

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

M. Thiollet-Scholtus<sup>1\*</sup>, M. Badier<sup>2</sup>, G. Barbeau<sup>1</sup>

<sup>1</sup>INRA, UE 1117, UMT Vinitera, F-49070 Beaucouzé, France

<sup>2</sup>Chambre d'Agriculture 41. Rue Gutenberg ZA 41140 Noyers sur Cher France.

\*[marie.scholtus@angers.inra.fr](mailto:marie.scholtus@angers.inra.fr)

## 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 use small scale results and a participatory method to get a systemic analyse of Terroir typicality of wines 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 to distinguish wines at the scale of Protected Designation of Origin (PDO), 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 use small scale results combined to 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.

## KEYWORD

Practices, vineyard, scale, observatory, participatory method

## INTRODUCTION

**Definition and measure of terroir.** 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).

Usually, **practices** are studied one by one at **small scale**: plant, plot, small AOC (Appellation d'Origine Contrôlée) (Thiollet-Scholtus et al., 2007). Larger scale like 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 dynamic 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 Protected Designation of Origin (PDO) scale, there are a very few studies at the larger production sub-bassin scale.

The aim of this paper is to use small scale results and a participatory method to get a systemic analyse of Terroir typicality of wines 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.** PDO « Anjou-Villages Brissac » (AVB) studied is located in the Loire valley (France), in Aubance river area, 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 oenological 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 oenological practice, which could influence the quality of the wines, was taken into account. Finally the 169 vine plots were characterized through the farm type, 20 viticultural practices and 12 oenological practices (Thiollet-Scholtus et al., 2007).

**Socio-economical types of farms.** In order to characterize socio-economical type of farms direct “semi-opened” interviews were carried out with the 33 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 scale of study.** In Loire Valley, the “Chambres d'agriculture” which are Research Development and Extension (RDE) agencies decided to join together and with research agents 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 of the process, which is original (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 have been organized in March 2009 with winegrowers' advisers and RDE agents of Loire Valley Vineyards. Participatory method to change scale of study and get research and development coordination in ViLVO.

**Statistical analysis.** 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 trimming 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 trimming during wet years (0.51) and Number of trimming 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 were related to Farm types were significant: type of winter pruning, og disbudding, of thinning leaves, of bunch removing, cover crop in rows and inter-rows, crushing pruned shoots, soil and leaf fertilizations, harvest temperature, extraction intensity and adding or not pressed-juice to free-run juice during 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 axis 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	<b>0,045</b>
DENS	<b>&lt; 0,0001</b>
LEAF_AH	<b>&lt; 0,0001</b>
TAILL_time	<b>&lt; 0,0001</b>
BOURG	<b>&lt; 0,0001</b>
TRIM_W	<b>0,027</b>
TRIM_D	<b>0,001</b>
HARVEST	0,256
FA_TEMP	<b>&lt; 0,0001</b>
FILTR	0,024
%TANK	0,758
%CAP	0,381
MATUR_MONTH	<b>&lt; 0,0001</b>
NEW_OAK	<b>&lt; 0,0001</b>
VATTING_DAYS	<b>&lt; 0,0001</b>
FA_DAYS	<b>0,001</b>

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	<b>&lt; 0,0001</b>
TYPE of SUPP_BRG	<b>0,001</b>
TYPE of EFFE2	<b>&lt; 0,0001</b>
Bunch_Removing	<b>&lt; 0,0001</b>
INTERROW	<b>&lt; 0,0001</b>
ROW	<b>0,021</b>
CRUSH_Pruned-SHOOTS	<b>&lt; 0,0001</b>
FERTI_MINERAL	<b>0,003</b>
FERTI_LEAF	<b>&lt; 0,0001</b>
HARVEST_Temperature	<b>0,029</b>
YEASTING	0,088
EXTRACT_Types	<b>&lt; 0,0001</b>
Free-Run Juice	<b>&lt; 0,0001</b>

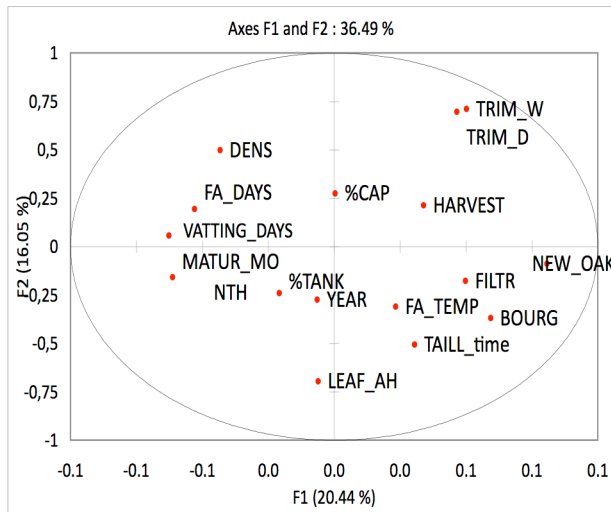


Figure 1. PCA of practices according to the Farm type.

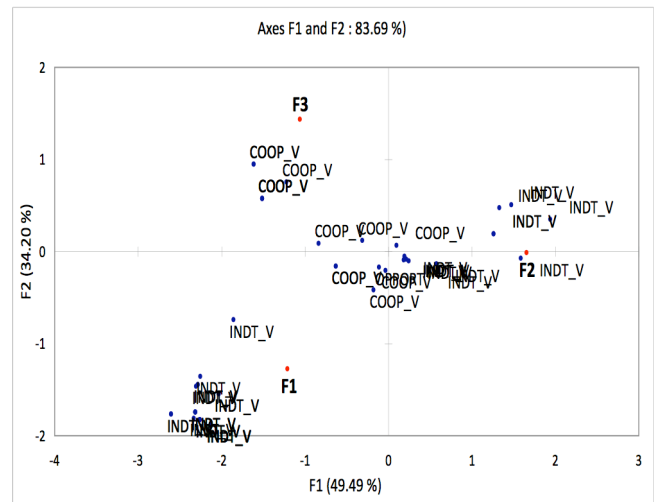


Figure 2. Principal Correspondence Analysis (PCA) of F1, F2 and F3 coordinates of categorical practices according to the Farm type.

#### R4. ViLVO contains wished by RDE agents.

Main reasons of the point “identify which subjects these people want to see in the ViLVO” deal with 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, ect.) 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 agents.**

Main reasons of the point “identify the potential reasons why people do not agree in working together in the ViLVO” are not only financial reasons but also databases property. RDE agents 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 agents and viticulture experts.

### **CONCLUSIONS**

This work proposes to use small scale results and a participatory method to get a systemic analyse of Terroir typicality of wines in a large territory ViLVO. It will be then possible to continue the second step of the participatory research method: surveys of outstanding practices and sociological farm types in a larger Loire Valley area to build useful databases for RDE agents 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 of research and RDE to the potential users, 4) develop new RDE projects according to farmers needs.

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