

EFFECTS OF DIFFERENT CLONES IN THE COMPOSITION OF CABERNET SAUVIGNON TROPICAL WINES

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ABSTRACT

The Cabernet Sauvignon is a variety that has been widely used in the region of Sao Francisco River Valley, and studies related to adaptation of different clones depending on the composition of the wines elaborated. In the present study was conducted on the physical-chemical and sensory evaluation of wines produced from different clones of Cabernet Sauvignon produced in tropical semi-arid. No significant difference ($p < 0.05$) was only found by the physical-chemical parameters pH, total acidity and tonality among clones. In the sensory analyses the wines presented few significant differences between the 24 descriptors selected. Nevertheless, suggest that the Cabernet Sauvignon clone 15 presenting it self as an alternative to exploit the aging potential of wines seeking to elaborate stores in the soil and climatic condition of the Northeast region of Brazil.

Keywords: *Vitis vinifera* L., grape, tropical wines, typical characteristics, climate variability, sensory analyses.

RESUMO

Cabernet Sauvignon é uma variedade que vem sendo muito utilizada na região do Submédio do Vale do São Francisco, sendo necessários estudos relacionados à adaptação de diferentes clones em função da composição dos vinhos elaborados. No presente trabalho realizou-se a caracterização físico-química e sensorial dos vinhos obtidos de diferentes clones de Cabernet Sauvignon elaborados em clima tropical semárido. A vinificação foi realizada pelo método tradicional. Os resultados físico-químicos demonstraram que somente para as variáveis pH, acidez total e tonalidade não houve diferença significativa ($p < 0,05$) entre os clones. Nas análises sensoriais os vinhos apresentaram poucas diferenças significativas ($p < 0,05$) em relação aos 24 atributos selecionados pela equipe para caracterizar as amostras. Ainda assim, sugere-se que o clone 15 da variedade Cabernet Sauvignon é a melhor alternativa quando deseja-se elaborar vinhos com maior potencial de longevidade nas condições edafoclimáticas do nordeste brasileiro.

Palavras-chave: *Vitis vinifera* L.; uva; vinhos tropicais; tipicidade; variabilidade climática; análise sensorial

INTRODUCTION

The Sao Francisco River Valley is the second region producer of fine wines in Brazil. It is characterized by being at altitudes around 350 meters in areas with typical landscape of scrub in the interior Northeast. The wine industry is located in plain areas and irrigation is carried out through the waters of the River. The climate is tropical semi-arid type, providing over one year period and a dry sub-humid period, allowing the vine to produce vegetative throughout the year. This characteristic gives it total differentiation from the wine world (PEREIRA, 2008).

The quality of grapes and consequently wine, are results of the interaction of various factors, among which we highlight the biological aspects (variety, clone and rootstock), physical (and class structure of the soil), climate (temperature, rainfall and light), health and cultural (LORET et al., 2003).

HARTMANN et al. (1990) defines a clone as a genetically uniform group of individuals derived originally from a single individual by vegetative propagation (cuttings, grafting, etc.). All grape varieties are propagated by asexual means to preserve the original characteristics of the variety. The clones of the same variety may have differences in the time of budding, maturation, production, fruit quality or other characteristics, depending on the conditions of climate and soil characteristics of a region (CALDWELL, 1998).

By necessity to evaluate the adaptation of clones of cultivars in northeastern Brazil, this study had as objective determine the effects of two clones of cv. Cabernet Sauvignon on the physical-chemical and sensory characteristics of wines in the Sao Francisco River Valley, Brazil.

MATERIAL AND METHODS

The grapes originated from a winery partner were harvested in November in the second season of 2009, being conducted in rows with spacing of 2 x 1 m and drip irrigated. Were used two clones of cv. Cabernet Sauvignon 15 and 685, both grafted on the rootstock IAC 313 (*V. Riparia-Carignane* x *V. rupestris du Lot*). After to determine the optimal point of maturity were harvested 80 kg of grapes per treatment and taken to the wine, made by traditional method (PEYNAUD, 1997). After bottled, the wines were analyzed by determining the density, dry extract, alcohol content, total and volatile acidity, pH, free sulfur dioxide and total, total anthocyanins, total polyphenols (R-280), colour intensity and tonality. The determinations were performed in triplicate.

Using quantitative descriptive analysis - QDA® (Stone et al. 1974, Stone and Sidel 2004), the sensory profile of the three wines samples have been evaluated by eight selected and trained panellists (2 male and 6 female), concerning to visual, olfactory and gustatory characteristics, using a 9-cm unstructured scale anchored in the left and right extremes with the terms "none/ weak" and "strong", respectively.

The sensory and chemical data was evaluated by ANOVA and Tukey means test (p=5%) using the SAS statistical software version 9.1.3 (SAS® Institute Inc., Cary, N.C., 2003). Additionally, with the sensory results, the polar coordinate graph was obtained using the means of the 27 descriptors selected to characterize the three wines.

RESULTS AND DISCUSSION

The Tab.1 describes the results obtained through the physical-chemical determinations in wines made from two clones of Cabernet Sauvignon (clone 15 and clone 685). For pH, total acidity, total SO₂ and tonality no significant difference ($p < 0.05$) among the clones studied were found. On the other hand, the parameters density, alcohol content, dry extract, volatile acidity, free SO₂, colour index, total anthocyanins and total polyphenols (R-280) content, had significant influence ($p < 0.05$) among the clones. The grape Cabernet Sauvignon clone 685 showed produced the wine of the highest alcohol content and with more polyphenols total content. While the grape Cabernet Sauvignon clone 15 originated the wine with more anthocyanins total content. These results probably occurred because, according to Reynier (2007) the clones have different capacities to adapt to conditions of climate and soil.

Tab. 1 Physical-chemical composition of Cabernet Sauvignon wines elaborated with the clones 15 and 685 harvest in November 2009.

Parameters	Cabernet Sauvignon wine samples	
	Clone 15	Clone 685
pH	3.6 ± 0.00 a	3.6 ± 0.00 a
Density (gL ⁻¹)	0.9964 ± 0.00a	0.9956 ± 0.00 b
Alcohol (° GL)	13.41 ± 0.08 b	14.25 ± 0.07 b
Dry Extract (gL ⁻¹)	35.93 ± 0.31 a	35.47 ± 0.21 b
Total acidity (meq / L)	84.66 ± 1.15 a	84.00 ± 0.00 a
Volatile acidity (meq / L)	11.13 ± 1.12 a	9.43 ± 0.15 b
Total SO ₂ (mg / L)	26.45 ± 1.48 a	24.74 ± 2.96 a
Free SO ₂ (mg / L)	23.88 ± 1.49 a	19.63 ± 3.91 b
Colour Index	10.84 ± 0.07 a	10.31 ± 0.03 b
Tonality	0.78 ± 0.01 a	0.78 ± 0.00 a
Anthocyanins	197.50 ± 2.42 a	105.2 ± 3.03 b
Total polyphenols (R-280)	44.00 ± 0.06 b	47.00 ± 0.06 a

* Means (± SD) followed by same letter not differ by Tukey test ($p=5\%$).

For the Cabernet Sauvignon clone 15 observed that the sugars contained in the must not have been fully converted into alcohol, resulting in a higher percentage of suspended solids in the mash, increasing the concentration of dry extract in it, which may contain some type of sugar does not for fermentation. Among the major groups that compose the total solids are fixed acids, organic salts and minerals, polyhydric alcohols, phenols, nitrogen compounds, sugars and polysaccharides (RIZZON, 2006).

The volatile acid was different but the values are below the limits of contamination, proving the efficiency of antioxidant use on the winemaking process.

The chromatic colour intensity and tonality obtained by reading the absorbance at 420nm, 520nm and 620nm are valid for young wines, because these have an absorption maximum of 520nm (red) and minimum of 420nm (yellow) (Ribéreau Gayon et al., 2004). In determinations revealed a greater intensity of colour for the wine made using the clone 15, showing 10.84, against 10.3 clone 685. This fact, probably have the relationship with the anthocyanins total content, highest values were obtained for clone 15. The overall result is according to Dufour (2008) that in studies with eight clones of Cabernet Sauvignon showed that clone 15 had higher levels of anthocyanins in the grape than clone 685, the same work being conducted in a temperate climate.

However, these differences between the two clones of Cabernet Sauvignon physical-chemical characteristics, probably not influenced their sensory profiles. According to the Tab. 2, the sensory evaluation showed that for all treatments there was no significant difference ($p < 0.05$) for most of the 24 attributes selected to discriminate the Cabernet Sauvignon wines samples, excepted for the descriptors visual viscosity, herbaceous aroma and intensity of mature of the tannins. By the Figure 1, that shows the coordinate polar graph obtained with the means of each sample of each descriptor, the two samples demonstrated to have a similar sensory profile.

Tab. 2 Means of the 24 descriptors selected to discriminated the sensory profile of the two Cabernet Sauvignon wines (clones 15 and 685) produced in Sao Francisco River Valley, Brazil, with grapes harvested in November 2009,

Descriptors*	Wines Cabernet Sauvignon samples	
	Clone 15	Clone 685
Colour Intensity	5.6 a	5.7 a
Evolution of color	2.0 a	2.0 a
Visual viscosity	2.2 b	2.9 a
Clarity	4.8 a	4.8 a
Fluidity	4.2 a	3.9 a
Aromatic intensity	5.2 a	5.2 a
Aromatic sharpness	4.9 a	4.9 a
Fruity aroma	3.0 a	3.2 a
Spicy aroma	1.5 a	1.9 a
Vegetative/fresh aroma	2.7 a	3.5 a
Herbaceous aroma	0.4 a	0.0 b
Chemical aroma	0.7 a	0.9 a
Caramelized aroma	0.3 a	0.5 a
Woody aroma	1.6 a	2.0 a
Aromatic quality	4.7 a	4.4 a
Aromatic complexity	3.5 a	3.5 a
Sour taste	3.0 a	3.6 a
Bitter taste	2.2 a	2.5 a
Sweet taste	1.9 a	1.5 a
Alcoholic flavour	2.9 a	3.1 a
Olfactory/gustative balance	3.6 a	3.5 a
Astringency	3.5 a	4.3 a
Tannins	3.1 a	3.0 b
Body	3.6 a	3.4 a

* Means followed by same letter not differ significantly by Tukey test ($p=5\%$).

Although the Cabernet Sauvignon clone 15 was demonstrated highest anthocianins and colour index by the Table 1, the two clones evaluated showed good intense of ruby colour, typical of young wines from the Sao Francisco River Valley, and in both there was no evolution of their color throughout the storage period (a year).

The panellists identified positive aroma notes of fruity in both Cabernet Sauvignon wines. In the clone 15 were identified notes of raspberry, cherry, plum and mango. While in the clone 685 were cited aromas of strawberry, melon and mango. The note of aroma of bell pepper found in both clones, described as vegetative/fresh aroma, it does not differ from the characteristic aromatic expression of cv Cabernet Sauvignon, featuring a little higher in clone 685.

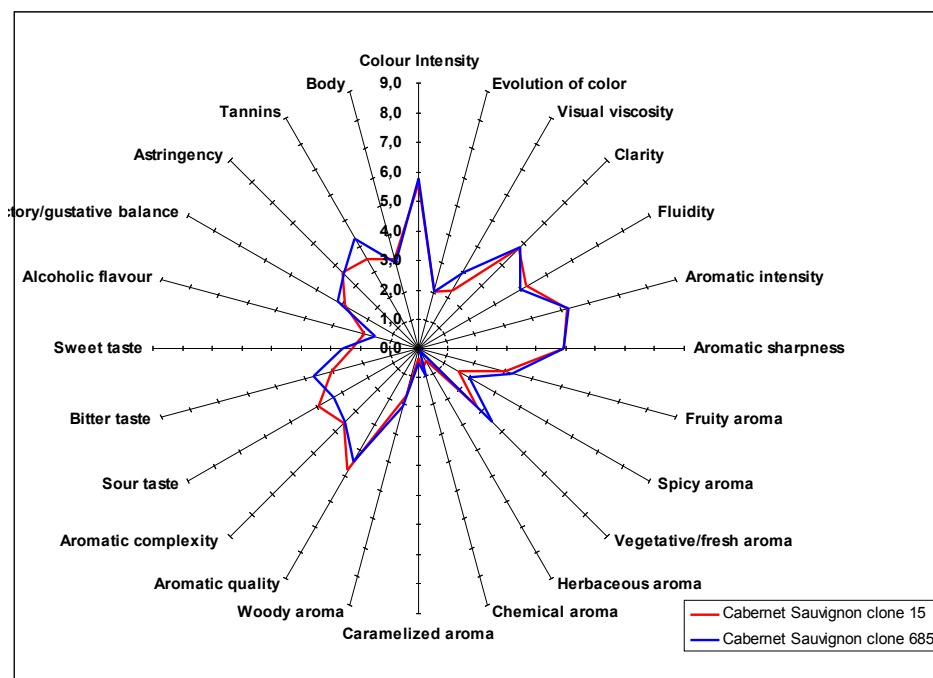


Fig.1 Sensory profiles of the two Cabernet Sauvignon wines, clones 15 and 685, elaborated with grapes harvested in November 2009 in northeastern of Brazil.

On the other hand, also by the sensory evaluation, the Cabernet Sauvignon wine elaborated with the clone 15 showed highest amount tannis matures, more intensity of body, and less intensity of sour and bitter tastes and astringency; sensory characteristics that suggest that this wine has the best potential to produce quality wines in the northeast region of Brazil.

This way, gets evident the necessity of choosing between the different plant materials to be used, aiming to produce wines specifically with winemaking protocols varied for obtaining different wines to please different customers, always seeking to exploit the potential enological, quality and typicality of tropical wines.

CONCLUSION

The wines elaborated with the two clones of Cabernet Sauvignon when cultivated in the tropical conditions of the Northeast of Brazil, showed some variations in the physical-chemical and sensory. Suggest that the Cabernet Sauvignon clone 15 presenting itself as an alternative to exploit the aging potential of wines seeking to elaborate stores in these soil and climatic condition.

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