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Diversification of large-scale cereal farms through vegetables to meet urban demand in the Paris city-region: strategies and needs

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Abstract

In the Paris city-region (Ile-de-France), as in many other urban areas, there is an increasing demand for local vegetables. As the agricultural area of this region is dominated by arable crops, diversification of cereal farms through vegetables could be a promising option to contribute to fulfil this demand. However, there is a lack of literature on this type of diversification. In this study, we aimed at answering the following questions: (i) which are the drivers for cereal farmers to diversify? (ii) which are their diversification strategies? (iii) which challenges do they face and which options to support them? We carried out semi-structured interviews with a diversity of stakeholders: 11 farmers, 5 agricultural advisors, 3 local development associations and 4 value chains actors (wholesalers, cooperatives, intermediaries). A qualitative analysis of the collected material allowed us to characterize 2 contrasting diversification strategies: (i) based on market gardening close to the city (diversified range of vegetables sold in short circuits), (ii) based on field vegetables further from the cities (restricted range of vegetables sold through local but long supply chains). Diversification is above all a means for farmers to ensure the economic viability and resilience of their farm, and agronomic considerations (longer rotations) are very secondary. The main barriers encountered in diversifying mainly concern the lack of adequate labour force in the region, access to markets and the withdrawal of pesticides historically applied to vegetables (for conventional farmers). To grow, store and package vegetables, large investment can be required which is also a limiting factor. After suggesting possible ways to overcome these barriers, we discuss the fact that complementarities, tensions, collective organization between cereal-based systems and other types of vegetable farms to locally feed cities should be further explored.

Keywords: Farm diversification; Local food systems; Barriers to innovation; Horticulture; Peri-urban agriculture.

INTRODUCTION

In cities, consumers' expectations for local, quality food are growing (Rieutort, 2009; Chiffolleau and Dourian, 2020). This demand particularly applies to vegetables, especially for collective catering supported by the government and municipalities as a place of equal access to food and nutritional education. In the Paris city-region, this raises the question of how to relocate vegetable production. Although there are vegetable producers in the Ile-de-France

region, such as market gardeners (mostly on small scale), this study focuses on the diversification of cereal growers, as they have significant production resources and acreages. In this regard, they could potentially provide the volumes needed for central purchasing agencies and collective catering for an upscaling of local consumption (Aubry, 2012). Research work on diversification exist (Meynard et al. 2013) but do not address the question of vegetables. Therefore, in this study, our objectives are to answer the following questions:

- What are the drivers for cereal farmers to diversify?
- What are the diversification strategies followed?
- What are the challenges faced and supporting options?

MATERIALS AND METHODS

To answer this question, we conducted 20 semi-structured interviews with a variety of agricultural stakeholders: 11 farmers, 5 agricultural advisors, 3 local development associations and 4 value chains actors (wholesalers, cooperatives, intermediaries). During each semi-structured interview the exchange was recorded and transcribed, then processed using a qualitative analysis method involving thematic coding (Yin, 2009; Miles and Huberman, 1994). Codes were grouped by categories to distinguish patterns in the interviews and identify diversification strategies. In order to analyse these strategies, we drew on the conceptual framework developed by Morel and Léger (2016). The choices made by farmers involving technical, marketing, investment, labour-use strategies are considered as interdependent and coherent with their objectives and the perception they have of their own situation (constraints and opportunities of the farm and its socio-economic environment).

RESULTS

Two contrasting diversification strategies

At the end of the interview analysis phase, we were able to characterise two diversification strategies: (i) market-garden diversification and (ii) field vegetable diversification. Farms characteristics are presented in **Table 1**.

Farm	Distance to Paris (km)	UAA (ha)	Including vegetables (ha)	Vegetables
A	35	210	20	Diversified (up to 70)
B	26	70	9	Diversified (up to 70)
C	30	264	1,5	Diversified (up to 70)
D	40	27	0	Planned "diversified"
E	55	400	15	Carrots
F	63	315	15	Carrots, Turnips
G	53	360	8	Carrots, onions, leeks, squashes
H	71	100	0	Stopped courgettes
I	64	172	90	French beans, onions

Table 1. Characteristics of the farms. Colours relate to the diversification strategy: in red, farms with a market-garden strategy and in blue farms with field vegetables. Two farms are not presented because one interview was too short to discuss the characteristics of the farm

in figures and for the other, the contact was the head of a group of farms and discussed the socio-economic context rather than the characteristics of each of his farms.

Motivations for Diversification

Growing vegetables is above all perceived by farmers as a way of ensuring the economic viability of their farm. Two types of risks are sought to be avoided and push for diversification: the variable profitability of the cereal activity, which can be affected by price crises as in 2016 in France (with low harvests in the countries and low prices on the global market). Lower remuneration conditions make it necessary to expand the farm to increase the area under cultivation; those who cannot do so turn to diversification. Secondly, but no less importantly, farmers find diversification a novelty in their often-solitary profession. They meet new people and vegetables bring new and interesting farming techniques.

Different situations are related to different strategies

The two diversification strategies differ first of all by their geographical location but also by the history of the farm. Market-garden oriented farmers are very close to urban areas (within 30 km) and sometimes even inserted into the urban area (**Figure 1**). They therefore have immediate access to the huge consumer pool that is the city of Paris and take advantage of this proximity to practice direct selling. These diversification initiatives are often very old, and may sometimes have been set up before the farm was taken over by the current farmer. In the latter case, the farmer inherits a mode of organisation that has already been developed, which facilitates the continuation of the vegetable activity.

Field vegetable-oriented farmers are further away from Paris (over 50 km) but still benefit from the strong local food demand in the Paris basin. These diversification initiatives are much more recent and are essentially the result of opportunities. Indeed, these farmers are also historically potato producers, commercially involved with the central purchasing agencies of supermarkets or wholesalers. It is through these downstream value chain actors that consumer demand for vegetables, and moreover local demand, is relayed to the farmers who are encouraged to diversify.

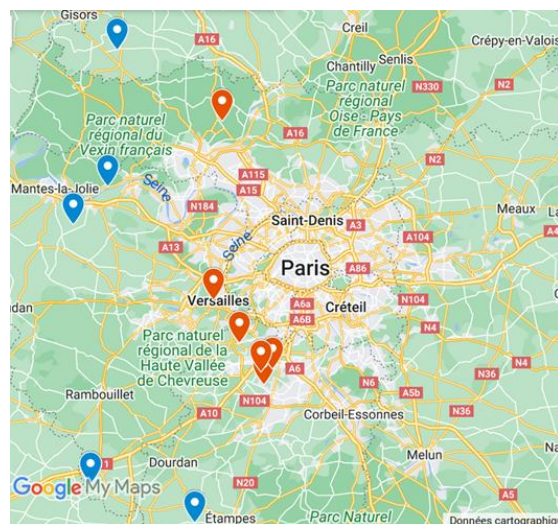


Figure 1. Map of interviewed farmers. Market-garden oriented farmers are marked in red whereas field vegetable-oriented farmers are marked in blue.

Strategic choices

1. Field vegetable diversification.

Field vegetable-oriented farmers cultivate a small number of references and seeks to produce in large volumes vegetables that are highly mechanisable to avoid the use of human labour (**Table 2**). Among the vegetables grown, we often find the same ones from one farm to another: carrots, onions, turnips and French beans. The essential characteristics of these crops are that their cultivation can be mechanised for planting, harvesting and weeding/treatment of the crops. Secondly, they are easily stored with cold storage equipment, not very fragile for packaging and washing operations and therefore easy to handle.

From a marketing perspective, these farmers generally turn to wholesalers and the purchasing centres of large and medium-sized supermarkets to which they are already linked for the sale of potatoes. This strategy requires in turn a massive investment in cold storage, packaging and washing equipment as well as in sowing and harvesting equipment. In total, one million euros must be invested for 15 hectares of carrots, for example. Although this investment can be subsidised till 30-50% by the Île-de-France region the amount of money involved represents a big risk taken by the farmer. This implies the need to produce vegetables in volume to be economically viable. Since vegetables are mechanised, labour is mainly hired for packing during winter, when cereals do not require much work.

2. Market-garden diversification

Market-garden oriented farmers grow a very wide variety of vegetables, up to 70 references per year, to match seasonal expectations of consumers and provide a large choice of products throughout the year. These farmers sometimes do not grow vegetables whose production can be highly mechanised to avoid competition and tend to focus on fresh products or even niche products (e.g. spring new potatoes rather than winter conservation potatoes). Benefiting from a nearby consumer base and privileged road access, these farmers find their outlets on Parisian open-air markets, in specialised organic shops or even on the farm.

Strategy	Market-garden	Field vegetables
Drivers	Creating added-value; Resilience to economic hazards; Looking for new job experience	
Situation	Close to city; Familial heritage; Strong local demand	Further to city; Pioneers; Link to mass-market retailing bringing opportunities; Already used to grow potatoes
Range of vegetables	Diversified (up to 70) apart from cereal rotation	Limited (1 to 4) including in cereal rotation
Marketing	Open-air markets; specialised shops; on farm	Wholesalers; Purchasing organisation for mass-market retailing
Investment	Planting/sowing; Harvesting; Weeding	Same + storage and conditioning
Labour organisation	Hiring labour for frequent operations all over the year	Hiring labour for packaging vegetables during periods with low cereal activity (winter)
Knowledge	Familial knowledge	Empirical (trial and error) ; Seed breeders and agricultural extension

Table 2. Summary of farmer's drivers, situation, and strategic choices for each diversification strategy

This proximity allows them to manage the entire logistics chain themselves, from production to the end customer, to capture the added value at each stage and thus sell their products with a high margin.

Barriers and levers to diversification in Ile de France

Whether it is for cereal, vegetable or market gardening farmers, the Paris city-region is in a labour shortage situation because agriculture attracts few people. The work is physically demanding. Field vegetable farms involve carrying heavy loads, crates, and vegetable nets, while on market garden farms the frequency of planting and harvesting, makes the work hard as it requires bending down. Lastly, the standard of living (especially for housing) makes the Paris city-region less attractive for agricultural workers (often with low wages) than other regions.

Added to this lack of labour is the difficulty of finding stable marketing outlets. Each channel has its own specificities. Central purchasing agencies demand volume and offer low margins. There are no stable contracts and prices are renegotiated every week. They are restrictive for the washing and packaging of vegetables. However, they are financially robust structures and the creation of a bond of trust over the years can make this outlet appreciated by farmers. On the other hand, specialised shops offer more interesting margins, are less demanding on the washing of products but are more sensitive to economic shocks, and the risk of bankruptcy is higher. Thus, it is the diversity of outlets that must be sought to overcome the difficulties of marketing. The requirement of performance in marketing is essential in order to be able to repay the heavy investments made in cold rooms, tunnels and irrigation systems.

The difficulty of marketing at competitive prices is also partly linked to the lack of means to control weeds in conventional farming. The gradual withdrawal of effective herbicides must be replaced by a combination of products deemed less effective and requires more extensive mechanical weeding, or in some cases very time-consuming manual weeding.

Despite the above-mentioned obstacles to diversification, the presence of a consumer base of 12 million people coupled with a very high demand for local products nevertheless

makes diversification projects interesting. This trend is supported at the political level by laws (Raimbert C., Raton G., 2020) which create new outlets in public catering.

DISCUSSION

Support for diversification

In view of the obstacles to diversification raised, various means can be devised to support farmers in their approach. Contrary to minor diversification species (such as legumes), there are well-structured channels for vegetables and the challenge lies in accessing these channels. Interviews showed that farmers receive little support in this regard and could be supported in two ways. Firstly, by identifying outlets and putting farmers in touch with future buyers, and secondly, by providing increased subsidy for investment, which would limit the burden of debt when purchasing equipment or building infrastructures. As the withdrawal of phytosanitary products makes crop management more complex for conventional farmers, support towards more input-saving practices or towards to switch to organic farming could alleviate these difficulties. Finally, in addition to this direct support to farmers, the attractiveness of the region for agricultural labour needs to be rethought. Working on the image of the Paris-city region, or facilitating access to housing with an acceptable rent for farm workers is essential.

Contribution of each diversification strategy in a territorial perspective

Through their presence close to the heart of cities, market-garden oriented farmers can play an important social role. Open-air markets are privileged spaces of exchange with customers where farmers can make their work known and valued, and raise awareness of the challenges of local agriculture. In addition to that they allow citizens to express their expectation, which can encourage farmers to diversify and change their production methods. However, with less cultivated land and a very diversified offer, market-garden oriented farmers do not seem to be the best suited to meet the mass needs of public collective catering and central purchasing agencies (big volumes of a limited range of vegetables).

This demand for local products can therefore benefit field vegetable-oriented farmers, who have significant production capacity to produce food in volume at low cost. For example, they are more likely to be able to meet the volume needs of public catering. Moreover, some vegetables (potatoes, carrots) produced by field vegetable-oriented farmers correspond to those sought after by mass caterers. The main obstacle is therefore the remuneration, which is not attractive enough, and the specifications (e.g. on size), which are too demanding.

In this study, we only focused on cereal farmers diversifying their production but nowadays most vegetable acreage in the Paris city-region relies on market gardeners, who only focus on vegetable production (AGRESTE, 2013).

It would therefore be interesting to complete this study to assess production potential, competition, and synergies between a diversity of farming systems involving both specialised vegetable farmers and cereal-based systems integrating vegetables. In addition, a cartographic approach would be promising to promote optimised spatial organisation and logistics of value chains to supply cities with local vegetables.

Limitations of the study

During the survey phase, it appeared that some farmers are on the borderline between the two strategies identified. The field vegetable-oriented farmers interviewed were often recent diversification initiatives and it would therefore be interesting to look for older diversification projects. Moreover, the question of organic farming was not addressed in this study. The specificity of organic vegetable value chains and related diversification strategies should be explored at organic dynamics are growing around cities in France.

CONCLUSIONS

The following main conclusions can be drawn from the study:

- Two strategies are identified for diversification of cereal based systems: market-garden oriented and field vegetable oriented;
- The motivations for diversification are essentially economic and agronomic considerations are secondary;
- Support for diversification must include investment support and assistance in identifying commercial outlets;
- Complementarities, tensions, collective organization between cereal-based systems and other types of vegetable farms to locally feed cities should be further explored.

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