THE EFFECT OF SOME PRE-FERMENTATIVE TREATMENTS ON ALIGOTÉ WINES COMPOSITION

INFLUENȚA UNOR TRATAMENTE PREFERMENTATIVE ASUPRA COMPOZIȚIEI VINURILOR OBȚINUTE DIN SOIUL ALIGOTÉ

CODREANU Maria[1], NICULAUA M.[2], COTEA V.V.[1], COLIBABA Cintia[1], MORARU .I[1], CONDORACHI Cristina[1]

e-mail: codreanu.maria@yahoo.com

Abstract: *This study aims at analysing the Aligoté must subjected to 9 treatments (oxalic acid, succinic acid, lactic acid, silica dioxide, tannins, bentonite, graphen, chitosan, charcoal). The tannin treatment positively influences the level of phenolic compounds content. The used analysis methods for compositional characteristics were: total polyphenolic index (IPT or D280), Folin-Ciocâlteu index and CIE Lab 76 for colour analysis.*

Key words: Aligoté, phenolic compounds, oxalic acids, prefermentative treatments

Rezumat. *În acest studiu, mustul obținut din soiul Aligoté a fost supus unui numar de 9 tratamente (acid oxalic, acid lactic, acid succinic, dioxid de siliciu, tanin, bentonită, grafen, chitosan cărbune). În urma determinărilor, s-a constatat că tratamentul cu tanin influențează pozitiv nivelul conținutului de compuşi fenolici. Metodele de analiză folosite pentru determinarea caracteristicilor de compoziție au fost: indicele de polifenoli totali (IPT sau D280), indicele Folin-Ciocâlteu, iar pentru determinarea culorii vinurilor metoda CIE Lab 76.*

Cuvinte cheie: Aligoté, compuşi fenolici, acid oxalic, tratamente prefermentative

INTRODUCTION

In modern wine-making, besides the grape processing technology, the treatments applied to the must before fermentation also have an important role in deciding the wine's quality. These have the main aim of preventing, improving or deleting some of the faults of oxidation, excess proteins or enzymes etc. (Pomohaci, 2005). By using these treatments accordingly and in good time, the guarantee of obtaining a quality product is higher (Cotea, 2009). Therefore, wine, in its evolution, will need a lesser number of treatments than a wine obtained from a must that wasn't treated in any way.

MATERIAL AND METHOD

The analysed wines were obtained from the Aligote variety, processed through the general white wines technology. Before the fermentation, 9 treatments were applied to the: oxalic acid - 0,6 g/L (V_1), lactic acid – 3 g/L (V_2), succinic acid – 2 g/L

[1]University of Agricultural Sciences and Veterinary Medicine Iasi, Romania

[2] Oenology Research Center – Iasi Branch of the Romanian Academy, Romania

(V_3), silica dioxide - 2,4 g/L (V_4), tannin – 5 g/hL (V_5), bentonite – 100 g/hL (V_6), graphen – 100 g/hL (V_7), chitosan – 100 g/hL (V_8) and oenological charcoal – 100 g/hL (V_9) (Croitoru, 2009). The major physical-chemical parameters were analysed for the obtained wines. The used analytical methods for the above mentioned parameters are in conformity with European standards and those legiferated by OIV. The total poliphenolic index or D_{280} – represents a global photometric determination of all the phenolic compounds present in wine, through a direct analysis if the absorbency at 280 nm reported to the absorbency of water. The Folin-Ciocâlteu index is determined by the method described by Waterhouse (2002), the reaction taking place directly in the 2 mL vials. The phenolic compounds were expressed with the help of the etalon curves with gallic acid with the following concentrations: 50, 100, 250 and 500 mg/L (Waterhouse, 2002). The sum of the phenolic compounds in wine is oxidised by the Folin–Ciocâlteu reagent, a mix of phosphomolybdate and phosphotungstate acids.

After oxidation of phenolic compounds, the mix is reduced to blue tungsten and molybdenum oxides (Ribéreau-Gayon, 2006). This blue colour has an adsorption maximum around 760 nm and is proportional to the total phenolic compounds content.

Measuring of the antioxidants capacity of wines was effectuated using the reductive power method, as in the protocol established at the Vine and Wine Institute, Dijon. Two solutions were prepared: Solution A – in a 50 mL vial, 150 mg ferric ammonium sulphate (iron alum) was dissolved in 2 mL concentrated sulphuric acid and distilled water was added to reach the sign. Solution B – in a 500 mL vial, 500 mg of 2,2'-bipyridyl were dissolved in 40 mL 0.1 N sulphuric acid and distilled water was added to reach the sign. One mL of A solution was mixed with 39 mL of B solution.

The reaction took place in 2 mL vials, pippetting 3 mL of the AB mix and 37.5 µL of the wine sample. The absorbency was read at 510 nm. MINOLTA CT-210 spectrophotometer was used to determine the chromatic characteristics according to CIE Lab 76.

RESULTS AND DISCUSSIONS

The determined physical-chemical parameters show that the obtained wines are dry and can be classified as superior table wines (VMS) and superior quality wines (VS).

Table 1

Physical-chemical characteristics of Aligoté wines

Sam-ple	Volatile acidity g acetic acid /L	Total acidity g tartaric acid /L	pH	Alcohol concentration % v/v	Reductive substances g/L	Total dry extract g/L	Non-reductive extract g/L
V	0.34	7.66	3.03	9.57	0.90	20.9	20.00
V_1	0.32	7.96	2.95	9.89	0.83	19.3	18.47
V_2	0.31	9.73	3.01	10.2	0.95	21.6	20.65
V_3	0.28	8.15	3.08	9.81	0.71	20.9	20.19
V_4	0.26	4.47	3.45	9.8	0.82	20.1	19.28
V_5	0.28	6.89	3.13	9.77	2.56	20.9	18.34
V_6	0.28	7.08	3.12	10.13	0.66	18.3	17.64
V_7	0.28	5.53	3.17	9.89	0.83	18.5	17.67
V_8	0.45	6.02	3.11	10.27	0.92	18.8	17.88
V_9	0.96	5.81	3.06	9.75	0.87	19.0	18.30

The volatile acidity's values, expressed in acetic acid g/L range between a minimal values of 0.26 g/L for the sample treated with silica dioxide (V_4) and a maximal value of 0.96 g/L, at the sample treated with oenological charcoal. The total acidity's values vary between 4.47 g/L tartaric acid (V_4) and 9.73 g/L tartaric acid (V_2), the increase being due to the lactic acid addition. As a consequence of chitosan treatment (V_8), the alcoholic concentration grew compared to the control sample. The total dry extract and the non-reductive extract have the smallest values at the bentonite treated samples. It was observed that the wines are dry, the reductive substances having small quantities. Figure 1 represents the evolution of total phenolic compounds (TPI) and compounds with reductive properties (IFC). If the level of total phenolic compounds and compounds with reductive properties grew due to tannin addition (V_5), the use of the other treatments did not significantly influence the values compared to the control sample, in general. An increase in TPI values compared to the control sample can be observed in the sample treated with graphen.

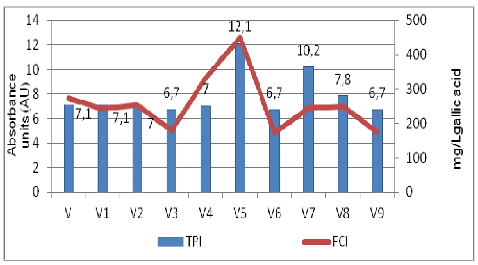

Fig. 1 - Evolution of TPI and FCI parameters

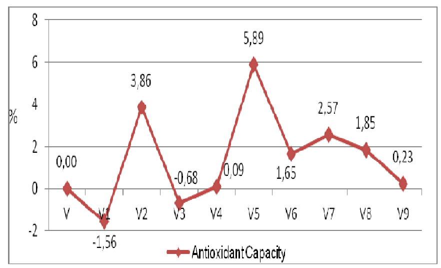

Fig. 2 - Percentage-wise evolution of antioxidant capacity

At the wines obtained with pre-fermentative methods, the antioxidant capacity was measured using reductive power method. In order to be able to portray the influence of the studied treatments on the antioxidant capacity, this parameter was represented through percentages (fig. 2). Significant increases of 3.86% and 5.89% compared to the control sample are registered in the samples treated with lactic acid and tannins. Variants V_1 and V_3 have negative values because of the loss of compounds with antioxidant properties.

Table 2

Chromatic parameters in Aligoté wines where different treatments were applied

Sample	Clarity L (0-opaque; 100-transparent)	Chromaticity		ΔE overall colorimetric difference	ΔH difference of tone
		a red/green component	b yellow/blue component		
V	98.0	-1.27	21.13		
V_1	93.6	1.47	29.64	9.96	2.71
V_2	93.2	1.53	26.56	7.81	2.76
V_3	97.0	-0.97	23.92	2.98	0.38
V_4	99.5	-2.18	18.39	3.24	1.17
V_5	95.3	0.83	25.47	5.53	2.14
V_6	94.7	0.60	23.88	4.70	1.90
V_7	93.7	1.59	25.75	6.94	2.83
V_8	101.8	-3.07	13.46	8.71	2.81
V_9	102.3	-1.30	6.25	15.49	1.72

The chromatic parameters of the wine samples were calculated according to the CIE Lab 76 methods, according to the registered absorption spectrum of each wine sample (Țârdea, 2007). The values of L parameter show that the wines obtained by applying chitosan and charcoal are the most clear. Generally the colour of the wines is yellow greenish (tab. 2).

Major hue differences are found in the samples treated with oxalic acid, lactic acid, graphen and chitosan, while in the case of colorimetric differences the biggest variation is registered in the case of V_9.(fig. 3).

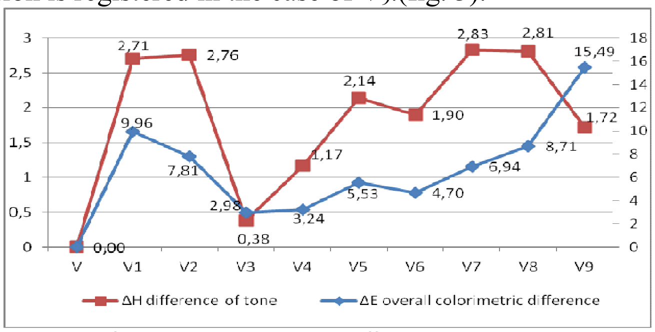

Fig. 3. Variation of colorimetric and hue differences compared to the control

CONCLUSIONS

The determined physical-chemical parameters show that the obtained wines are dry and can be classified as superior table wines (VMS) and superior quality wines (VS).

The level of total polyphenolic compounds and of those with reductive properties grew after applying the tannins treatment. The oxidation potential grew in samples treated with lactic acid and tannins. The chitosan and oenological charcoal treatments lead to obtaining clear and light wines.

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