment given the farmers' aversion to the presence of weeds in their fields. Finally, he leads with the farmer a diagnosis of the material means (tools, storage capacity, drying) that he owns and makes some recommendations. Following these diagnoses (soils, weed pressure, equipment), the technician develops a potentially diversified potential over three years. During a second visit, passing through all the plots, he proposes to set up this rotation which allows the farmer to adapt better to the conditions of his soil, to the pressure of the weeds and the means he holds. At the same time, it is a means of guaranteeing an outlet for the farmer. This is what farmers refer to as saying that the technician helped them "for rotations" during the preparation phase.