

Zoning of the Veneto region areas with Denomination of origin

Zonage des appellations d'origine contrôlée de la région Veneto

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Abstract: To characterize in depth the enological productions according to the origin territories and to provide modern tools for the qualitative raising of the assorted typologies of wine produced, Veneto Agricoltura (the regional agency for the agriculture, forestry and food industry development), the Regional Government of Veneto (north-eastern Italy) and various Consortia of Producers have undertaken since 2002 a systematic classification of the viticultural territories by agro-ecological zoning to achieve a strategic project aimed to set Veneto as the first Italian region to have completed in a systematic and scientifically rigorous way the zoning of most of its Denomination of Origin areas. In denominations such as Bardolino (VR), Breganze (VI), Colli Berici (VI) and Lison-Pramaggiore (VE) the program of study has come to an end with the year 2006. In other areas the jobs foresee a further year of investigation as for Arcole (VR), Lessini Durello (VR-VI) and Prosecco di Conegliano-Valdobbiadene (TV), while for the consortia of Bianco di Custoza (VR), Montello e Colli Asolani (TV), Terradeiforti (VR) and Valpolicella (VR) the studies of characterization will finish in 2008. For the denomination Soave (VR) a study is deepening the results of a previously concluded zoning project including Colli Euganei (PD) area. The first results underline the complexity of the viticultural models of the Veneto region, with a very wide and diversified ampelographic base both for the international and autochthonous varieties, and with territories that range from the lake and alluvial plains to the high hills. This complex pattern has to be interpreted to provide technical indications to the operators of the whole viticultural sector.

Key words: zoning, veneto, *terroir*

Introduction

Every study on factors influencing wine quality has to deal with two opposing views: the Nations of the Old World, producing wines for centuries, which are strong supporters of the area of origin as a key factor of wine typicity; on the other side stand the New World Countries, where viticulture is more recent, considering vine variety as the major responsible for wine characteristics.

These two points of view can be linked assuming that wine is the ultimate result of the interaction between environment and grape variety (Parodi, 1997). From this connection derives the quality and specificity of a certain wine: in two areas you can produce two good wines, but definitely different.

In order to understand and to improve quality is important to know the environmental components affecting wine performance and to manage these components choosing the appropriate varieties and cultivation practices (Bogoni, 1998). Therefore, a wine production area can be defined as a set of natural components acting on a vineyard to determine a typical and original wine. And, not incidentally, this statement adheres to the modern definition of *terroir*: « a specific designation area sharing the same type of soil, weather conditions, grapes and wine making style, which contribute to give a specific personality to the wine. Cultivation practices are adapted to the environment peculiarities by man's intervention, in order to enhance the local production specificity ».

This definition states the importance of studying the various factors relevant for the interaction between vineyards and the environment and affecting the genetic expression of a certain variety. This kind of study

was made possible applying an integrated and interdisciplinary methodology in order to identify the set of natural components related to the *terroir* effect.

Since the 80's it has been clear that a variety-environment interaction study has to be integrated and multidisciplinary. Viticultural attitude can be defined considering a wide range of information including climate, topography, soil, cultivation techniques, vineyard response, all these showing the degree of relation between climate, soil and vine (Scienza *et al.*, 1990).

The « viticultural attitude » notion can be therefore enhanced by « viticultural zoning »: an assigned area is partitioned and classified by its environmental features as well as by the ability of different varieties to react to these features.

Modern studies on viticultural attitude considering variety-environment interaction are based on 3 fundamental assumptions:

- interdisciplinary approach: a range of professionals must be involved: soil experts, climatologists, agronomists, enologists and information technology experts in order to analyse deeply and to explain environmental components;
- study of the interaction between genotype and environment: the potential quality of a production area can be evaluated analysing the results of the vine varieties interacting with the environmental components;
- assessment of wines produced in each different environment.

This can be a money and time-consuming methodology, it is therefore important to select a limited set of environmental, climatological and physiological parameters, nevertheless wide enough to understand the *terroir* effect. The complexity of the study is also due to the need of isolating the natural factors responsible for typicity from the man's made factors affecting production, such as viticultural and enological practices. This can be done by adopting standard techniques in vineyards and cellars as well as suitable statistical methods. The final results are used for the production of the best possible grapes from a certain environment and, consequently, of the best possible wine. Therefore, viticultural zoning can be considered as a tool for the assessment of the viticultural attitude of an assigned area in order to find limitations and potentials of the *terroir* expression. In other words, the final goal is to optimise the interaction between genotype and environment, defining suitable managerial strategies and guidelines.

A zoning study may have relevant impacts not only on the production techniques, but also it can lead to:

- new original and typical productions according to environmental specificities;
- identification of sub-areas with a strong viticultural attitude;
- protection from land planning projects that can threaten the best vineyards;
- implementation of a promotion policy based on quality wine.

Having in mind all these strategic goals Veneto Agricoltura, the Agency for the agricultural, forestry and agri-food sectors of the Veneto Region, since 2002 and first in Italy, has been working on a project for the classification of the Denominations of Origin (DOC) areas. To date, these are the areas where a viticultural zoning study has been set (fig. 1):

1. Colli Euganei (PD)
2. Soave (VR)
3. Bardolino (VR)
4. Breganze (VI)
5. Colli Berici (VI)
6. Lison-Pramaggione (VE)
7. Arcole (VR)
8. Lessini Durello (VR-VI)
9. Prosecco di Conegliano-Valdobbiadene (TV)
10. Bianco of Custoza (VR)
11. Montello e Colli Asolani (TV)
12. Terra dei Forti (VR)
13. Valpolicella (VR)

(VR = Province of Verona; VI = Province of Vicenza; PD = Province of Padova; TV = Province of Treviso; VE = Province of Venezia)



Fig. 1 - Denominations of Origin studied

Material and methods

All the zoning studies are based on a multidisciplinary approach featuring a regional chart of soils on a scale of 1:250 000 (AA.VV., 2005), further deepened to 1:25 000 in each study area, on a study of climatic resources (rainfall, temperature, etc.) and on bioclimatic indexes (Winkler, Huglin, etc.), but first of all on the study of interaction between genotype and its environment evaluating both maturation kinetics and quali-quantitative data during harvesting period, and organoleptic value on the base of microvinifications carried out for each vineyard used for the study. In table 1 features of investigation for each zone and each DOC are reported (surface area, varieties, number of vineyards).

| DOC | Surface area (ha) | Variety | Vineyards |
|---|-------------------|--|-----------|
| Colli Euganei (PD) | 1500 | Cabernet franc, Merlot, Moscato w. | 44 |
| Soave (VR) | 6600 | Garganega w. | 55 |
| Bardolino (VR) | 3000 | Corvina r., Rondinella r. | 114 |
| Breganze (VI) | 600 | Merlot, Cabernet S., Tocai w., Vespaiola w. | 28 |
| Colli Berici (VI) | 2000 | Merlot, Cabernet S., Red Tocai, Pinot w., Sauvignon b. | 31 |
| Lison-Pramaggiore (VE) | 2300 | Merlot, Refosco r., Pinot g., Tocai w. | 75 |
| Arcole (VR) | 4000 | Merlot, Pinot g. | 18 |
| Lessini Durello (VR-VI) | 600 | Durella w., Pinot n. | 21 |
| Prosecco di Conegliano-Valdobbiadene (TV) | 4100 | Prosecco w. | 54 |
| Bianco di Custoza (VR) | 1200 | Trebbiano w., Garganega w., Cortese w. | 30 |
| Montello e Colli Asolani (TV) | 470 | Merlot, Cabernet S., Prosecco w., Bianchetta w. | 34 |
| Terradeiforti (VR) | 22 | Enantio r., Casetta r., Chardonnay, Pinot g. | 37 |
| Valpolicella (VR) | 5800 | Corvina r., Rondinella r. | 60 |

Table 1 - Investigation of each Denomination of Origin: total surface area of the denomination, variety considered and number of vineyards studied

1- **Colli Euganei**: from 1998 to 2000 this DOC area has been investigated to evaluate the soil-vine interaction considering 10 taxonomic units of soil and the grape varieties Cabernet Franc, Merlot and White Muscat on a total amount of 44 vineyards. For each unit, at least 3 samplings for each plot have been carried out to evaluate sugar content, titrated acidity, pH, malic acid and tartaric acid. For at least 3 plants per plot at harvesting period analytic parameters and agronomic data (number of bunches per plant, weight of production per plant and number of shoots per plant) have been collected. At the end a sufficient amount of grapes has been harvested for microvinifications following a standard protocol and the wines obtained have been evaluated both analytically and sensorially (AA. VV., 2001).

2- **Soave**: from 1996 to 2001, with a surface area of 6 600 hectares (ha) registered as DOC, on 14 sub zones 55 vineyards of Garganega variety have been studied to evaluate its interaction with different growing environments. On each of them dates of principal phenological phases (sprouting, flowering, ripening, harvesting period) have been recorded. Also maturation kinetics about sugar accumulation and

degradation of acids have been recorded. During harvesting period, parameters such as sugar content, acid content (total, malic and tartaric) and pH on 10 plants per vineyard have been determined. Finally, for each of the sub-zones a microvinification process has been carried out to evaluate chemical and sensorial features (AA. VV., 2002). A deepening of the study to identify 16 *crus* of Soave and to evaluate the viticultural landscape is currently ongoing.

3- **Bardolino**: from 2002 to 2005, 114 vineyards of the typical varieties cultivated in this area (Corvina and Rondinella) have been selected on the base of a Soil Survey showing 66 cartographic units. For each vineyard data on phenological phases, maturation indexes (sugars, titrable acidity, pH, anthocyanins, polyphenols) have been collected. During harvesting, 6 plants in each vineyard have been evaluated (considering number of clusters, production, number of the buds, sugars, titrable acidity, pH, anthocyanins, polyphenols) and using around 100 kg of grapes microvinifications for each vineyard have been performed, evaluating the resulting wines from chemical and sensorial points of view.

4- **Breganze**: from 2002 to 2005, using the same experimental protocol before explained, 28 vineyards has been investigated. The varieties considered have been Merlot, Cabernet Sauvignon, Tocai w., Vespaiola w. and the soil investigation shows 22 cartographic units. The surface area of the Denomination amounts to 600 ha.

5- **Colli Berici**: from 2002 to 2005, using the same experimental protocol before explained, 31 vineyards have been investigated. The varieties considered have been Merlot, Cabernet Sauvignon, Red Tocai, (as locally known the Grenache n.), Pinot b., Sauvignon b. The soil study evidenced 19 cartographic units on a total surface area of 2 000 ha.

6- **Lison-Pramaggiore**: between 2002 and 2005 using the same experimental protocol a total of 75 vineyards of the varieties Merlot, Refosco r., Tocai w., Pinot g. has been investigated. The soil study evidenced 27 cartographic units for a total surface of 2 300 ha planted.

7- **Arcole**: between 2002 and 2005 a total of 18 vineyards of the varieties Merlot and Pinot g. has been investigated using the same experimental protocol in a pedological situation that has evidenced 13 cartographic units for a total surface of 4 000 ha planted on the denomination.

8- **Lessini Durello**: from 2003 to 2005 the investigation in this denomination to the realization of a sparkling wine made with a basis of the local variety Durella has been performed. On a total planted surface of 600 ha the preliminary soil investigation showed 8 Units of Landscape (UDP) in which 17 vineyards of Durella and 4 of Pinot n. has been studied.

9- **Prosecco di Conegliano-Valdobbiadene**: in this area, starting from 2003, the local variety Prosecco (base for the typical sparkling wine) has been investigated with 54 vineyards placed on the 11 UDP individuated from the preliminary soil study. The total surface of the denomination covers 4 100 ha.

10- **Bianco di Custoza**: in this denomination the study of the interaction between genotype and environment started in 2005. In an area of 1 200 ha of planted surface a number of 10 UDP has been identified by a preliminary study. In each of this landscape unit vineyards of Cortese w., Garganega w. and Trebbiano w. has been selected and followed according to the same experimental plan.

11- **Montello e Colli Asolani**: the zoning started in 2005 in an area of 470 ha planted. The vineyards selected for the study have been 34 (Merlot, Cabernet Sauvignon, Prosecco w., Bianchetta w.) placed in 10 UDP.

12- **Terradeiforti**: in this small denomination (only 22 ha) during the first year of study (2005) a total of 37 vineyards has been investigated for the varieties Enantio r., Casetta r., Chardonnay, Pinot g. the preliminary pedological study showed 6 different UDP.

13- **Valpolicella**: in this famous and wide (5 800 ha) denomination the two typical varieties (Corvina r., Rondinella r.) has been studied in a total of 60 vineyards placed in 11 UDP individuated. This investigation started in 2005 and will finish in 2007.

Results and discussion

The extreme complexity of having experimental plans so different for varietal typology, ecopedological features and timing of realization does not allow to give a complete background of the vitivinicoltural system of Veneto region regarding its vocational attitude and its capacity of interaction between territories and varieties.

Zoning concluded in **Colli Euganei** allowed to mark factors which influence on quality; in this case environmental features more than soil features have conducted to a qualitative discrimination which allowed to set a vocational chart showing 6 homogeneous areas with different productive attitude for the three varieties considered (AA.VV., 2001).

In **Soave** a big correlation between phenological cycles and quality of wine has been demonstrated and thus in relation with climatology of investigated areas: streams coming from west (Garda lake) and from north cause a greater rainfall on steeper slopes, consequently the vegetative cycle is slower, maturation delayed and the adaptative answer is different (AA.VV., 2002).

First results obtained in **Bardolino** area showed that factors more influencing adaptative answer both of Corvina and of Rondinella are A.W.C. (Available Water Content), soil texture, drainage, deepness of soils and altitude.

For **Breganze** denomination, first results obtained concerning Cabernet Sauvignon showed that high deepness of soils fosters high concentration of malic acid, slow drainages of soils favours accumulation of anthocyanins instead of polyphenols and caused marked scents of jam; it has been also found that high altitudes over 150 m favour accumulation of sugar but also less colour in wines. In **Colli Berici** area first results on Tocai showed a great influence of water factor with better results obtained in soils with high A.W.C. For **Lison-Pramaggiore** area first results allow us to observe a different adaptative answer for Merlot, Tocai and Tocai w. in the areas with different hydromorphy in the soil.

For all other denomination areas investigated (**Arcole, Lessini Durello, Prosecco di Conegliano-Valdobbiadene, Bianco di Custoza, Montello e Colli Asolani, Terradeiforti and Valpolicella**) studies are still ongoing.

Conclusion

The notion of wine quality can be fully understood considering two different kinds of quality: « natural quality » due to the interaction between vineyard and environment, and « acquired quality » due to man's intervention and enological practices (Scienza, 1992). This is not a mere academic consideration. For 150 years the French law has been including these two aspects of quality that only recently have been considered also by the Italian legislation: in the 142/92 Act on the Denomination of Origin natural quality is judged to be different from acquired quality.

Strongly believing in this fundamental assumption, deriving from a 1000 year old European wine culture, the Veneto Region is looking forward to provide the technical tools in order to characterise and optimise the relations between the large amount of varieties and environments that can be found in the Denomination of Origin areas of the Region. This wide range of interactions provides several results for many typical productions, rather than a single result. European viticulture is challenged by the global market to take advantage from this diversity and originality of wines as well as their tight link with the territory of production; this challenge is taken up by the Veneto Region, asserting that a bottle of wine is not only a beverage, notably of worldwide acknowledged quality, but also the result of the tradition and culture created through centuries in that same territory.

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