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Sustainability of Geographical Indications (GIs) in the context of the diversification of agricultural activities in local areas.

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Geographical Indications (GIs) are traditional intellectual protection tools for agricultural products that are embedded in specific territories. Rich in tradition and specific to the region, GIs reflect the diversity of agricultural activities, but they may increase the specialization of the area, especially when the reputation of the GI is high. In a context of agroecological transition, it is therefore appropriate to analyse the effects of GIs on the diversification of agriculture, and on the sustainable development of regions. Thus, this article raises the following question: To which extent the concentration of production of some GIs, due to their success, hinder the effects of GIs on the sustainable development of territories?

Keywords: Protected designation of origin (PDO), viability, vulnerability, specialization, transition, complementarities, geographical scales, specifications

Introduction

In a context of agro-ecological transition, farming activities should tend towards a process of diversification. Indeed, specialisation produces negative externalities that limit the sustainability of farming activities and their territories (Kremen and Miles, 2012; Lurette et al., 2016; Puech and Stark, 2023).

Nevertheless, the specialisation of areas in specific agricultural activities is an almost natural process (Chatellier and Gaigné, 2012; Gaigné, 2024), due to the fixity of resources and the differences in the endowments of areas. The specialisation of farms generates gains in efficiency (economies of scale) to which can be added some economies of agglomeration linked to the concentration of activities in their territories. Thus, despite agricultural policies (e.g. the Common Agricultural Policy (CAP), the role of the Sociétés d'Aménagement Foncier et d'Établissement Rural (SAFER)) on the one hand, and spatial planning policies (e.g. the Territorial Food Projects (TFP)) on the other, which encourage the diversification of farming activities, 29% of French farms specialise in arable farming, 12% in beef cattle and 10% in winegrowing (Barry, 2022).

Against this backdrop, we can question the effect on sustainability and agricultural diversification of the anchoring of agricultural production protected by geographical indications (GIs) (such as Protected Designations of Origin (PDOs) and Protected Geographical Indications (PGIs)), to which an ever-increasing proportion of farms belong. Between 2010 and 2020, the proportion of farms declaring a GI in the Agricultural Census increased by 5 percentage points. In 2020, 18% of farms have a PDO and 8% have a PGI. The involvement of farms in these schemes depends mainly on the type of production: 97% of winegrowing farms have a GI, while less than 4% of farms specialising in field crops are involved in these schemes (Barry, 2022).

To go a step further, it seem useful to look at the sustainability of geographical indications (GIs) through the prism of the diversification of agricultural activities at regional level. This was the aim of the Carrefour

de l'Innovation Agronomique (CIAg) workshop on November 9th 2023, which looked at the role of GIs (and in particular PDOs) in the transition of regions towards greater sustainability and diversification of agricultural activities: do GIs reinforce the specialisation of agriculture or do they contribute to the diversification of agriculture and its sustainability?

In order to answer this question, we begin by defining the issue of the sustainability of GI areas and the agricultural anchoring processes at work. Secondly, we look at some regional examples of GI development processes and their impact on the diversification or specialisation of regions. Thirdly, we outline a number of avenues for innovation in GIs that are conducive to transitions in agriculture and its regions. Finally, we look at some lessons and prospects for the development of GIs and their territories.

1. What impact do Geographical Indications (GIs) have on sustainable development and the diversification of agricultural activities in local areas?

This first point leads us to address the issues of sustainability and diversification of agriculture in its territories. With this in mind, we propose first of all to look back at some of the principles of GI protection, and then at the territorial dynamics that encourage the concentration of productive activities and raise questions about the sustainability of territories. We will then show that it is possible to mobilise precise statistical data to report on the sustainability of GIs for 1,517 cantons in mainland France.

1.1 Protecting GIs as a principle for diversifying and sustaining farming activities in local areas

Geographical Indications are first and foremost signs of quality that guarantee the characteristics of a product: that it comes from a specific region and that it has been produced using traditional methods defined in precise specifications.

At both national level (French Rural Code, Livre VI - Titre IV - Article L 640) and European level (EU Regulation n°1151/2012), GIs are legal instruments whose political aim is to promote rural, economic and social development. Conceived as genuine tools for sustainable agricultural development, several public bodies (such as the FAO (Food and Agriculture Organisation), the Centre de coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and the National institute of origin and quality (INAO)) are working towards their international recognition in southern countries.

From the mid-twentieth century onwards, GIs have been a particularly appropriate response in so-called less-favoured areas, where natural handicaps have left little room for the kind of production-based agriculture that would ensure food security. GI farming thus appears, by default and in principle, to be extensive, respectful of the diversity of terroirs and the guarantor of many rural heritages (Sylvander et al., 2007). What's more, the collective commitment implicit in membership of any GI is, for the legislator, the major lever for rural and social development (Rapport d'information 2015, Marcel and Cinieri, Commission des affaires économiques, Assemblée Nationale Française).

1.2 Some theoretical tools for understanding the territorial dynamics shaped by GIs

Qualitative studies on the development of GIs are usually based on a theoretical framework that is useful if we want to progress towards a generic understanding of the territorial dynamics at work. (Many examples are presented by the SINER-GI group, https://www.origin-gi.com).

In theory (Colletis, 1999), the activation of local resources leads to three distinct territorial economic dynamics:

- The agglomeration, which makes it possible to gain in efficiency by limiting transport costs in particular. It occurs when activities are concentrated geographically;
- The specialisation of activities corresponds to a more advanced stage of concentration: it provides superior performance resulting from the sharing of the same skills in an area with common resources;
- Specification, based on the activation of original resources and a structured institutional framework. Over and above specialisation and the sharing of skills, it brings comparative advantages to the region, which sets it apart from simple competition based on costs between producers and between regions, and provides it with a degree of protection.

The distinctive principles of GIs, their terroir and their local roots, are probably the driving forces behind a dynamic of specification, which creates territorial quality rents (Olivier and Wallet, 2005). But the self-reinforcing economic mechanisms driven by these rents can reduce the diversity of agricultural activities and the sustainability of territories. The territorial dynamics of GIs are therefore not based on a logic of specialisation, but the risks of weak sustainability of territories marked by the specification of their assets are very real.

To take his analysis of the dynamics of territorial specification with GIs a step further, Pecqueur (2001) points out that territorial quality rents are the result of composite organisational strategies that combine product, history, know-how and service (tourism in particular). This combined offer of goods and services constitutes a genuine strategy for differentiating territories. The connections between parallel GI promotion strategies tend to strengthen local economic dynamics while encouraging the diversification of agricultural activities. Reflections on territorial governance have also led rural geographers such as Frayssignes (2005) to see these strategic synergies between GIs as polarisation processes (particularly in the PDO cheese sector). Territorial typologies of agri-food quality approaches can thus be identified (Pouzenc et al, 2007).

Following on from these theoretical considerations, Boshma and Iammarino (2009) take as their starting point the idea that GIs fuel a positive territorial economic dynamic. The authors also acknowledge that in a diversified region, these learning effects can be more effective, particularly through their ability to drive cross-fertilisation of innovation. But they also point out that superior agglomeration economies (Jacob's externalities) only emerge if cross-sector complementarities are revealed. The areas in question evolve through their 'linked variety' (Frenken, 2007; Boschma, 2009; Gonçalves et al., 2022), particularly with the outside world: extralocal links must be complementary if they are to be capable of renewing knowledge and the quality of local production.

The authors thus open up a relatively original way of combining economic efficiency based on concentration effects and diversification through the inter-sectoral complementarity of activities at various territorial scales.

It seems that our framework of study, sustainability through the diversity of agricultural activities, finds in this approach a new way of analysis: it would no longer be a question of addressing the simple diversification of agricultural activities in an area for its own sake and its environmental benefits, but of seeking complementarity between varied agricultural activities within an area and thus linking economic, social and environmental performance.

In addition to these initial conceptual foundations for analysing the territorial dynamics of GIs and their sustainability, the next section proposes a more quantitative approach.

1.3 Sustainability and diversity of GIs in local areas

Quantitative studies on the sustainability of GIs often focus on one or more specific productions (Vandecandelaere et al., 2018, 2021; Cei et al., 2018; Arfini and Bellassen, 2019). Quantitative studies on the territorial dynamics of Quality and Origin Identification Signs (SIQO) are rarer, mainly due to a lack of exhaustive data on GI farms. In France, the partnership between the INAO and the ODR[1] (INRAE) on the Territorial Observatory of SIQO (OT-SIQO) for more than 10 years has made it possible to gather data on all the operators involved in GI schemes (mainly agricultural producers and processors) and their location between 2012 and 2020 (Regolo et al. 2024)[2] .

Using these data, Regolo et al (2024) measured the intensity with which GI approaches are present in the territories and the diversity of GIs. The former is approximated by the proportion (in %) of farms involved in GIs, and the latter by the number of GIs in which farms are involved. This study covers 1,517 cantons (cantonal level – NUTS4) nationwide over the period 2013-2020.

An econometric analysis was then used to assess the impact of changes in these indicators on the three dimensions of sustainable agricultural development in the cantons:

- Economic performance is measured by the farm profit earned per unit of non-salaried work (data from Mutualité Sociale Agricole - MSA, 2012-2021);
- Social performance is estimated using employment indicators (number of FTEs, average salaries);
- Environmental performance is analysed using a measure of the pressure on biodiversity from farming activities (proportion of grassland, crop diversity, nitrates, pesticides).

Figures 1 and 2 show that in 2013, GIs are mainly concentrated in mountainous areas, which are less suitable for intensive farming.

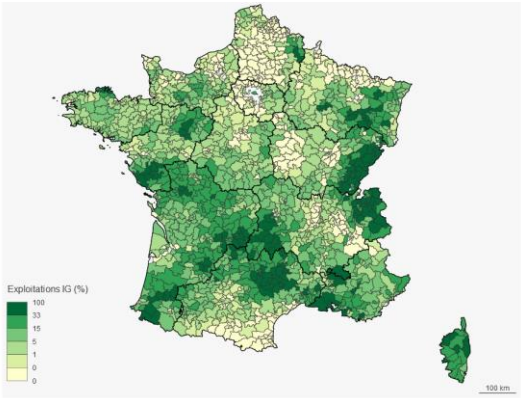


Figure 1: Share of GI farms (intensity) in % in 2013

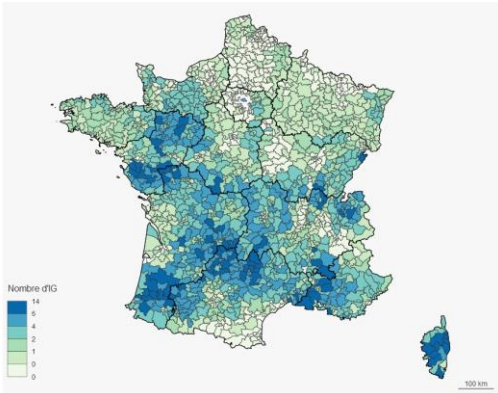


Figure 2: Number of GI products (diversity) in 2013

Source: ODR-INAO data, Regolo et al (2024)

The study also shows that variations in the proportion of farms with GIs and in the diversity of GIs between 2013 and 2020 vary from one region to another (figures 3 and 4). For example, positive variations can be observed in Vendée (Bœuf de Vendée, Volaille de Vendée, Mogette de Vendée), Saône et Loire, Pyrénées Orientales and Corsica.

[1] The Rural Development Observatory is a service unit of INRAE, which hosts and processes large administrative databases on agricultural systems and policies in France, based on institutional partnerships with public bodies in charge of agricultural, rural and environmental policies.

[2] Link to the OT-SIQO platform: https://odr.inrae.fr/intranet/carto_joomla/index.php/reseaux/portailqualite

Link to the resources for the INAO/INRAE seminar on SIQO on 26 September 2023 : https://www.inao.gouv.fr/Nos-actualites/colloque-inao-inrae-26-09-2023

On the contrary, a significant drop in the proportion of GI farms can be seen in the Massif Central, which is traditionally a very committed area.

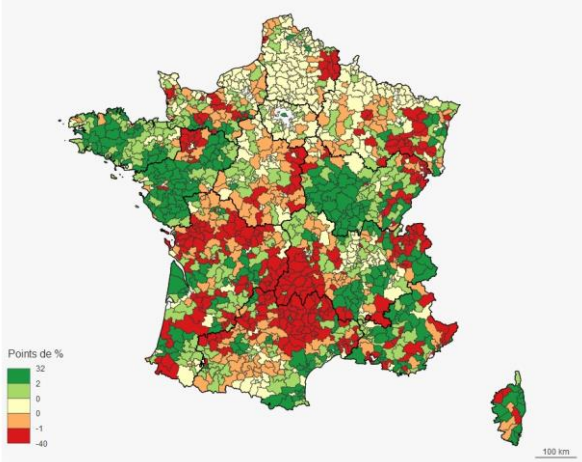


Figure 3: Average change in the proportion of GI farms (%)

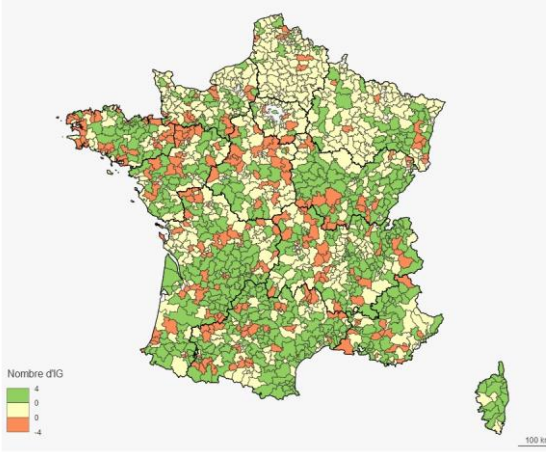


Figure 4: Average change in the number of GI products

Source: ODR-INAO data, Regolo et al. 2024

The researchers then measured the impact of these changes on sustainable development. The econometric analysis is based on a double-difference impact assessment model on continuous variables. This model makes it possible to assess whether cantons whose level of GI (intensity or diversity) has increased compared with 2013 have seen their sustainability indicator (economic, social and environmental) increase more than cantons that have not seen an increase in GI, "all other things being equal", i.e. once controlled for all the other factors that can influence sustainability[3] .

The results show positive economic, social and environmental effects:

- GIs are initially more present in territories where farmers' incomes are relatively low, which is consistent with the results of Cei et al. (2018) in Italy;
- An increase in the average income of farmers and in employment in cantons where an increase in GI has been observed;
- No clear and significant impact on wages;
- A positive effect on pesticides in surface water and on the preservation of habitats (crop diversity and proportion of grassland). However, an increase in the concentration of nitrates in surface water is associated with a high intensity of GIs.

In addition, the results show that the diversity and intensity of GIs both play a complementary role in the sustainable development of territories and confirm the relevance of the GI protection policy in France (Regolo et al., 2024). They provide interesting information regarding the implementation of these policies, confirming the importance of GI diversity and suggesting the limits of GI intensification in a small number of products.

The above analysis provides us with information on the effects of GIs and their diversity on the sustainability of territories. However, it has not enabled us to identify whether GIs have contributed to the diversification or specialisation of regions.

[3] The authors control for all factors linked to the cantons and invariant over time (cantonal fixed effect), for annual shocks (year fixed effect), as well as for changes in support from the second pillar of the CAP and organic farming in the cantons over the period 2013-2020.

In the next section, we use data from the OT-SIQO to investigate this question.

2. Observations of GIs in the regions: between the viability and sustainability of production/industries

We present here the results of work by agronomy students at INP-ENSAT who have described and analysed the presence of GIs in certain areas and their development in terms of the specialisation of these areas, using data from the OT-SIQO (ODR/INAO). The analyses focused on the territories of certain former regions, which are large enough to encompass a diversity of production, but not as large as the new regions. A total of six areas were chosen to illustrate the variety of products, GIs and soil and climate conditions. (Figure 5).

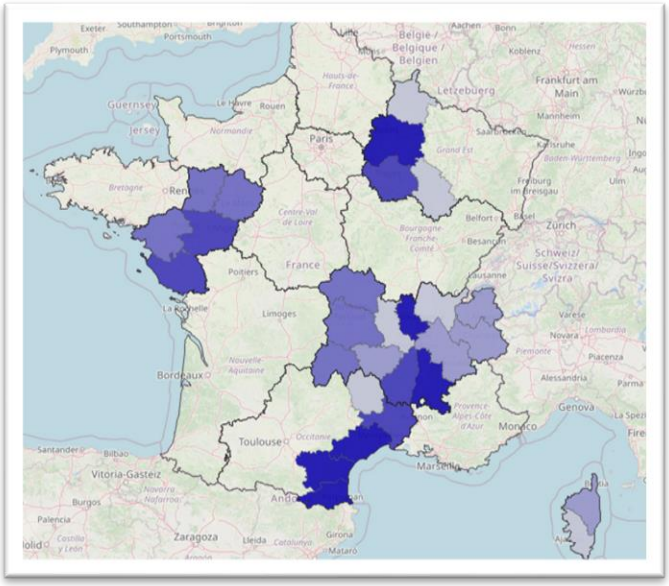


Figure 5: The 6 study areas

The study consisted of examining the correlations between the technical and economic orientations of the local farms and the GI sectors present in these areas, taking into account the intensity of their presence, their diversity and their economic performance (focusing on the PDOs that are more firmly rooted in their terroirs).

The underlying hypothesis is: if the OTEX (which is the sector of technical and economic specialisation of the territory) and the sector of a GI are identical, and if the GI is very present and growing economically, then the GI contributes to the area's specialisation. However, high-performance and diverse GIs outside the area's OTEX are seen as a vector for diversification.

The data collected on OT-SIQO allow to calculate changes in the share of PDO operators between 2013 and 2021 and in the diversity of GIs in these regions. The indicator of performance is the evolution of volumes produced under PDO in the zone.

In summary, a graphic representation (mapping) of the area has been designed to position the PDOs according to their performance (economic viability) and according to their role in the diversification or specialisation of agricultural activities in the area (whether or not the PDO sector coincides with the local

OTEX)[4] . We propose below to present the broad outlines of two analyses chosen for the contrasting dynamics they reveal.

2.1. Areas undergoing diversification: the example of Corsica

All of Corsica is covered by PDOs, and the geographical areas of the PDOs overlap.

There is a mosaic of OTEX in Corsica (figure 6). Soil and climate conditions influence the OTEX, but the OTEXs do not correspond to the production areas of the 16 PDOs (Figure 7).

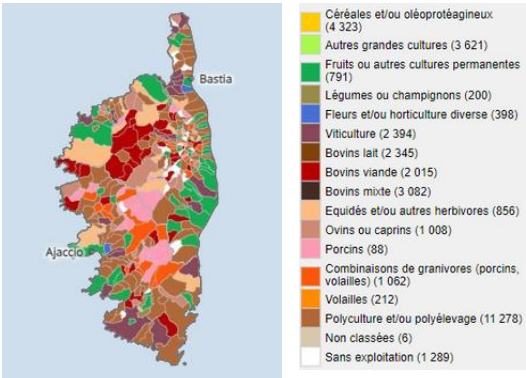


Figure 6: Map of OTEX in Corsica

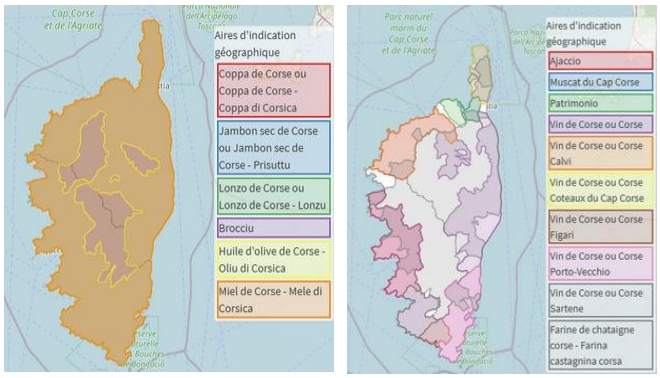


Figure 7: Geographical areas of Corsica's PDOs (within the region and along the coast)

Source : Barthe Marion - Cabrol Flora - Cuq Pierre - Enjalbert Lucie - Fabre Tanguy - Aya Menard (2023)

Between 2013 and 2020, certain PDO products, such as Muscat de Corse, remained stable in terms of the number of operators and their location. Other designations, such as Coppa de Corse PDO, on the other hand, are tending to spread out over various territories. Comparing the results on the economic viability of the sectors and territorial specialisations gives rise to the diagram below (figure 8).

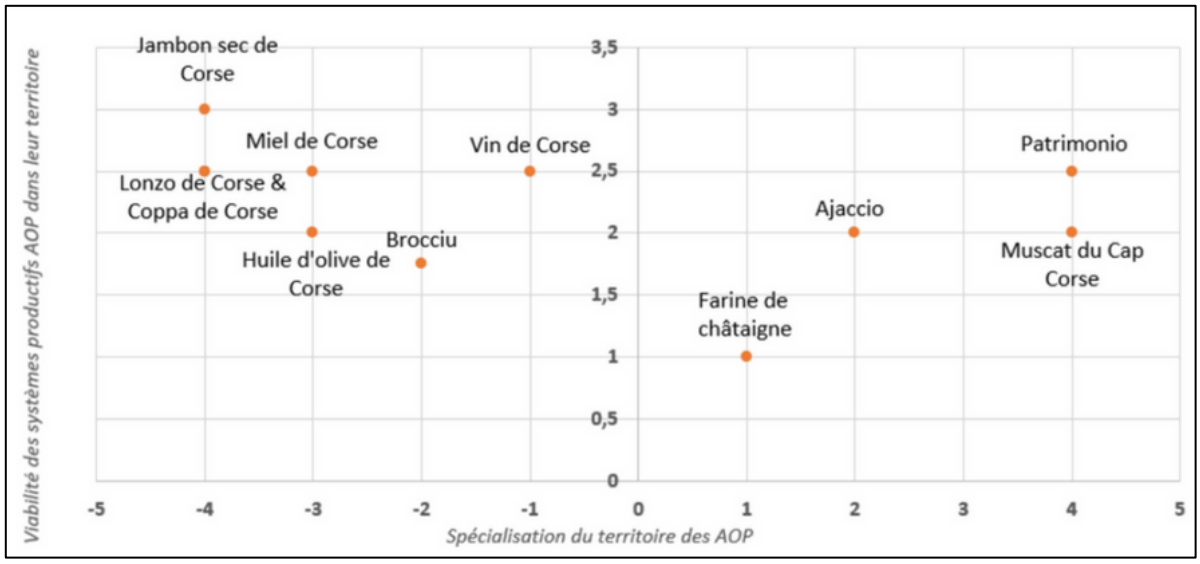


Figure 8: Mapping of PDO production systems in Corsica

Source : Barthe Marion - Cabrol Flora - Cuq Pierre - Enjalbert Lucie - Fabre Tanguy - Aya Menard (2023)

[4] The summary posters produced were presented at the CIAG conference on 9 November 2023.

It is clear that the proliferation of PDOs across the region is helping to diversify farming activities. Some inter PDO complementarities can be observed, for example, in the centre of the region, the PDO Corsican chestnut flour and the PDO Corsican Coppa or the PDO Corsican Lonzo.

2.2. Areas undergoing specialisation: the example of Champagne

In the Champagne region, the dynamics are quite different. The GI area is dominated by wine production and partly by cheese production, which also corresponds to the technical and economic orientation of farms in the area (figures 9 and 10). In 2020, there were still a large number of producers: 21,215 licensed operators for these PDO products.

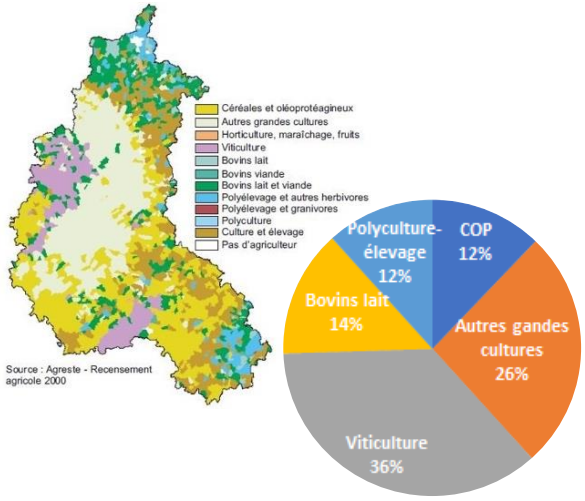


Figure 9 : OTEX in Champagne-Ardenne

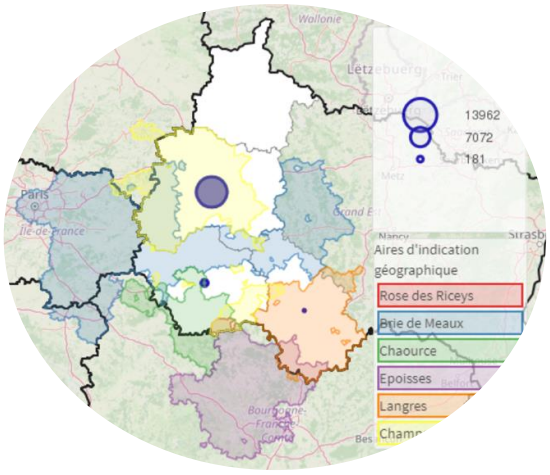


Figure 10: Areas covered by the 6 PDOs in Champagne-Ardenne

Source : Camille DUMAS, Marc ANTIGNY-GENET, Alexandra LAMOULIATTE, Solene BESANCON - Aya MENARD (2023)

The economic performance of the leading PDO : PDO Champagne provides a long-term future for producers in an increasingly large geographical area. The 5 other GI productions occupy very few farms. Whatever their appellation area, these other GIs are more vulnerable (figure 11).

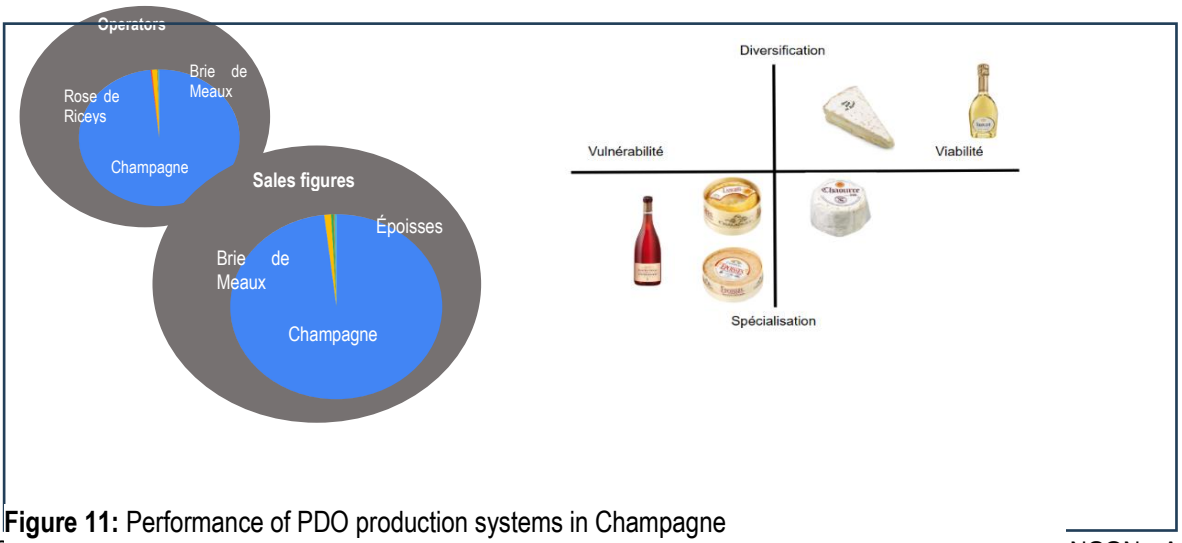


Figure 11: Performance of PDO production systems in Champagne

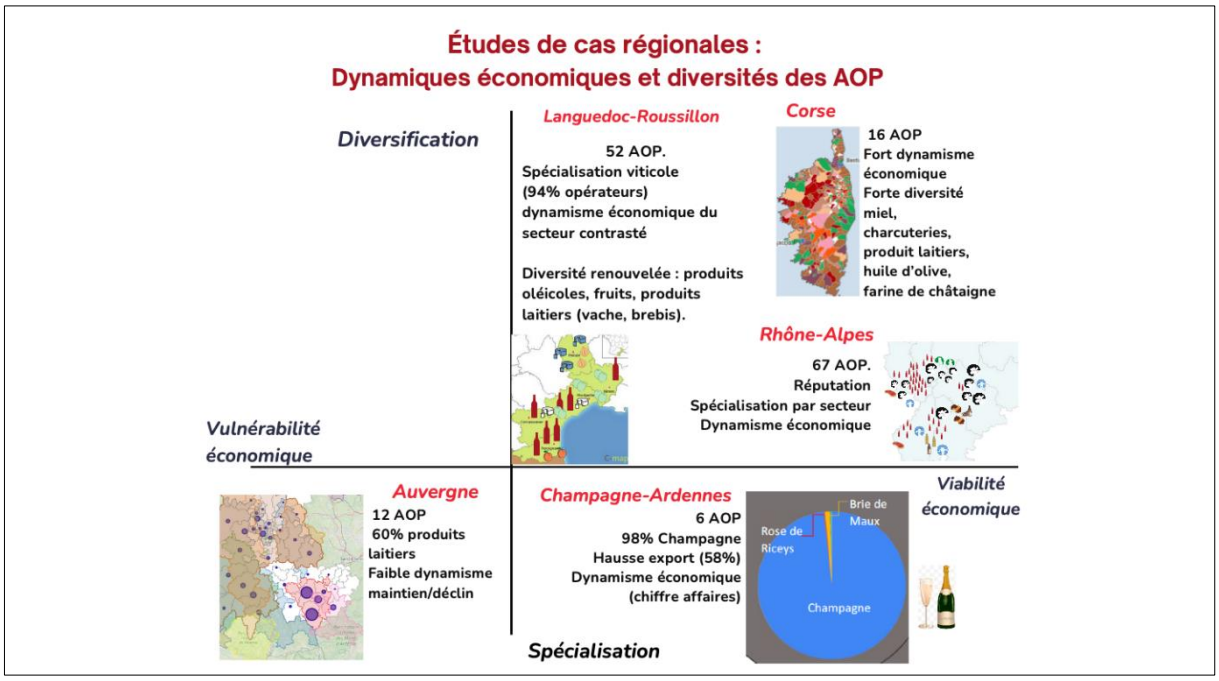
Source : Camille DUMAS, Marc ANTIGNY-GENET, Alexandra LAMOULIATTE, Solene BESANCON, Aya MENARD, (2023)

2.3. A summary of five areas with contrasting dynamics

To conclude this review of the situation in a number of areas, we find that the creation of value most often brings economic continuity to producers, as is the case in Champagne. It can also lead to a concentration of production, which tends to undermine the diversification of agricultural areas. The Champagne PDO is economically dynamic, particularly in terms of exports, and concentrates the vast majority of operators in the defined area.

However, some regions, such as Corsica, managed to move away from the rationale of income to encourage the maintenance of a variety of more or less complementary agricultural products.

The other four explorations of regions also show that the contributions to the diversity of GI farmland are also dealt with on a case-by-case basis (figure 12).



Source : Julie REGOLO, Valérie OLIVIER SALVAGNAC, Aya MENARD, Lucie GIRAUDOU

Figure 12: Regional case studies: Economic dynamics and diversity of PDOs

In the Rhône-Alpes and Languedoc Roussillon regions, the dominant wine and dairy PDOs, which are relatively export-oriented, are firmly rooted in the region, but coexist with a wide variety of other PDOs in a wide range of sectors, which are experiencing strong economic growth.

3. The results of the CIAg workshop: innovations for the better

At the turn of the 21st^{ème} century, sustainable agriculture means sustainable food. Consumer expectations now combine hedonic, environmental and social criteria. As a result, the positive image of GIs in their territory is struggling to be maintained, particularly when comparative tests of products and supply chains show that, in terms of specifications, some GIs appear to be less beneficial in environmental terms than in economic terms, while others manage to keep their promises (Basic Report, GreenPeace, WWF, 2021). What's more, consumers no longer feel that GI products are sufficiently firmly rooted in the local area. Particular attention should be paid to forms of "relocalisation of agriculture" (Frayssignes et al, 2021), combining short circuits and other collective approaches.

These thoughts were put to the participants (students, researchers, teachers) in the CIAg workshop on the role of GIs in the diversification of agricultural activities. The aim was to ask participants to suggest

agro-ecological transition initiatives that would help to meet environmental challenges and diversify farming activities in GI areas. A three-stage "post-it" sequence (annex) was used to launch the discussions:

Period 1: examples of PDOs were proposed by the participants according to the production dynamic generated in their area (diversification or territorial specialisation) and according to their economic performance (vulnerability, viability).
Period 2: Diagnosis of the obstacles and levers to diversification in PDO areas.
Stage 3: Medium- and long-term approach to encourage the transition of PDO areas towards greater diversification.

For the participants, land pressure and international renown are major obstacles to change and diversification in GI areas, particularly PDOs. PDOs with a high added value, such as the Champagne PDO, increase land pressure and leave little room for other types of production.

Among the existing levers, the participants cited the current interest shown by farmers, agricultural advisors and local authorities alike in the circular economy, the exploitation of co-products, the joint exploitation of several crops, the development of associated crops and the food autonomy of livestock farms.

In the context of an agro-ecological transition of territories, several potential transformations of GIs have been mentioned.

An initial series of discussions during the workshop led to a broader reflection on the concept of the pedoclimatic environment, enabling :

- Analyse its potential in the context of climate change (e.g. what crops should be grown to replace vines?) and the implications in terms of agricultural land management. The aim could then be to implement proactive land management policies to promote diversification;
- Encourage the combination of old and new complementary products.

The second category of issues concerns the introduction of environmental requirements into the specifications drawn up by producers (e.g. better water management; the obligation to use local organic fertilisers; greater food self-sufficiency on farms).

The final recommendations relate to the communication efforts that need to be stepped up, particularly with regard to the requirements met by GIs, with tourists and local marketing channels, in order to promote the vectors of agricultural and food sustainability promoted by GIs in their area.

To sum up, the diversity of the participants' points of view made it possible to discuss possible courses of action combining technical developments, conceptual changes in terroir selection policies and local communication initiatives.

4. Outlook: between deadlock and transition towards diversification

GIs have a fairly positive impact on the sustainable development of France's regions, as shown by the work of the ODR in 2022. What's more, the diversification of PDO production in the same area reinforces these effects, both economically and environmentally.

However, it emerged that PDOs are making varying contributions to the diversification of production in different regions (case studies). In fact, there is a significant risk of intensifying the specialisation of certain products as soon as their economic performance/creation of value becomes particularly attractive for the region (examples: Champagne, winegrowing, spirits). We mentioned the example of Champagne in this workshop, but this is also the case for other export-oriented French vineyards. For example, the vineyards

of Bordeaux, which doubled their surface area in the 1990s in response to their export success, are now facing a crisis of overproduction. In addition to the environmental issues involved, specialisation in this region means that producers' incomes are highly vulnerable to the ups and downs of the world market. The current fall in global demand for Bordeaux wines is forcing some producers to grub up their vines and encouraging them to diversify. On a different note, the Comté AOC has enjoyed great success on the national market in recent years, and the sector has emerged as a model of remuneration for milk producers, both in terms of level and stability. Despite a balanced governance structure that allows volumes to be regulated, the intensification of production over a limited geographical area is now showing its limits. Not only are farmers' incomes stagnating, but the ecological consequences of excess nitrogen in the soil are worrying.

However, PDOs can also act as diversification tools at several levels, at farm level by diversifying sources of income, but also at regional level by maintaining a diversity of activities. They make it possible to protect these emblematic local products from cost competition and to guarantee consumers food that respects traditional know-how. In addition, the development of farming activities is based on economic, social and environmental performance founded on complementarities that can be exploited to the full, enhancing the reputation of the locality and encouraging the joint organisation of outlets (in line with the concept of linked variety). This is the case in Corsica, as we have seen. There is also potential in other regions, such as Languedoc-Roussillon with the PDOs 'Châtaignes des Cévennes', 'Abricots rouges du Roussillon', 'Lucques du Languedoc' and 'Taureau de Camargue' (see posters from the GI CIAg workshop, November 2023).

Discussions during the workshop revealed that a transition towards greater sustainability in agricultural areas is not limited to technical solutions centred on revising the requirements of specifications. We also need to think in terms of regional governance and collective action to meet the heightened expectations of society and the urgent need to tackle climate change.

Research into these issues is ongoing and will continue, notably as part of the GIngKo project: Geographical Indications as Global Knowledge commOns (funded by the Agence Nationale de la Recherche - ANR) and as part of the INFAAQT Chair in "Innovation in agricultural and agri-food sectors, for quality and territories",[5] on the multiplication of quality approaches in a context of transition.

Ethics

The authors declare that the experiments were carried out in compliance with the applicable national regulations.

Declaration on the availability of data and models

The data supporting the results presented in this article are available on request from the author of the article.

Declaration on Generative Artificial Intelligence and Artificial Intelligence Assisted Technologies in the Drafting Process.

The authors have used artificial intelligence-assisted technologies to translate from French to English.

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[5] The INFAAQT teaching and research chair is dedicated to approaches to the qualification of agri-food products that involve the upstream sectors. It is backed by the Endowment Fund of the Toulouse Midi-Pyrénées Federal University, and supported by Toulouse INP-ENSAT, El-Purpan, Institut Agro Montpellier and the Occitanie Regional Institute for Food Quality (IRQUALIM).

Authors' contributions

The authors carried out the bibliographic analyses. They supervised the students' work on the case studies and posters. They contributed to the Carrefour de l'Innovation Agronomique workshop on GIs. They wrote this article.

Declaration of interest

The authors declare that they do not work for, advise, own shares in, or receive funds from any organisation that could benefit from this article, and declare no affiliation other than those listed at the beginning of the article.

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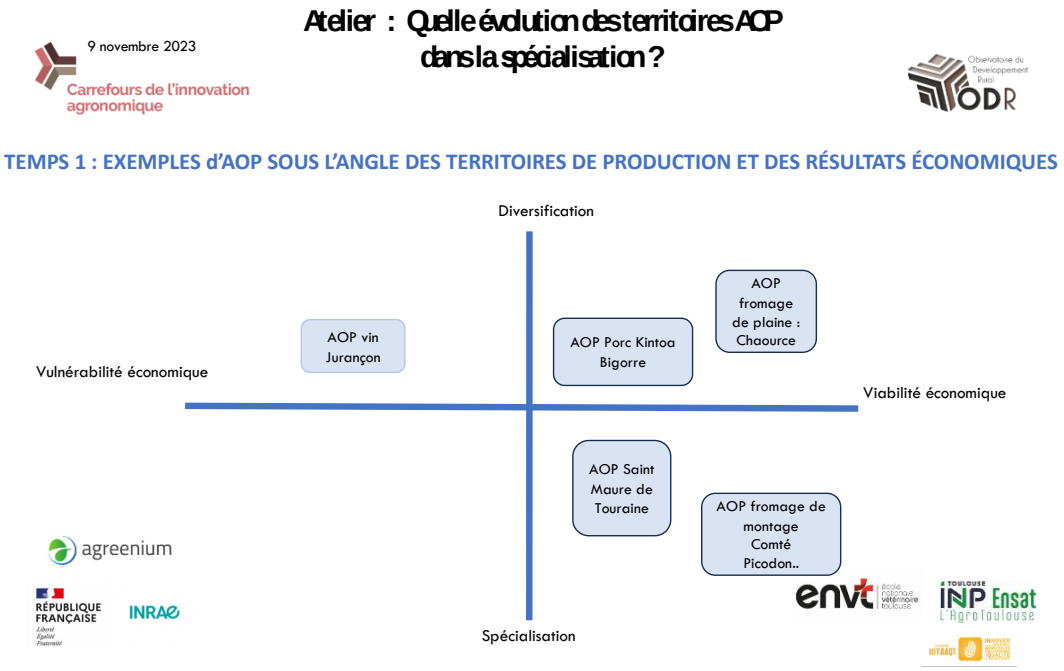
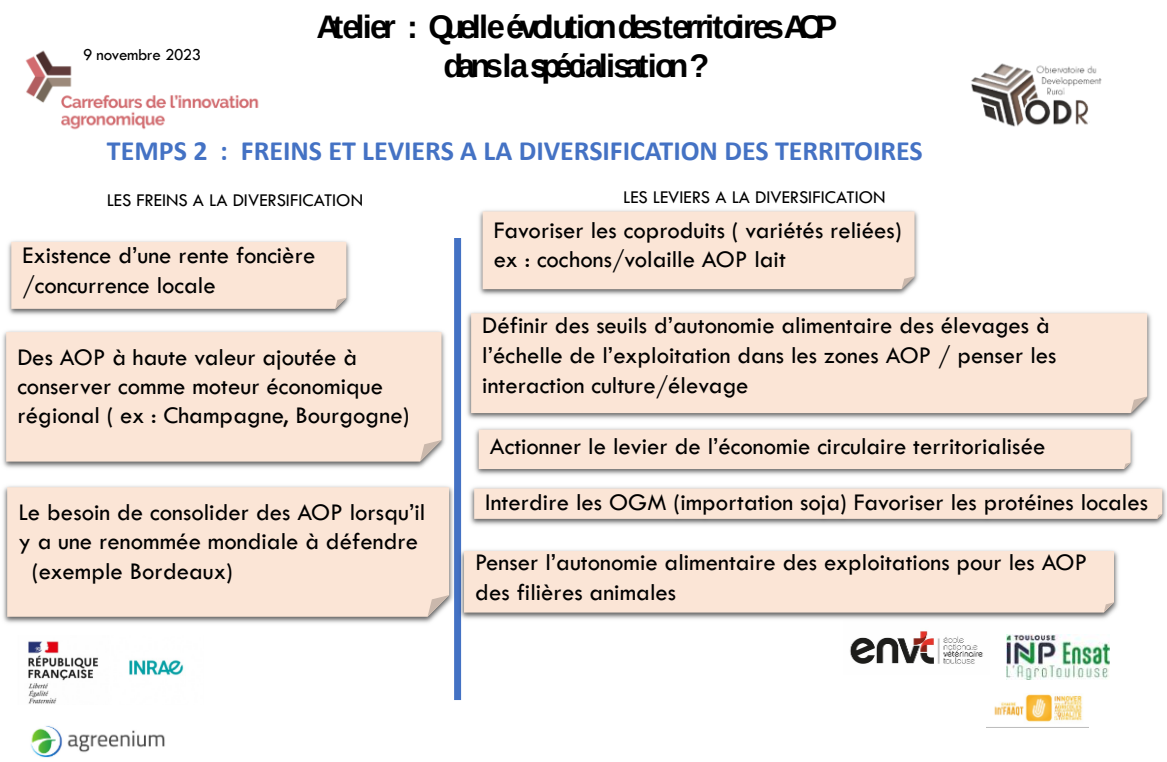
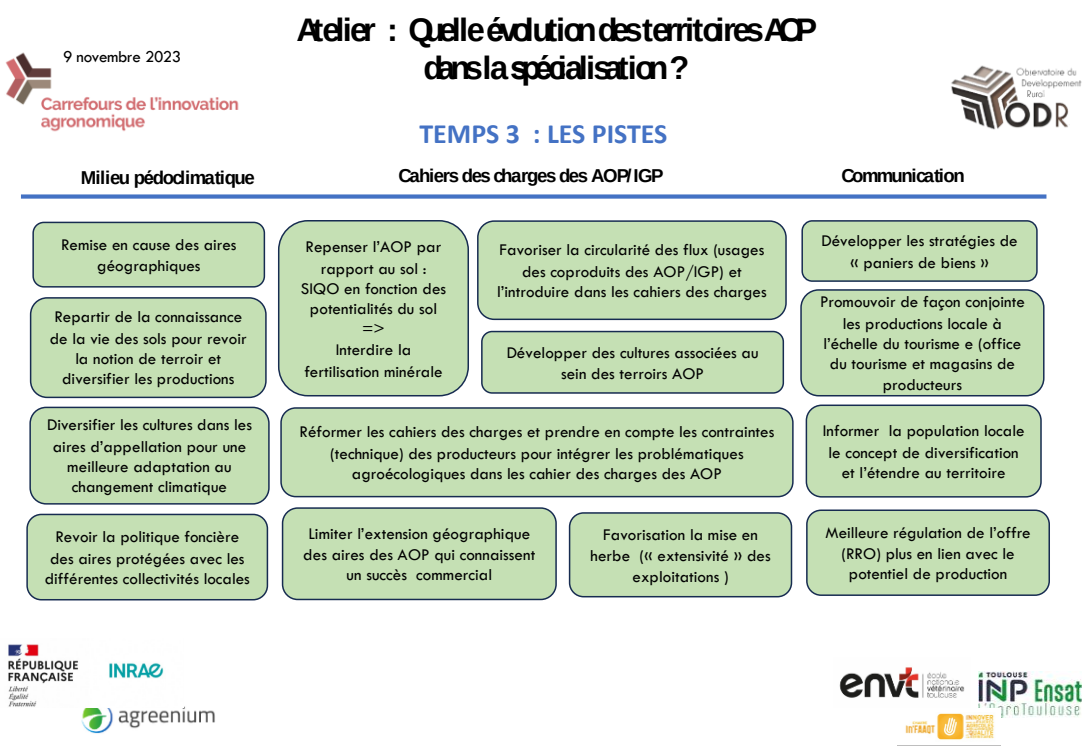
Appendix: Post-it sequence - GIAg workshop, November 2023, INP ENSAT in 3 stages
Each box corresponds to a post-it note proposed by a participant







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