SENSORY PROFILES OF TROPICAL WINES PRODUCED IN THE SÃO FRANCISCO RIVER VALEY (NORTHEAST BRAZIL)

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Summary

Given the lack of available information on the subject, this study aims to characterize and evaluate the sensory stability of the experimental wines made from *Vitis Vinifera* - Syrah, Petit Verdot, Tempranillo, Sauvignon Blanc, Verdejo and Viognier - grown in the region of Vale de São Francisco in the northeast of Brazil, where the climate is tropical and semi-arid. Samples of the wines were analyzed after 3, 6, 9 and 12-months of storage by means of Quantitative Descriptive Analysis (QDA) and the data were submitted to Principal Component Analysis (PCA). The application of multivariate analysis resulted in a satisfactory differentiation of the wines in relation to grape variety, storage duration and in identifying the attributes most pronounced in the wines. It was observed that the red wines gradually became softer in flavour while the whites remained refreshing. All wines showed a perceptible decrease in sensory characteristics throughout storage.

Keywords: tropical wines, sensory properties, Quantitative Descriptive Analysis, stability.

INTRODUCTION

Despite the commercial distribution of tropical wines made from *Vitis vinifera* (Syrah, Petit Verdot, Tempranillo, Sauvignon Blanc, Verdejo and Voignier grown in the region of Vale De São Francisco) the scientific literature does not provide information about their visual, olfactory or gustatory characteristics.

The region is situated between the 8th and 9th parallel of the southern hemisphere where the climate is tropical and semi-arid with intra annual variability characterized by hot days and nights (Tonietto, Teixeira, 2004).

It is well known that climate and soil conditions can produce different compounds that contribute to wine color, odour and flavour - which are the features responsible for the balance, quality and reliability of wines (Mellion *et al.*, 2009; Tao *et al.*, 2009; Cliff *et al.*, 2007; Falcão *et al.*, 2007).

This study was carried out with the objective to characterize, identify and quantify the principal sensory markers in order to evaluate the characteristics of wines and their stability during storage.

MATERIAL AND METHODS

Winemaking

Young mono varietal wines were elaborated in Laboratório de Enologia da Embrapa Semiárido (Semiarido Enology Laboratory of Embrapa), Petrolina/PE, with *V. vinifera* L., cv. Syrah. Petit Verdot, Tempranillo, Sauvignon Blanc, Verdejo e Viognier, grapes, harvest 2008, cultivated in the Casa Nova/BA (Northeast of Brazil). A starting material of 80-kg of grapes from each variety was used to obtain 40 L of must vinified on a semi-industrial scale. Potassium metabisulphite and commercial yeast *Saccharomyces cerevisiae* were added to musts, alcoholic fermentation, coinciding with the solid/liquid infusion phase, lasted for 5 to 7 days at 25 °C ± 1 °C. Then the wines were kept for 20 days at 18 °C ± 1°C until the transformation of malic acid into lactic acid was complete and, finally, kept in a cold chamber (0 °C ± 0.5 °C) for 30-days for clarification and stabilization. The last operation was hand bottling in 750 mL glass bottles with agglomerated cork stoppers and storage in wine cellar heated to 16 °C ± 1 °C and an average relative humidity of 60% ± 1% (Peynaud, 1997).

Sensorial evaluation

The sensory evaluation, performed after 3, 6, 9 and 12 months of storage was made by 12 trained judges over four sessions using the Quantitative Descriptive Analysis – QDA - in a balanced incomplete block design. The wine samples were presented, in randomized order, at 18 °C ± 2 °C (red wines) and at 12 °C ± 2 °C (white wines) in taster glasses (50 mL) as described by the International Organization of Standardization (ISO – 3591). The sensorial profile included 16 attributes (4 visuals, 5 olfactives and 7 gustative) defined by consensus, which were quantified in one not structured scale of intensity with 9 points (Sancho *et al.*, 2002).

Statistical Analyses

ANOVA and Duncan's test ($p<0,05$) were carried out to determine the influence of variety and of storage for 3, 6, 9 and 12-months; Principal Component Analyses (PCA) was performed to find the dominants terms to describe the tropical wines, using the software Statistic for Windows 7®.

RESULTS AND DISCUSSION

The results (Table 1 and 2) show that the wines present a considerable decrease in brightness and clarity in relation to storage time. The colour of the wines changed in intensity and tone. The reds were more amber than purple, which corroborate the results obtained by Caillé *et al.* (2009), and only the Viognier, of the white wines, showed color variation - from white-yellow to amber.

Table 1. Sensory profile of the red wines of the Petit Verdot (PV), Syrah (SY) e Tempranillo (TP) after 3, 6, 9 e 12 months of the storage in the bottle (safra 2008).

wine	visual atributes				olfative attributes				gustative attributes						
	color	bri[a]	lim[b]	CI[c]	fruit	spicy	emp[d]	aro per[e]	sw[f]	acid[g]	alc[h]	bitter[i]	astr[j]	body	gust pers[l]
PV3	0.2[a]	8.0[a]	7.7[a]	8.3[a]	5.2[a]	2.7[a]	0.8[a]	3.6[a]	2.1[a]	2.3[a]	5.6[a]	4.0[a]	6.9[b]	6.1[a.b]	4.7[a]
SY3	1.1[b]	8.0[a]	7.9[b]	7.9[a]	4.1[b]	0.6[b]	3.3[b]	4.1[a]	1.6[b]	3.0[b]	4.1[b]	6.2[b]	5.8[a]	6.6[a]	6.6[b]
TP3	0.5[c]	7.5[a]	6.7[a]	8.0[a]	4.2[b]	0.4[b]	1.8[c]	4.4[a]	1.4[c]	3.4[b]	4.0[b]	5.2[c]	6.7[b]	7.1[a.c]	7.0[b]
PV6	0.2[a]	7.9[a]	6.6[a]	8.7[a]	5.1[a]	1.7[a]	0.8[a]	3.3[a]	2.0[a]	2.3[a.c]	5.5[a]	3.3[s]	6.2[a]	4.6[a]	4.7[a]
SY6	1.4[b]	7.0[b]	5.5[b]	7.8[b]	4.2[b]	0.6[b]	3.1[b]	3.7[a]	1.5[b]	3.0[a]	4.0[b]	5.0[b]	5.0[b]	5.9[b]	5.8[b]
TP6	0.8[c]	6.8[b]	5.0[b]	7.5[b]	3.4[b]	0.5[b]	1.6[c]	2.8[b]	1.4[b]	3.2[a.b]	4.2[b]	6.0[a]	6.0[a]	6.7[c]	6.2[c]
PV9	0.3[a]	7.2[a]	6.6[a]	8.6[a]	4.9[a]	1.7[a]	0.7[a]	2.4[b]	2.1[a]	2.3[a]	5.6[a]	2.6[a]	4.7[a]	3.8[a]	4.1[a]
SY9	2.2[b]	5.8[b]	5.4[b]	7.3[b]	3.7[b]	0.6[b]	2.9[b]	3.2[a]	1.8[ac]	3.3[b]	3.8[b]	4.8[b]	4.8[a]	5.6[b]	5.5[b]
TP9	1.6[c]	5.5[b]	5.0[b]	7.2[b]	3.1[b]	0.5[b]	1.8[c]	2.4[a]	1.4[bc]	3.4[b]	4.4[b]	4.0[c]	5.7[b]	5.7[b]	6.5[b]
PV12	0.3[a]	6.3[a]	6.5[a]	8.7[a]	4.1[a]	0.8[a]	0.6[a]	1.9[a]	2.1[a]	2.2[a]	5.7[a]	2.0[a]	3.0[a]	2.8[a]	3.8[a]
SY12	2.4[b]	5.3[b]	4.2[b]	7.2[b]	2.9[b]	0.5[b]	1.6[b]	3.2[b]	1.8[b]	3.2[b]	4.1[b]	4.2[b]	4.0[b]	3.8[b]	3.8[a]
TP12	2.2[b]	5.5[b]	5.0[b]	7.4[b]	2.8[b]	0.5[b]	1.6[b]	2.3[a]	1.4[c]	3.3[b]	4.5[b]	3.2[c]	4.9[c]	4.8[c]	6.5[b]

a: brightness; b: limpidity; c: colour intensity; d: empyreumatic; e: aromatic persistence; f: sweetness; g: acidity; h: alcahol; i: bitterness; j: astringency; l: gustative persistence. Averages followed by different letters were significantly different according to the test of Duncan ($p<0.05$). Averages in the columns followed by small letter – indicate comparation beteween varieties in the same storage time.

Table 2. Sensory profile of the white wines of the Sauvignon Blanc (SB), Viognier (VG) e Verdejo (VD) after 3, 6, 9 e 12 months of the storage in the bottle (safra 2008).

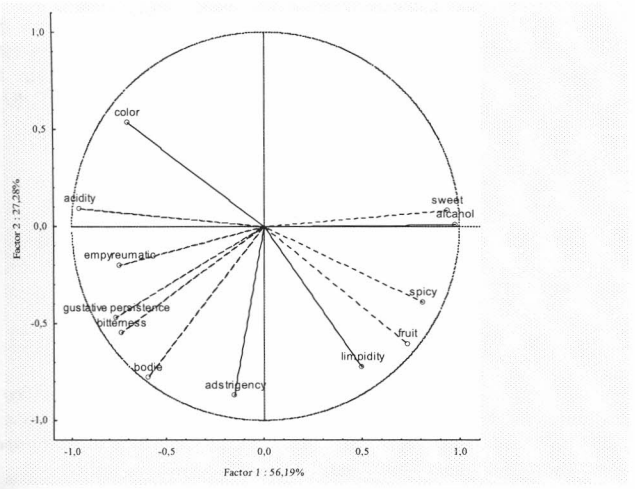
wine	visual atributes			olfative attributes				gustative attributes					
	color	bri[a]	lim[b]	IC[c]	fruit	floral	aro pers[d]	sweet[e]	acid[f]	alc[g]	bitt[h]	body	gust pers[i]
SB3	2.4[a]	7.2[a]	4.2[a]	4.2[a]	5.1[a]	4.6[a]	4.5[a]	2.8[a.b]	5.2[b]	4.4[a]	1.6[a]	2.3[a]	3.9[a]
VG3	1.8[b]	6.4[a]	4.8[b]	4.5[a]	6.6[b]	5.6[a]	3.9[b]	2.1[a.c]	6.1[a]	4.3[a]	1.1[b]	2.1[a]	4.5[a]
VD3	1.6[b]	6.3[a]	3.3[c]	3.3[b]	2.7[c]	3.0[b]	4.3[c]	2.2[a]	4.5[b]	4.5[a]	1.6[b]	2.3[a]	2.0[b]
SB6	2.3[a]	6. 6[a]	3.0[a]	3.8[a]	5.1[a]	4.6[a]	4.0[a]	2.7[a.b]	5.0[a]	4.2[a]	1.8[a]	2.4[a.b]	3.9[a]
VG6	1.9[b]	4.7[b]	4.6[b]	4.1[a]	6.6[b]	5.4[a]	3.4[a]	2.0[a.c]	5.6[b]	4.1[a]	1.9[a]	1.6[a.c]	3.9[a]
VD6	1.5[b]	5.8[a]	3.1[a]	3.3[b]	2.7[c]	1.9[b]	2.6[b]	2.2[a]	4.4[a]	4.4[a]	1.6[a]	1.9[a]	2.0[b]
SB9	2.1[a]	6.2[a]	2.1[a]	2.8[a]	3.1[a]	4.1[a]	3.9[a]	2.5[a.b]	5.2[a]	4.2[a]	3.8[a]	2.1[a]	4.0[a]
VG9	2.5[b]	4.6[b]	4.6[b]	3.9[b]	4.9[b]	5.0[b]	2.0[b]	1.9[a.c]	5.5[a]	4.1[a]	2.6[b]	1.3[b]	3.8[a]
VD9	1.6[c]	5.3[c]	2.9[c]	3.1[a]	2.6[a]	0.6[c]	2.1[b]	2.1[a]	4.3[b]	4.4[a]	1.3[c]	1.8[a]	2.1[b]
SB12	1.9[a]	6.0[a]	2.0[a]	2.6[a]	2.3[a]	2.3[a]	2.0[a.b]	2.6[a]	5.1[a]	4.2[a]	3.8[a]	2.0[a]	4.2[a]
VG12	3.0[b]	4.3[b]	3.4[b]	3.8[b]	4.8[b]	4.8[b]	1.7[a]	1.6[b]	5.2[a]	4.1[a]	4.3[a]	1.1[b]	2.8[b]
VD12	1.5[c]	5.0[c]	4.0[b]	3.0[c]	1.9[a]	1.9[a]	1.4[a.c]	2.0[b]	4.0[b]	4.4[a]	1.1[b]	0.8[b]	2.1[c]

a: brightness; b: limpidity; c: colour intensity; d: aromatic persistence; e: sweetness; f: acidity; g: alcahol; h: bitterness; i: gustative persistence. Averages followed by different letters were significantly different according to the test of Duncan ($p<0,05$). Averages in the columns followed by small letter – indicate comparation beteween variety in the same storage time.

The results of this investigation, presented by means of multivariate modeling method PCA, show the distribution of wines based on sensory characteristics. For red wines (Figure 1) the sensory profile were projected in two principal components which explain 83.47% of the total variance: the first (PC1) that represents 5619%, was dominated by sweetness and alcohol concentration, while the second (PC2) 27.28%, by astringency and body.

Petit Verdot wines had higher intensity of fruits and spices odor, alcohol and sweetness; Tempranillo and Syrah were described by empyreumatic odor, astringency, body, bitterness, acidity and gustative persistence.

(a)



(b)

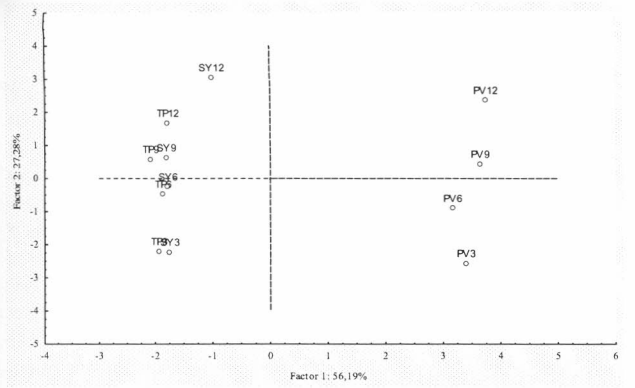
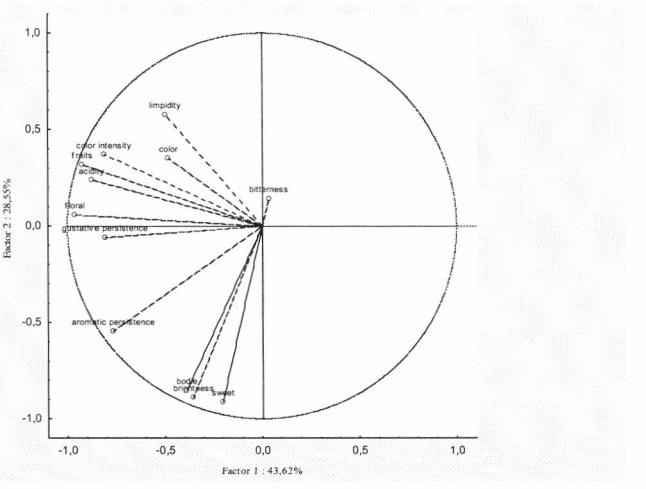


Figure 1. The variable contribution (a) and distribution of the red wines (b) (SY= Syrah; PV= Petit Verdot e TP = Tempranillo), during storage for 3, 6, 9 and 12 months in the bottle, in two dimension with the coordinates system defining the first and second principal component.

With respect to the white wines (Figure 2) the first two principal components explained 72.17% of the total variance. The PC1, which represents 43.62%, was dominated by color intensity, white and tropical fruits and floral odors and acidity, while the PC2 28.55%, by brightness, sweetness and body. The Sauvignon Blanc wine was described by sweetness, brightness and body and Viognier by floral and tropical fruit odor, color intensity, acidity and aromatic and gustative persistence.

(a)



(b)

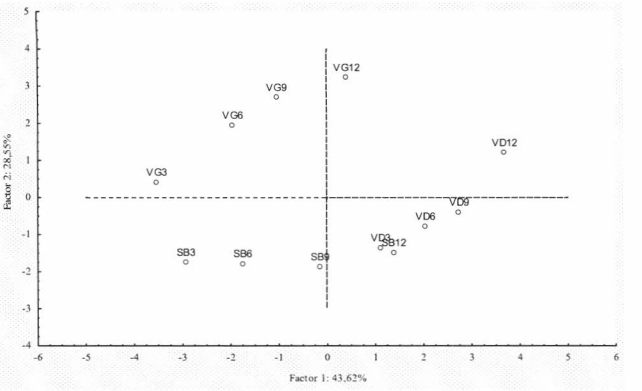


Figure 2. The variable contribution (a) and distribution of the red wines (b) (SB= Sauvignon Blanc; VG= Viognier e VD = Verdejo), during storage for 3, 6, 9 and 12 months in the bottle, in two dimension with the coordinates system defining the first and second principal component.

All wines analyzed, independently of variety, presented a perceptible decrease in sensory characteristics throughout storage. The sensory profile obtained for each wine differed satisfactorily according to variety. This sensorial variation will be a contribute to the establishment of geographical indication of origin

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