

**CHANGING THE SCALE OF CHARACTERIZATION OF A WINE AREA:  
FROM A SINGLE PROTECTED DESIGNATION OF ORIGIN TO A  
VINEYARD LOIRE VALLEY OBSERVATORY (ViLVO).**

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**ABSTRACT**

Terroir is increasingly important today in wine markets. In a large wine production area such as the Loire Valley, the whole territories/terroirs can be distinguished according to different combinations of geological, soil, climatic and landscape features but are also characterized by their differences and likenesses in terms of combinations of terroir units and practices.

The objective of the study is to obtain a systemic analysis of the typicality of wines conferred by the terroir in a large territory and identify which practices are associated with the production of typical wines in a given territory or a specific area of wine production.

In a previous work, a method was designed to identify some viticultural and enological practices that allow distinguishing wines at the scale of a PDO (Protected Designation of Origin<sup>1</sup>), in a small territory. The new challenge is to extend the method to the different sub-basins of the Loire Valley, and to check if the same results can be obtained for other types of wines. The extension of our method to study the practices of the winegrowers requires some adaptations before it may be applied on a larger scale as in a Vineyard Loire Valley Observatory. The choice of the strategy was to combine a small scale diagnosis with a participatory method with Research Development and Extension (RDE) officers to answer our questions and organize ViLVO.

We were thus able (i) to solve some problems such as the working organization of ViLVO users and databases property, (ii) to combine RDE officers and searchers goals around the identification of significant practices associated with wine quality and fame and (iii) to focus on outstanding practices involved in terroir typicality of Loire Valley wines.

**KEY-WORDS**

Practices, vineyard, scale, observatory, participatory method

**INTRODUCTION**

Terroir is increasingly important today in wine markets. In a large wine production area such as the Loire Valley, the whole territories can be distinguished according to different combinations of soil, climatic and landscape features but are also characterized by their differences and likenesses in terms of combinations of terroir units and practices and socio-economical links between winegrowers (Casabianca et al., 2006; Warner, 2007).

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<sup>1</sup> « Appellation d'Origine Contrôlée », in French

Usually, **practices** are studied one by one at a **small scale**: plant, plot, small PDO (Thiollet-Scholtus et al., 2007). Larger scales such as watershed or region deal with environmental or economic topics (J.-B. Coulon et al., 2004; Thiollet-Scholtus, 2004).

### **Definition and measure of social and economic dynamics of a farm.**

#### **Study of terroir combined to farm dynamic.**

Structure of collective winegrowers' actions to reach a goal (environmental qualification of quality assessment ?). (Teil et al., 2009)

**The aim of the study.** Most of European famous wines are very well-known because of centuries of know-how. If there are many studies about wines at the PDO scale, there are only a very few studies at the larger sub-basin production scale.

The aim of this paper is to combine results obtained at a small scale with a participatory method to get a systemic analysis of the typicality of wines conferred by the terroir in a large territory. In other words, using small-scale results and participatory method to characterize wine Terroir typicality of a large production area?

### **MATERIALS AND METHODS**

**Geographical area.** The PDO « Anjou-Villages Brissac » (AVB) is located in the Loire valley (France), along the Aubance river, southeast of Angers. According to the low demand of AVB wines, AVB wines are produced on approximately 62 ha whereas 2000 ha are classified as « Anjou-Villages Brissac » PDO.

**Soil types of plots.** The plot soils were studied using a field soil model based on the type of parent rock, the depth and the clay content of the soil, mainly in connection with the weathering level of the parent rock. Each soil type is considered as a homogeneous unit for vine production in terms of ecophysiological factors (Cerf et al., 1998). Each plot is characterized according to this typology.

**Viticultural and enological practices.** In order to characterize vine production systems, direct “closed-ended” interviews were carried out with 33 winegrowers who produced AVB wines. The questions aimed at describing all the technical choices and vineyard operations. Every viticultural and enological practice, which could influence the quality of the wines, was taken into account. At the end, 169 vine plots were characterized according to farm type, 20 viticultural practices and 12 enological practices (Thiollet-Scholtus et al., 2007).

**Socio-economical types of farms.** The method used to characterize the farms consisted on direct “semi-opened” interviews carried out with the 34 winegrowers who produce AVB wines. The questions aimed at describing the labour and farm management and organisation, winegrower business strategy and winegrower point of view about French wines market.

**Participatory method for changing the scale of study.** In the Loire Valley, the “Chambres d’agriculture<sup>2</sup>” decided to join together with researchers to analyse the wine production systems in a participatory workshop process. The method attempts to target more effectively RDE dedicated work programmes by involving winegrowers and RDE actors from the very beginning

<sup>2</sup> Research Development and Extension (RDE) agencies

of the process (Dore et al., 2008). In our project, the association of social and technical analyses is needed in order to understand the adoption of decision-making processes by the winemakers (Sarrazin, 2008). It is also very important to convince real-world RDE managers to be involved together with the researchers and to negotiate with them the potential mutual benefits of the ViLVO (Akinola, 1986; McCown, 2002). For these purposes, three guided brain-storming meetings were organized in March 2009 with winegrowers' advisers and RDE staff of Loire Valley Vineyards. Participatory method was used to change scale of study and get research and development coordination in ViLVO.

**Statistical analyses.** Sociological data were synthesized by a sociological expert and practices were analysed with XLstat-pro (Addinsoft, 2009).

## RESULTS AND DISCUSSION

### R1. 3 social-economical types of farms.

Among the 34 farms analysed in PDO-AVB, 4/5 of them (27) develop a strategy to promote PDO-AVB among French wines. 22 INVA farms are independent wine companies and decide by themselves their business strategy whereas 5 COOP farms are members of a wine cooperative and follow the cooperative's strategy. Only 7 INOP farms are independent and don't do anything to promote PDO-AVB wines more than others PDO they produce.

### R2. Outstanding practices for farm types at PDO scale.

For practices with continuous data (Tab. 1), an ANOVA was performed, using a model where Farm types was the main effect. 12 among 16 practices were related to Farm types ( $P < 0.1$ ): age of the plot, density of vineyard, leaf area, winter pruning time, numbers of buds, number of trimmings during wet and dry years, temperature and duration of alcoholic fermentation, duration of maturation of the wine, percentage of use of new oak barrel during ageing wine, duration of vatting wine.

A PCA was performed on continuous practices; total inertia of the 3 first axes was 48% (Fig. 1). For F1, highest cosines of the variables were as follow: total number of buds left during pruning (0.35), duration of maturation of the wine (0.38), use of new oak during maturation of the wine (0.65), duration of vatting of the wine (0.39), duration of alcoholic fermentations (0.28). For F2, cosines were the highest for planting density of the vineyard (0.25), Leaf area/height ratio (0.48), number of trimmings during wet years (0.51) and number of trimmings during dry years (0.49) and for F3, they were the highest for day of harvest (0.43).

For practices with categorical data, Khi-2 tests were performed for each Farm type (Tab. 2). 12 among 16 practices related to Farm types were significant: type of winter pruning, disbudding, of leaf thinning, of bunch removing, cover crop in rows and inter-rows, crushing pruned shoots, soil and leaf fertilizations, harvest temperature, juice extraction intensity and adding or not pressed-juice to free-run juice after? pressing.

A multiple correspondence analysis was performed on practices with categorical variables. In order to reduce the amount of information, a HCA and a PCA were performed on the three first axis coordinates with a total inertia of 62%. Fig. 2 shows this analysis of categorical practices with F1, F2, and F3. The two axes F1 & F2 are represented by INVA plots whereas axis F3 deals with COOP plots.

Table 1. Univariate analysis of variance of the practices according to the Farm type (169 plots).

Variable	Pr > F (Farm type)
YEAR	0,045
DENS	< 0,0001
LEAF_AH	< 0,0001
TAILL_time/prunning	< 0,0001
BOURG	< 0,0001
TRIM_W	0,027
TRIM_D	0,001
HARVEST	0,256
FA_TEMP	< 0,0001
FILTR	0,024
%TANK	0,758
%CAP	0,381
MATUR_MONTH	< 0,0001
NEW_OAK	< 0,0001
VATTING_DAYS	< 0,0001
FA_DAYS	0,001

Table 2. Univariate analyses for Khi2-test of qualitative variables according to the Farm type (169 plots).

Variable	p-value
BEDROCK	0,184
VARIETY	0,438
ROOTSTOCK	0,251
TYPE of TAILL	< 0,0001
TYPE of SUPP_BRG/disbudding	0,001
TYPE of EFPE2	< 0,0001
Bunch_Removing	< 0,0001
INTERROW	< 0,0001
ROW	0,021
CRUSH_Pruned-SHOOTS	< 0,0001
FERTI_MINERAL	0,003
FERTI_LEAF	< 0,0001
HARVEST_Temperature	0,029
YEASTING	0,088
EXTRACT_Types	< 0,0001
Free-Run Juice	< 0,0001

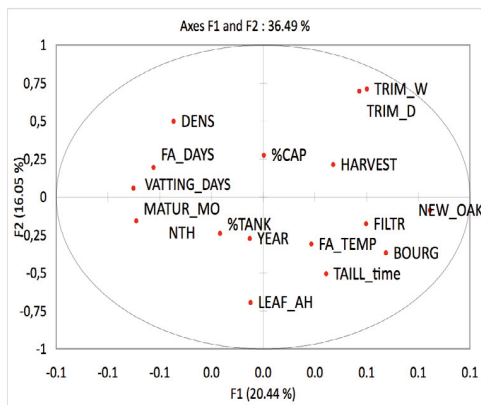


Figure 1. PCA of practices according to the Farm type.

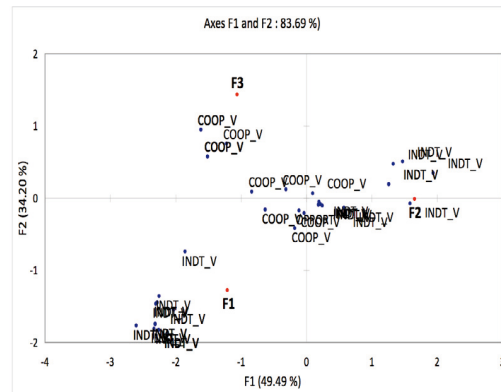


Figure 2. Principal Correspondence Analysis (PCA) of F1, F2 and F3 coordinates of categorical practices according to the Farm type.

**R4. Wishes expressed by RDE staff in ViLVO.**

Main reasons of the point “identify which subjects these people want to see in ViLVO” deal with the scale of work: the work has to be developed both at the field and at the territory scales.

At field scale, the objective is to optimize vine production systems in order to improve the fame of wines. At the territorial scale, the objective is to combine field data (technical practices, yield, must composition, etc.) and environmental factors such as climate or slope length for sustainability and development of wines fame (Dore, Clermont-Dauphin et al., 2008). These goals have to be developed as RDE and research combinative questions as for example: characterization of practices involved in wine fame according to Terroir typicality (Cadot et al., 2010; C. Coulon et al., 2010) and (Renaud et al., 2010; Teil & Barrey, 2009).

### **R3. Potential oppositions to ViLVO by RDE staff.**

Main reasons of the point “identify the potential reasons why people do not agree in working together in ViLVO” are not only financial reasons but also databases property. RDE staff want to have a ViLVO which give rapid answers to diseases problems in the field and economical sustainability of farms (Thiollet-Scholtus et al., 2009). To answer to RDE officers’ brakes, we can propose to submit tenders of reports for national and local funding.

To conclude the first step of the participatory research we need to solve the potential oppositions and describe what ViLVO will take into account. These decisions will be taken with winegrowers, RDE staff and viticulture experts.

### **CONCLUSIONS**

This work proposes to combine results obtained at a small scale with a participatory method to obtain a systemic analysis of the typicality of wines conferred by the terroir in a large territory and to compute results at a larger scale: ViLVO Loire Valley bassin. It will be then possible to go on with the second step of the participatory research method: surveys of outstanding practices and sociological farm types in a larger Loire Valley area in order to build useful databases for RDE staff and searchers. The adoption of this method will attempt to 1) exchange technical and social references among the different territories of the Loire Valley, 2) provide the growers with reliable and easily accessible information 3) transfer the results from research and RDE to the potential users, 4) develop new RDE projects according to farmers needs.

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### **BIBLIOGRAPHY**

- Akinola, A. A. (1986). Farmers' participation in the National Accelerated Food Production Project (NAFPP) in Nigeria. *Agricultural Systems*, 20(4), 301-311.
- Cadot, Y., Caillé, S., Thiollet-Scholtus, M., Samson, A., Barbeau, G., & Cheynier, V. (2010). Typicality related to terroir: from conceptual to perceptual representation. Study of the links with enological practices. In, *VIIIe Congrès International des Terroirs Viticoles*. Soave, Italie.
- Casabianca, F., Sylvander, B., Noël, Y., Béranger, C., Coulon, J.-B., Giraud, G., et al. (2006). Terroir et Typicité : proposition de définitions pour deux notions essentielles à l'appréhension des Indications Géographiques et du développement durable. In ENITA, *Vth International Terroir Congress*. Bordeaux-Montpellier: ENITA.

- Cerf, M., Papy, F., & Angevin, F. (1998). Are farmers expert at identifying workable days for tillage? *Agronomie*, 18, 45-59.
- Coulon, C., Rioux, D., Guillaume, S., Charnomordic, B., Barbeau, G., & Thiollet-Scholtus, M. (2010). Design of an indicator of vine vigor potential conferred by soil (VIPOS), using a fuzzy expert system. In, *VIIIe Congrès International des Terroirs Viticoles*. Soave, Italie.
- Coulon, J.-B., Delacroix-Buchet, A., Martin, B., & Pirisi, A. (2004). Relationships between ruminant management and sensory characteristics of cheeses: a review. *Lait*, 84, 221-241.
- Dore, T., Clermont-Dauphin, C., Crozat, Y., David, C., Jeuffroy, M.-H., Loyce, C., et al. (2008). Methodological progress in on-farm regional agronomic diagnosis. A review. *Agronomy for Sustainable Development*, 28(1), 151-161.
- McCown, R. L. (2002). Changing systems for supporting farmers' decisions: problems, paradigms, and prospects. *Agricultural Systems*, 74(1), 179-220.
- Renaud, C., Benoit, M., Thiollet-Scholtus, M., & Jourjon, F. (2010). Evaluation des impacts environnementaux des itinéraires techniques viticoles de production de vins AOP en Val de Loire : démarche d'adaptation de la méthode de l'analyse du cycle de vie. In, *VIIIe Congrès International des Terroirs Viticoles*. Soave, Italie.
- Teil, G., & Barrey, S. (2009). La viticulture biologique : de la recherche d'un monde nouveau au renouvellement du goût de terroir. *Innovations agronomiques*, 4, 427-440.
- Thiollet-Scholtus, M. (2004). *Construction d'un indicateur de qualité des eaux de surface vis-à-vis des produits phytosanitaires à l'échelle d'un bassin versant*. Unpublished PhD thesis, Institut Polytechnique de Lorraine, Nancy-Colmar.
- Thiollet-Scholtus, M., Morlat, R., & Barbeau, G. (2007). A new way to study relationships between Terroir and typical wine using technical and corporate surveys in an AOC territory. In, *XV International GESCO Viticulture Congress*. Porec, Croatie.
- Thiollet-Scholtus, M., Sarrazin, F., Badier, M., & Barbeau, G. (2009). Design of a participatory research to study the contributive factors in the building of wines fame. In, *II Farming System Design*. Monterey, USA.
- Warner, K. D. (2007). The quality of sustainability: agroecological partnerships and the geographica branding of California winegrapes. *Journal of Rural Studies*, 23(2), 142-155.