DEFINING THE UNIQUENESS OF MONOVARIETAL WINES FROM NATIVE PORTUGUESE VARIETIES OF *Vitis vinifera*

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ABSTRACT

Studies have been carried out on red and white monovarietal wines vinified during the 1995, 1996 and 1997 harvests. The essential aim being to evaluate sensory quality, correlate it with chemical analytical data and relate these to the various winemaking options available. Hence selective native varieties from the Douro, Dão, Bairrada and Vinhos Verdes regions have been studied and the analytical / sensorial data correlated to such factors as grape maturation and maceration regime. Results are presented illustrating the quality effects of variety / winemaking practice combinations, both in terms of analytical data (sensory and chemical) and taster preferences.

KEY WORDS: Portuguese varieties, winemaking, aroma

INTRODUCTION

As a traditional wine producing country, Portugal possesses a long established "appellation" system in which official bodies attempt to define and control the regional characteristics of wine styles. The varieties encountered within these demarcated regions are considered characteristic and although in some cases certain native varieties have close relatives in other (predominantly southern European) regions, most are apparently unique to Portugal. Many of these varieties can produce wines of high quality and export market acceptability, despite this little is known about these varieties apart from basic ampelographic descriptions. Each region uses distinct varieties of *Vitis vinifera* grapes in the production of its wines, although the commercialisation of wines from single varieties is rare in this context, the majority are blends which, at their best, are carefully prepared to accentuate regional and quality characteristics.

Despite the fact that such wines are not generally commercialised it is considered essential that single varieties are used when studying the characteristics of regional wines.

Thus the wines used in this study were derived from 4 different viticultural regions of central and northern Portugal namely Dão, Bairrada, Douro and Vinhos Verdes. In this study the grapes and/or wines were also submitted to various enological procedures namely different states of grape maturation, grape maceration trials, fermentation in oak vessels and utilisation of selected strains for malolactic and alcoholic fermentations. Presented here are selected results from the 1995, 1996 and 1997 harvests. The study of the Dão region includes red and white wines whilst the study of the other regions only includes white wines. All wines were analysed for standard enological parameters, for volatile profiles (GC), selected volatile compounds (monoterpenes, higher alcohols and esters) and were submitted to a rigorous sensorial analysis by a panel of trained tasters. The results were submitted to a statistical evaluation.

MATERIALS AND METHODS

– Grape varieties

Dão region
white grapes: Encruzado and Assario, red grapes: Touriga Nacional and Jaen

Bairrada region
Maria Gomes, Cercial, Arinto and Bical

Douro region
Fernão Pires, Côdega, Gouveio, Malvazia Fina and Viozinho

Vinhos Verdes region
Loureiro, Pedernã and Trajadura

– Vinification

Wines were obtained from fruit processed by SOGRAPE. Various scales of vinification were employed: micro (≤ 20 L), mini (≤ 350 L) and commercial scale (≥ 5000 L), depending on the availability of suitable grape material and general winemaking or experimental considerations.

(I) The grape maturation studies were conducted on red and white varieties of the Dão region at 3 different levels of probable alcohol content (11, 12 and 13° baumé), grapes being harvested from an experimental vineyard site.

(II) Skin contact studies (12 h at 4° C) were performed with white varieties from Vinho Verde and Bairrada regions, some assays being conducted with addition of extracts of enzymes.

– Chemical analyses

. standard enological parameters (pH, ethanol concentration, total and volatile acidity and total and free SO2) following the Portuguese standard.

. GC analysis
  . volatile fermentation derived compounds and terpenes following the method of Bertrand (1981)
  . Higher alcohols, ethanal, ethyl acetate and methanol following the method of Bertrand (1994)

. HPLC analysis
  . organic acids (Dionex, following manual instructions)
  . aminoacids (post-column ninhydrin derivatization, method described on manual instructions).

– Sensory analysis

All wines were tasted "blind" by a professional panel from SOGRAPE and ESB with a total of 14 tasters - a minimum of 8 being present at each session. Specific and semi quantitative scoring was employed using a tasting sheet containing 21 items (2 visual, 13 olfactory and 6 gustatory).

– Statistical analysis

Correlation between sensory and analytical data is achieved employing a Principal Component Analysis (PCA). This method calculates linear combinations of variables, this allows the original multidimensional matrix to be simplified making easier the interpretation of complex data. The results of PCA can be graphically displayed as two sets of plots. The software employed was the STAT-ITCF.

RESULTS

Selected results are presented below showing the major findings and tendencies of the studies undertaken.

I) The influence of grape maturation state on the quality of wines from *Dão* region.

Ia) Red wines

– Analysis of the sensory data indicates a clear preference for *Touriga Nacional* 12 (TN 12) and TN 13, which have the higher levels in ethyl esters, acetates, higher alcohols, free fatty acids, as well as in linalool and terpeniol contents (Fig. 1 and 2)

– Touriga Nacional 13 was considered the softest wine with the greater "volume".

– The wines with the lowest level of maturation (TN 11) were classified as "vegetal" and "acid". These wines contain low levels of linalool and ethyl esters.

– Jaen wines were generally poor in free terpene compounds and in volatile fermentation compounds. These wines were sensorially classified as "vegetal" and acidic.

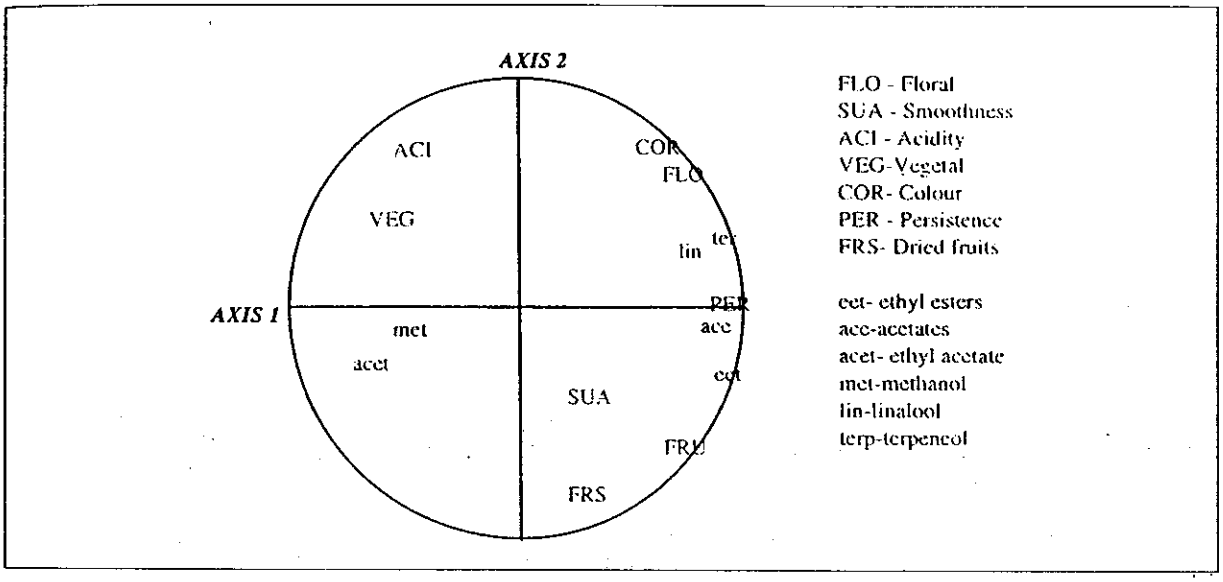

Figure1. Selected chemical and sensory variables identified in red Dão wines projected on the plane formed by axes 1 and 2.

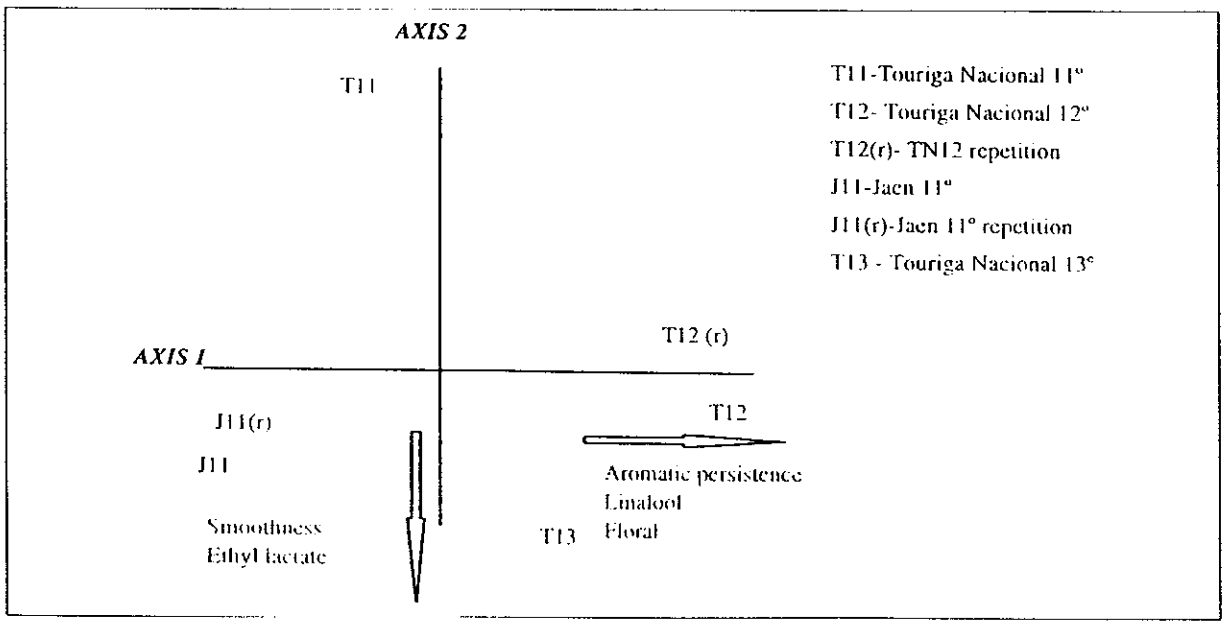

Figure 2. Projection of Dão red wines on the plane formed by the axes 1 and 2. The numbers 11, 12 and 13 refer to the Baumé values at harvest.

Ib) White wines

- Assario and Encruzado white wines with low levels of maturation (AS 11 and EN 11) were classified as the most acid wines and with the higher levels of hexanol (Fig. 3 and 4).

- Sensorially the wine with the higher classification was the En 12 which was the most fruity and with the higher aromatic persistence (Fig. 4).

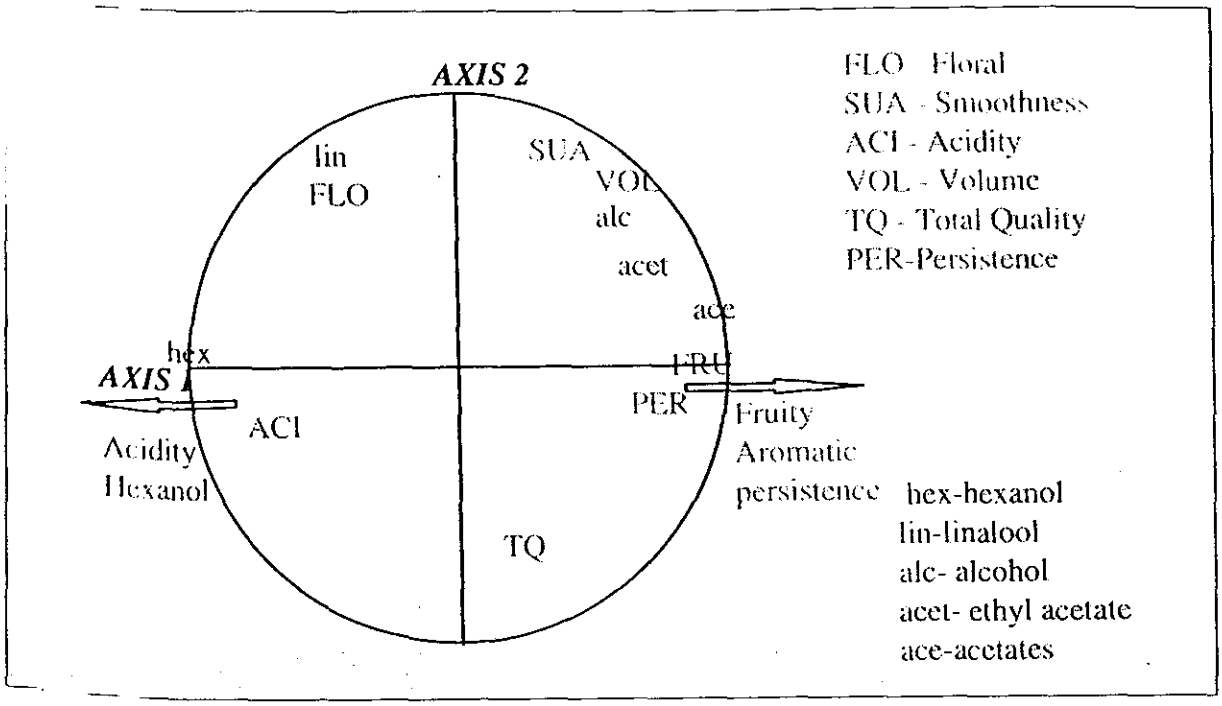

Figure 3. Projection of selected chemical and sensory variables on the plane formed by axes 1 and 2.

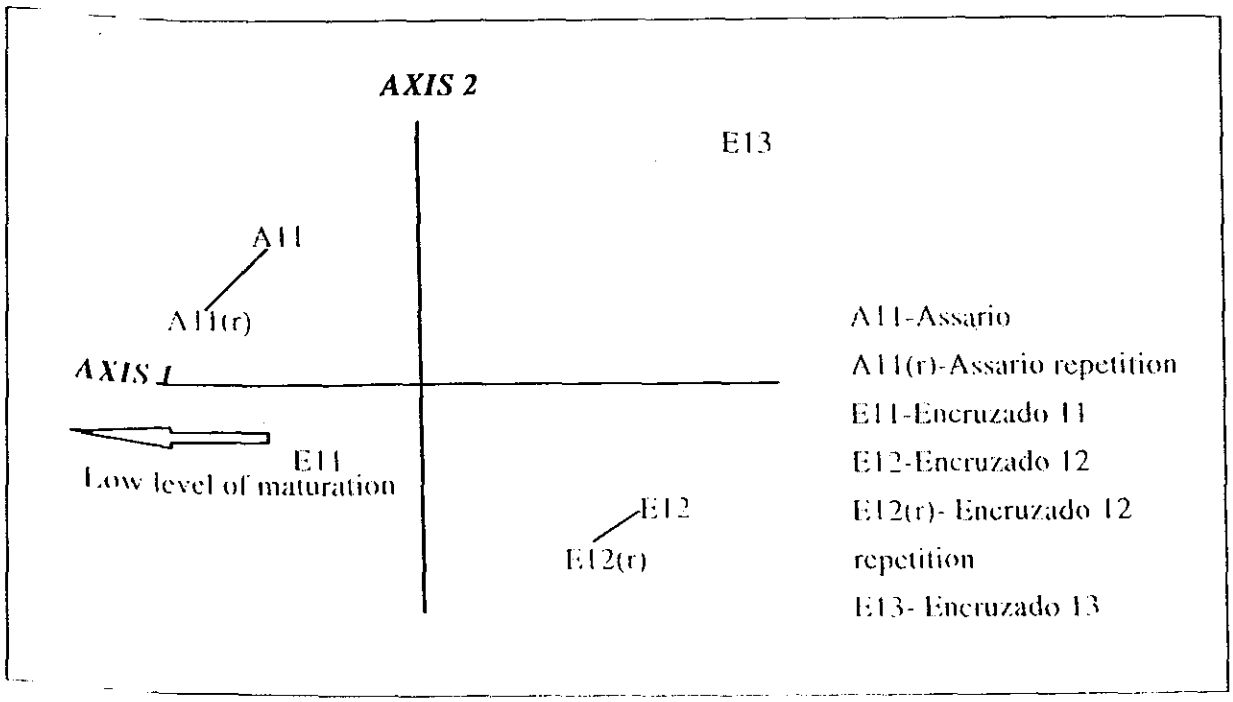

Figure 4. Projection of *Dão* white wines on the plane formed by the axes 1 and 2.

II) Characterization of wines from white varieties from the Bairrada, Douro and Vinhos Verdes regions and the influence selected enological practices

Figures below show the differentiation of the white wines from Bairrada, Douro and Vinhos Verdes regions (Fig. 6) and the characteristics which were used to separate them (Fig. 5). The effect of skin contact and enzyme treatment from the Maria Gomes and Loureiro varieties are thus included on figure 6.

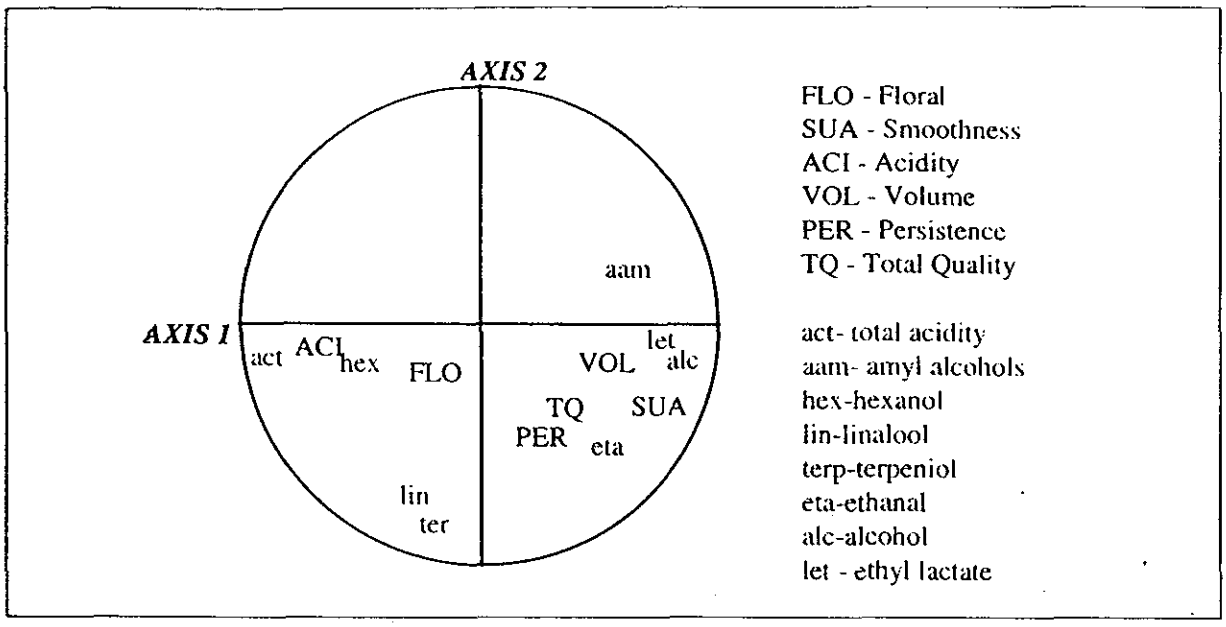

Figure 5. Projection of selected chemical and sensorial variables on the plane formed by axis 1 and 2.

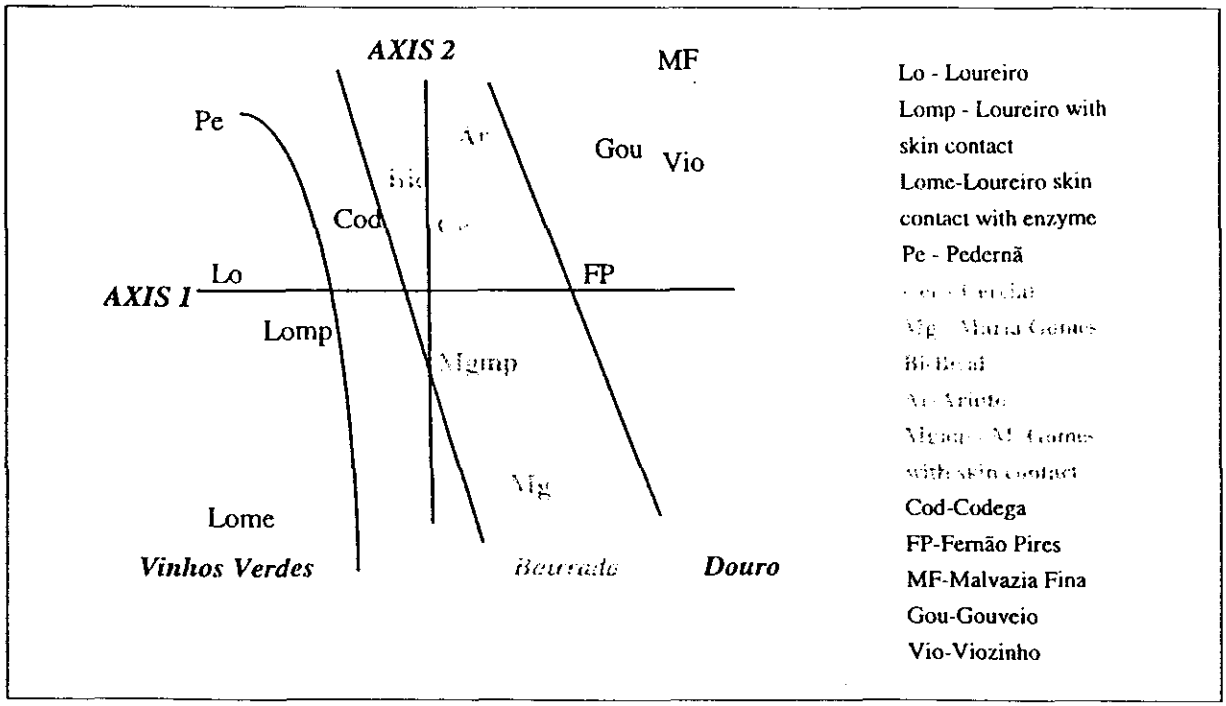

Figure 6. Projection of Bairrada, Douro and Vinho Verde white wines on the plane formed by the axes 1 and 2.

– Axis 2 is made up of variables such as linalool, terpeniol, total quality (TQ) and persistence (PER). The Maria Gomes wines from Bairrada region show a strong floral and fruity character and are alligned on this axis. Distant from these wines we can see those of Bical, Arinto and Cercial from the same region which are characterised by low levels of linalool and terpeniol

– The wines from Vinho Verde region are distinguished from the wines from Bairrada and Douro regions due to sensorial acidity (ACI), chemical acidity (Act), "floral" character (FLO) and hexanol concentration (Hex) (Fig. 6).

– The Loureiro wine with skin contact and with enzyme treatment was clearly differentiated from the others due to the higher levels of terpene compounds (linalool and terpeniol).

– In figure 5 the axis 1 is made by variables such as volume, alcohol, ethyl lactate and "softness" and "roundeness". Douro wines are projected on this axis. Wines from Fernão Pires variety (synonymous with the Maria Gomes variety from Bairrada) were the most aromatic wines from the Douro region.

CONCLUSIONS

It is underiable that many native Portuguese varieties of Vitis vinifera produce wines with distinct and attractive characteristics. The lack of descriptive data concerning the aroma active compounds in these varities certainly limit the winemaking options. The results presented here suggest that the methodology employed and the techniques used are appropriate to identify the aroma and flavor characteristics and substances which contribute to them.

Although certain tendencies have already been suggested further analysis will be required to fully understand the potential of these varieties.

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