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Towards a change in agricultural practices for a safe and local production: linking farmers to their environment in the French overseas territories.

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Abstract.

The question of limiting the use of synthetic pesticides and selling locally in agriculture is a central issue that gathers both public and private requirements. Indeed, it has become a topic of particular interest for researchers in multiple fields of research. As an illustration, the ECOPHYTO PUMAT (Pour un maraîchage attractif : le cas de la tomate en Martinique) project was launched with the aim of promoting safe and local vegetable farming in Martinique. Indeed, the horticultural farming systems are evolving rapidly with simultaneous challenges: stringent norms and standards and new marketing channels. However, to this date, local production only supplies about 40% of the total demand in Martinique. To our knowledge, this issue has not been studied in the French overseas, which justifies this project and the associated doctoral considered. To identify the stakes and levers for such a challenge, we need tangible data that are representative of farms in all their diversity, including farming and marketing practices. We also need to understand how these farms interact with their environment. In this context, we will present our theoretical, methodological and empirical approaches.

Keywords: Market gardening, French overseas, Agroecological practices, Marketing strategy.

INTRODUCTION

In a context of environmental awareness, both public and private actors are strengthening phytosanitary requirements implemented. Thus, the Ecophyto Plan II+ of the French Ministry of Agriculture and Fisheries in 2018 aims, among other things, to reduce the quantity of plant protection products used by 50% by 2050. At the same time, enhancing local and safe farming practices is a challenge but also and above all an economic and agronomic opportunity for farmers and, more broadly, all the actors of the supply chain. It is an economic opportunity insofar as it allows farmers to capture a larger share of the added value. Agronomic opportunity to the extent that it meets the objective of reduction of synthetic pesticides and hence the development of agronomic alternatives.

As one of the main agents in the supply chain, farmers, and especially vegetable farmers, play a major role in implementing more environmentally friendly practices, which are most often valued locally because vegetable crops are perishable. The closeness between

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local farmers and local consumers in their transactions confirms the need for transparency, trust, and proximity. The matching of supply and demand expectations contributes to the emergence of new agricultural practices and new marketing channels.

This double challenge of reducing synthetic pesticides and selling locally is all the more important for small island economies that depend heavily on imports. Martinique is more particularly concerned since it imports nearly 60% of its vegetable consumption. It is therefore essential to consider the specific characteristics of island economies and the challenges they face. Indeed, these small island economies are dependent on financial transfers from the European Union. These transfers structure the economic sectors which benefit from them, including the "export" crops (mainly bananas and sugar cane). Alongside these export crops, vegetable and fruit production suffer from the lack of organization of the sectors and of appropriate regional, national and European aid (Conseil Économique et Social, 2003). Direct sales on markets or on the roadside - as well as informal sales - are highly developed. This reflects, on the one hand, a deficient organization of the sector and, on the other hand, an inability or refusal to add value to production through the demanding and competitive long-distance channels (François et al., 2005). These constraints are added to an increased exposure to natural hazards and invasions of exotic species which have also become a problem for most island economies (Petit & Prudent, 2010). The problem of chlordecone pollution remains a topical one, with proven risks and lasting consequences on crop production, transparency and trust. These conditions make supply irregular and reinforce the difficulty of organizing the sector.

THE RESEARCH QUESTIONS

The objective of this doctoral work is to answer the following questions: What are the productive and marketing specificities of market gardeners in Martinique? How do they differ from, or are similar to, market gardeners in Guadeloupe, Reunion and mainland France? What are the dynamics of the trajectories of these farmers according to the production and marketing strategies they implement? What role do marketing intermediaries play in the objective of reducing the use of synthetic pesticides?

Understanding the trajectories adopted by farmers, in terms of marketing and farming strategy, and studying the impact of these strategies on the development of safe and local production, is the main challenge that drives our approach. The diffusion of agroecological practices depends on the prior identification of the action levers that enable farmers to adopt appropriate farming and marketing strategies.

The first step is to characterize the heterogeneity of vegetable farmers in terms of commercial and farming strategy. This heterogeneity will be put into perspective with their capacity to adapt to change and thus their resilience to exogenous shocks such as health crises. As farmers evolve in a context of perpetual change, it is essential to analyze the impact of farming and marketing strategies on the development of safe and local production, considering these fluctuations. The study of Martinique is relevant for the reasons mentioned above. However, in order to properly understand the functioning of farmers in this island economy, it should be compared to other island economies (Reunion and Guadeloupe) and to mainland France, which all have to face the same regulatory requirements in terms of reducing phytosanitary products. We will seek to answer the following questions: What is the profile of vegetable farmers in Martinique and to what extent does it differ from other island economies and mainland France? What is the impact of the marketing channels on farms' sustainability? At the farmer level, what determines the adoption of agroecological practices?

A second stage will focus on the interdependence of farmers with the other agents in the vegetable and horticultural sector and the role of collective action in meeting the

challenges of reducing synthetic pesticides. This change of scale will allow us to understand the relationships that farmers have with all upstream and downstream agents. In particular, we will explore the key role of farmers' organizations and associations as well as technical advisors and extension officers. We will seek to answer the following questions: What are the characteristics of farmers who market through a farmer's organization? What is the impact of this integration of production on a farm sustainability? Which forms of interaction are the most suitable and most likely to develop in Martinique, Reunion, Guadeloupe and mainland France? Is the organization of the chain totally independent of the environment in which farmers operate?

CONTRIBUTION

This thesis is part of the ECOPHYTO PUMAT 2021-2024 project (Pour Un Maraîchage Attractif : le cas de la Tomate en Martinique). This multidisciplinary project in economics, agronomy and political science, focuses more specifically on farmers, who, along with input suppliers, are among the first links in the supply chain. The project has a twofold objective: to reduce the use of and dependence on synthetic pesticides by developing agronomic and economic support for changes in farmers' practices; and to promote the organization of the sector and allow the development of local and safe production. The aim is to design a new form of local and safe agriculture economically viable.

The first originality of this work is its multidisciplinary nature. Multidisciplinarity in the approach, in the measurements and in the modelling implemented. Exchanges with agronomists will make it possible to identify relevant agronomic measures at the level of plots and farms. These data will be coupled with data relating to the economic and financial dimensions of the farms. In collaboration with the Territoires Durables project funded by the French Ministry of Overseas, a study of the link between digital transition and agroecological transition is planned.

The second originality is the analysis of the role of the environment in its various dimensions: geographical, agronomic, institutional and relational. Putting the island economies into perspective with each other and with mainland France, which is subject to the same national and European regulatory requirements, is an original approach since it has never been studied to our knowledge. While some studies focus on island economies, others focus on mainland France. However, these environments must all meet the same regulatory requirements. Their comparison is therefore relevant to measure the impact of the different dimensions of the environment on the development of healthy and local production.

THE THEORETICAL APPROACH

This doctoral work will focus on the one hand on the farmers and on the other hand on the relations they have with the actors of the chain. As the scales of analysis are different, we adopt different theories.

On the farmers' side

The aim of the farmers' study is to see to what extent the development of marketing strategies (i.e. direct sales) impact on the three pillars of sustainability of their farm. Two steps have to be considered. Firstly, the individual predispositions of the farmers to the development of this strategy are to be identified. Secondly, this selection bias is to be corrected in the analysis of the impact of this strategy on sustainability.

From a theoretical point of view, we mobilize the resource-based view theory which emphasizes the key role of resources and skills in the development of the activity and the diversification of firms (Penrose, 1959; Wernerfelt, 1984; Prahalad & Hamel, 1990). The

application of this theory leads us to consider the set of skills (age, education, household size, etc.) and resources (farm size, number of employees, etc.) available to the farmers and assets on the farm. These factors allow us to understand the individual motivations to diversify their activity and to adopt alternative practices (Fernandez-Cornejo, 1996; Carpentier, 2010) or to sell directly. The identification of individual and structural characteristics makes it possible to correct any selection bias when analyzing the impact of the change of practices on the sustainability of farms. This impact analysis is based on innovation theory, which emphasizes the key role of innovation adoption on performance (Schumpeter, 1939; Abdelatif & Yamina, 2015; Davies & Buisine, 2017). We rely on the work of Chiffolleau & Prévost (2013) and Vaillant et al, (2017) to justify how direct sales marketing can be considered as a form of innovation.

Putting these two theories into perspective will allow us to finely understand the link between direct sales and farms' sustainability (Aubert & Enjolras, 2014; Malak-Rawlikowska et al., 2019; Jarzębowski et al., 2020).

On the supply chain's side

It is essential to consider the farmer in its environment. The environment is considered here in its broadest definition and covers several dimensions: the economic environment (Feder et al., 1985; Deressa et al., 2009, Parrot et al., 2020), the institutional environment (Rogers, 1962; Aubert, 2017; Aubert et al., 2019), the geographical environment (Ormrod, 1990; Genius et al., 2006) and the relational environment (Parrot et al., 2017; Aubert et al., 2020). We will consider both the interactions and coordination of farmers with all actors in the chain (other farmers, government, advisors, associations, distributors, etc.) (Rogers, 1962; Wu & Zhang, 2013; Aubert et al., 2019) and the pedoclimatic environment (location, climatic conditions, pest pressure, etc.) (François et al., 2005; Aubert, 2017).

Farmers develop numerous interactions with many agents. We will consider the role of farmer organizations in particular, as one of their objectives is to contribute to the implementation of alternative practices (Aubert et al., 2020). We focus on organization theory (Roethlisberger & Dickson, 2003; Mayo, 2010) and social capital theory (Bourdieu, 1986; Zhou et al., 2018), which emphasize the importance of the human factor in organizations and of group membership in achieving a common goal. This analysis of collective action at the scale of island economies will aim to better understand the importance of coordination of agents within the supply chain, but also to identify the factors that enable the structuring of the entire value chain and the creation of a group dynamic between farmers.

The study of relations between agents goes hand in hand with the study of the resulting transaction costs. While studying the three dimensions identified for characterizing transactions: uncertainty, frequency, and asset specificity (Williamson, 1991), we try to unveil the determinants of the internalization of activities by vegetable farmers (productive, marketing, administrative or also digital activities).

DATA

On the farmers' side

Empirically, we use data from the 2010 agricultural census and the 2016 farm structure surveys. Although the data collected in 2010 is exhaustive, the data from the structural surveys is representative of farms in terms of physical size, geographical location and farming orientation. This representativeness thus makes it possible to measure the impact of the geographical and productive environment. Farms can be classified and compared according to their specialization thanks to indicators such as Standard Gross

Production^b or Economic and Technical Orientation^c. The data available include a wide range of variables concerning farmer's and farmer's characteristics and allow not only for a perennial identification of farms but also a comparison between European countries. Their use can become limited when it comes to specific research questions and will be complemented by field surveys.

As mentioned above, official databases cannot cover all topics that may be of interest to researchers, especially when different fields of research are considered: economics, agronomy, management, etc. To this extent, field surveys are particularly beneficial. They allow researchers to focus on one or several specific themes that are not addressed in official databases. For instance, the question of the use of digital tools or the specificities of marketing methods is only partially addressed in the 2020 agricultural census. To realize an analysis of the sectors in the Martinican and Guadeloupean context, we have set up a questionnaire to be administered to 200 farms in Martinique and 200 in Guadeloupe. The data will be collected on the basis of stratified sampling methods in order to obtain results that are representative of market gardeners.

On the supply chain's side

In addition to considering several farmers' characteristics, this questionnaire will allow us to deepen our reflection by considering other dimensions that are not addressed because they are not available in the data from official sources such as the perception of relationships with other actors. Indeed, these surveys will enable us to characterize the diversity of marketing and productive relations (formal and informal) and the qualification of these relations (cooperation, competition, conflicts).

METHODOLOGY

On the farmers' side

From a methodological point of view, we rely on propensity score matching and difference-in-differences methods, which allow us to analyze the farms' trajectory in detail. More precisely, these methods will allow us to measure firstly the impact of direct sales on farms' sustainability of farms. We combine these two methods in order to benefit from their advantages while reducing their disadvantages (Enjolras & Aubert, 2020). These methods are complementary and will make it possible to highlight the factors of the adoption of alternative practices and its short- and medium-term impacts while comparing the island economies to the mainland but also to each other.

On the supply chain's side

With regard to the study of the vegetable farming sector as a whole, a list of agroecological practices that can limit the use of synthetic pesticides has been drawn up in collaboration with the project's agronomists. We will identify with Principal Component Analysis and Factor Analysis methods but also with count regression models (Cameron and Trivedi, 2013) to what extent the relationships and environment in which farmers evolve can influence the adoption of such practices.

^b Farm classification in terms of economic size and specialization. It describes a production potential of the farms and is expressed in euros but it is above all a common unit that makes it possible to rank the productions.

^c Farm classification according to their main production (market gardening, livestock, etc.). A farm is specialized in a field if the SGP of the production(s) concerned exceeds two thirds of the total.

CONCLUSION

Promoting safe and local production in an understudied island context raises many research questions and opportunities. It is in this sense that the doctoral project was built. Indeed, this objective of safe and local production must be achieving while keeping in mind the need of profitable production for farmers in the French overseas. To do so, we presented the different concepts and methods, both theoretical and empirical, mobilized throughout the doctoral work. The use of statistical methods is an integral part of this work and relies on multiple data sources : official databases and field surveys.

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Literature cited

- Abdelatif, K., & Yamina, D. (2015). *Innovation: Facteur de compétitivité dans l'économie de connaissances* [Working Paper]. Colloque international portant : Innovation, valorisation de la ressource humaine, et économie de la connaissance dans les pays du Maghreb : enjeux et perspectives le 22 et 23 Février 2015 : laboratoire de recherche Poidex, université de Mostaganem. <http://e-biblio.univ-mosta.dz/handle/123456789/7826>
- Aubert, M. (2017). *Quantifier ou l'art de mesurer l'utilisation des produits phytosanitaires: Analyse empirico-formelle de la gestion sanitaire et environnementale des producteurs horticoles*.
- Aubert, M., Debrune, O., Huat, J., & Parrot, L. (2019). The institutional environment: Key support for formal market gardeners in Mayotte. *Systèmes Alimentaires / Food Systems, 2019*(n°4), 185–206. <https://doi.org/10.15122/isbn.978-2-406-09829-4.p.0185>
- Aubert, M., & Enjolras, G. (2014). Do short food supply chains go hand in hand with environment-friendly practices? An analysis of French farms. *International Journal of Agricultural Resources, Governance and Ecology, 12*(2), 189. <https://doi.org/10.1504/IJARGE.2016.076932>
- Aubert, M., Huat, J., & Parrot, L. (2020). L'organisation collective au coeur du processus de réduction des produits phytosanitaires: Le cas des maraîchers mahorais. *Revue de l'Organisation Responsable*. <https://doi.org/10.3917/ror.153.0028>
- Bourdieu, P. (1986). *The forms of capital*.
- Cameron, A. C., & Trivedi, P. K. (2013). *Regression Analysis of Count Data* (2e éd.). Cambridge University Press. <https://doi.org/10.1017/CBO9781139013567>
- Carpentier, A. (2010). Economie de la production agricole et régulation de l'utilisation des pesticides, une synthèse critique de la littérature. *La réduction des pesticides agricoles enjeux, modalités et conséquences, Lyon, FRA, 2010-03-11-2010-03-12*. <http://prodinra.inra.fr/ft/2E0FEFA8-059E-4D02-A3B5-2FD95C9BBB0D>
- Chiffolleau, Y., & Prévost, B. (2013). Les circuits courts, des innovations sociales pour une alimentation durable dans les territoires. *Norois, 3*, 7–20.
- Conseil Économique et Social. (2003). *Quels enjeux et quels développements pour les agricultures des départements d'outre-mer ?* 271.
- Davies, M., & Buisine, S. (2017). La culture d'innovation dans les organisations françaises. *Technologie et Innovation, 17*. <https://doi.org/10.21494/ISTE.OP.2017.0160>
- Deressa, T. T., Hassan, R. M., Ringler, C., Alemu, T., & Yesuf, M. (2009). Determinants of farmers' choice of adaptation methods to climate change in the Nile Basin of Ethiopia. *Global Environmental Change, 19*(2), 248–255. <https://doi.org/10.1016/j.gloenvcha.2009.01.002>

- Enjolras, G., & Aubert, M. (2020). How does crop insurance influence pesticide use? Evidence from French farms. *Review of Agricultural, Food and Environmental Studies*, 101(4), 461–485. <https://doi.org/10.1007/s41130-020-00129-5>
- Feder, G., Just, R. E., & Zilberman, D. (1985). Adoption of Agricultural Innovations in Developing Countries: A Survey. *Economic Development and Cultural Change*, 33(2), 255–298.
- Fernandez-Cornejo, J. (1996). The microeconomic impact of IPM adoption: Theory and application. *Agricultural and Resource Economics Review*, 25(2), 149–160.
- François, M., Moreau, R., & Sylvander, B. (2005). *Agriculture biologique en Martinique. Quelles perspectives de développement ?* <https://hal.inrae.fr/hal-02831097>
- Genius, M., Pantzios, C. J., & Tzouvelekas, V. (2006). Information Acquisition and Adoption of Organic Farming Practices. *Journal of Agricultural and Resource Economics*, 31(1), 93–113.
- Jarzębowski, S., Bourlakis, M., & Bezat-Jarzębowska, A. (2020). Short Food Supply Chains (SFSC) as Local and Sustainable Systems. *Sustainability*, 12(11), 4715. <https://doi.org/10.3390/su12114715>
- Malak-Rawlikowska, A., Majewski, E., Waś, A., Borgen, S. O., Csillag, P., Donati, M., Freeman, R., Hoàng, V., Lecoœur, J.-L., Mancini, M. C., Nguyen, A., Saidi, M., Tocco, B., Török, Á., Veneziani, M., Vittersø, G., & Wavresky, P. (2019). Measuring the Economic, Environmental, and Social Sustainability of Short Food Supply Chains. *Sustainability*, 11(15), 4004. <https://doi.org/10.3390/su11154004>
- Mayo, E. (2010). *The Human Problems of an Industrial Civilization* (Reprint édition). Routledge.
- Ormrod, R. K. (1990). Local Context and Innovation Diffusion in a Well-Connected World. *Economic Geography*, 66(2), 109–122. <https://doi.org/10.2307/143741>
- Parrot, L., and Keleher, L. (2017). The Alliance Approach to Innovation: Agro-ecological innovations, Alliance, and Agency. *Ethics and Economics* 14, 33–48. .
- Parrot, L., Biard, Y., Klaver, D., Kabré, E., and Vannière, H. (2022). Slicing the fruit five ways: An economic, social, and environmental assessment of five mango food supply chains in Burkina Faso. *Sustainable Production and Consumption* <https://doi.org/10.1016/j.spc.2022.01.019>.
- Penrose, E. (1959). *The Theory of the Growth of the Firm*. Oxford university press.
- Petit, J., & Prudent, G. (2010). *Climate Change and Biodiversity in the European Union Overseas Entities*. 200.
- Prahalad, C. K., & Hamel, G. (1990). The Core Competence of the Corporation. *Harvard Business Review*, 14.
- Roethlisberger, F. J., & Dickson, W. J. (2003). *Management and the Worker*. Psychology Press.
- Rogers, E. M. (1962). *Diffusion of Innovations* (1st Edition. 1st Printing). The Free Press of Glencoe. <https://www.biblio.com/book/diffusion-innovations-first-printing-rogers-everett/d/793420976>
- Schumpeter, J. (1939). *BUSINESS CYCLES. A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. 385.
- Vaillant, L., Gonçalves, A., Raton, G., & Blanquart, C. (2017). Transport et logistique des circuits courts alimentaires de proximité: La diversité des trajectoires d'innovation. *Innovations*, n° 54(3), 123–147.
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180. <https://doi.org/10.1002/smj.4250050207>
- Williamson, O. E. (1991). Comparative Economic Organization : The Analysis of Discrete Structural Alternatives. *Administrative Science Quarterly*, 36(2), 269-296. <https://doi.org/10.2307/2393356>
- Wu, B., & Zhang, L. (2013). Farmer innovation diffusion via network building: A case of winter greenhouse diffusion in China. *Agriculture and Human Values*, 30(4), 641–651. <https://doi.org/10.1007/s10460-013-9438-6>
- Zhou, J., Liu, Q., & Liang, Q. (2018). Cooperative membership, social capital, and chemical input use: Evidence from China. *Land Use Policy*, 70, 394–401. <https://doi.org/10.1016/j.landusepol.2017.11.001>