INFLUENCE OF MATURATION PRODUCTS ON CHROMATIC AND PHYSICAL-CHEMICAL PARAMETERS OF SAUVIGNON BLANC AND BUSUIOACĂ DE BOHOTIN WINES

INFLUENȚA PRODUSELOR DE MATURARE ASUPRA PARAMETRILOR CROMATICI ȘI FIZICO-CHIMICI A VINURILOR SAUVIGNON BLANC ȘI BUSUIOACĂ DE BOHOTIN

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Abstract. *Ageing of wines on lees involves keeping wines in contact with dying yeast cells for several months/years. Over recent years, ageing of wines on lees is becoming more and more familiar in the wine process and studies are made to analyse its influence on quality.*

Ageing on lees is a winemaking technique consisting on maintaining the wine after fermentation in contact with the yeast lees to intensify the transfer of compounds between yeast cells and wine during yeast autolysis. Wine ageing on fine lees (essentially dead yeast cells) allows the release from the cell wall of different compounds into wines during yeast autolysis, such as polysaccharides, amino acids, fatty acids and mannoproteins, compounds that interact with the wine and give it texture and complexity.

In the present study, the effect of ageing on lees using 12 commercial maturation products was analyzed in white and rosé wines obtained in Iasi vineyard, vintage 2020. The aim of this experiment was to follow the evolution of physical-chemical and chromatic parameters of wines, depending on commercial maturation product used after alcoholic fermentation.

The first impression that the consumer receives from wine is colour and it influences the taste. Regarding chromatic parameters, an increase in colour intensity was evident for all samples after the ageing period on lees. The oenological products used for ageing on lees of wines showed a low influence on the physical-chemical characteristics: a low decrease in total acidity for Sauvignon blanc (samples V8S, V1S), a slight increase in total dry extract for the wines obtained from Busuioacă de Bohotin grapes (samples V12B, V2B, V10B and V4B).

The results show that this technique offers great prospects for improving the quality of wines.

Keywords: ageing on lees, physical-chemical parameters, wines quality, chromatic parameters.

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Rezumat. *Maturarea vinurilor pe levuri implică menținerea vinurilor în contact cu celulele de levuri moarte timp de câteva luni/câțiva ani. În ultimii ani, maturarea vinurilor pe levuri a dobândit o mare distincție în procesul de vinificație ca o tehnică interesantă pentru îmbunătățirea calității vinului.*

Maturarea pe levuri este o tehnică de vinificație ce constă în menținerea vinului după fermentație în contact cu levurile pentru a favoriza transferul compușilor între celulele moarte și vin în timpul autolizei levurilor. Maturarea vinurilor pe levuri (în esență celule de levuri moarte) permite eliberarea din peretele celular al diferiților compuși în vinuri în timpul autolizei levurii, ca polizaharide, aminoacizi, acizi graşi şi manoproteine, compuși care interacționează cu vinul și îi conferă textură și complexitate.

În acest studiu, efectul maturării pe levuri a vinurilor folosind 12 produse comerciale de maturare în vinuri albe și roze obținute în podgoria Iași, anul 2020. Scopul acestui experiment a fost urmărirea evoluției parametrilor fizico-chimici și cromatici ai vinurilor, în funcție de produsul comercial de maturare utilizat după fermentația alcoolică.

Prima impresie pe care consumatorul o primește despre vin este culoarea și influența sa asupra gustului. În ceea ce privește parametrii cromatici, o creştere a intensității culorii a fost evidentă pentru toate probele după perioada de maturare pe levuri. Produsele oenologice utilizate pentru maturarea pe levuri a vinurilor au prezentat o ușoară influență asupra caracteristicilor fizico-chimice: o scădere lentă a acidității totale pentru Sauvignon blanc (de exemplu,probele V8SB, V1SB), o ușoară creștere a extractului sec total pentru vinurile obținute din struguri Busuioacă de Bohotin (de exemplu,probele V12BB, V2BB, V10BB și V4BB), fapt ce relevă că s-au obținut vinuri corpolente după maturarea pe levuri.

Rezultatele au arătat că această tehnică oferă perspective mari de îmbunătățire a calității vinurilor.

Cuvinte cheie: maturarea pe levuri, parametri fizico-chimici, calitatea vinurilor, parametri cromatici.

INTRODUCTION

Humans have produced alcoholic beverages for millennia and these products have been traditionally used for medicinal, nutritional and social purposes. During the centuries, the technical procedures for their production have continuously evolved and wine aging has been improved over the centuries. The new technologies, new methods and new techniques can be applied to shorten the time of aging, as well as increase wine quality (Blasco *et al.*, 2011; Legras, 2007; Capozzi *et al.*, 2015).

A series of changes take place with a direct impact of wines proprieties during ageing on lees, due to the enzymatic activity, to the interaction between the wines components, and the polysaccharides released by the lees. Usually wines made from pink and black grapes are the ones subjected of the aging on lees process, as they are rich in phenolic compounds, especially anthocyanins.

Thus, white wines are not commonly subjected to aging, since they are far less resistant to oxidation, excepting few dry white wines and some sparkling white wines which are fermented in oak barrels.

The purpose of ageing on lees process is to keep the wine in contact with the amino acids, fatty acids, polysaccharides and mannoproteins by actively mixing the yeasts for the following consideration: the risk of hydrogen sulphide and mercaptan formation is reduced because yeasts prevents oxidation of the wine.

During wine ageing, the colour of wine change, anthocyanins participate in several reactions (oxidation, reduction, polymerization), involving other wine molecules, conducive to establishment of more stable compounds as anthocyanin-derived compounds (Lavigne *et al.*, 2007).

In this paper, the effect of different application dosages of a commercial specific inactive dry yeast on physicochemical parameters and attributes (colour parameters) related to the quality of white wines, and acquire better knowledge about the use of different dosages of specific inactive dry yeast for ageing process in white and rosé wines with the objective to improve their proprieties and quality.

MATERIAL AND METHOD

Experimental samples were obtained from grapes of Vitis vinifera varieties Sauvignon blanc, Busuioaca de Bohotin harvested in Iasi-Copou vineyard.

Grape samples and winemaking. In the Laboratory of Oenology of USAMV Iasi, wine samples from Sauvignon Blanc and Busuioacă de Bohotin grapes were obtained. In the experimental wine processing, Sauvignon Blanc and Busuioacă de Bohotin grapes were harvested from Iasi vineyard and experimental samples were obtained after alcoholic fermentation using different dosages of commercial specific maturation products, obtaining 12 samples, as follow:

V1S/V1B – BÂTONNAGE PLUS 20KD (4g product/ 10L wine);
V2S/V2B – BÂTONNAGE PLUS 150KD (4g product/ 10L wine);
V3S/V3B – BÂTONNAGE PLUS ÉLEVAGE (4g product/ 10L wine);
V4S/V4B – BÂTONNAGE BODY (6g product/ 10L wine);
V5S/V5B – SUPER-MANN (4g product/ 10L wine);
V6S/V6B – SPHÈRE BLANC (2g product/ 10L wine);
V7S/V7B – SPHÈRE EXPRESS (2g product/ 10L wine);
V8S/V8B – TRAP' METALS (8g product/ 10L wine);
V9S/V9B – FRESH AROM (3g product/ 10L wine);
V10S/V10B – OENOLESS® (4g product/ 10L wine);
V11S/V11B – OENOLESS® MP (3g product/ 10L wine);
V12S/V12B – POWERLEES® ROUGE (4g product/ 10L wine);
V13S/V13B – WINE TEST (no inactive dry yeast addition).

The aim of this research was to analyse the influence of ageing on lees by using different dosages of commercial specific inactive dry yeast on the physical-chemical parameters of obtained wines samples.

Ageing on less was carried out for two months in glass demijohns, by periodic stirring.

Study of physico-chemical and chromatic parameters.

Basic wine parameters including reducing sugar, alcohol strength, total and volatile acids, extracts, pH, free and total SO2 values of the given samples were analysed using the methods prescribed by OIV.

Colour plays a greater role in defining perceived odour than chemical constitution of wine and it is the most important sensory characteristics of white wine.

Hue and colour intensity measurements give practical information about tendency for oxidation and phenolic concentration.

The determination of the chromatic characteristics of the wines under study was performed five months after their obtaining, by the usual OIV spectrophometric method. The chromatic parameters CIE-LAB 76 obtained by calculation for each experimental variant, as well as the computerized simulation of the wine colour (Schwedt, 1997).

RESULTS AND DISCUSSIONS

Ageing on lees is widely used to improve technological and sensory quality of wines because during autolysis process that leads to the release of various compounds from yeasts. However, it is a complex and slow process and it may involve some oenological issues such as microbiological and organoleptic alterations requiring several months, even years to be completed (Andújar-Oritix *et al.*, 2009).

In order to evaluate the physical-chemical parameters, analyses were performed after the addition of different dosages of the above mentioned commercial products: ethanol content, volatile acidity, total acidity, density, pH, total sugars, malic and lactic acids.

Table 1 shows the physical-chemical parameters of wines obtained from Sauvignon Blanc and Busuioacă de Bohotin produced at the Iasi-Copou vineyard, after two months of ageing on lees.

The ethanol content represents the result of the alcoholic fermentation process, with the conversion of monosaccharide from musts (glucose and fructose) into ethanol and carbon dioxide and causes some quantitative and qualitative changes in chemical composition of wines samples (Moreno and Peinado, 2012). The analysis showed an alcoholic strength between 13% vol. (V8S) – 14.1% vol. (V10B).

The maturation products for ageing on lees of white and rosé wines showed a low influence on the physico-chemical parameters, with an increase observed in non-reducing dry extract (V3S, V5S, V12S; V5B, V12B) compared to the control samples (V13S, V13B).

A slight decrease in total acidity for all wine samples (samples V8S, V1S) was noticed as well as a slight increase in total dry extract (samples V3S, V4S, V5S and V12S).

Regarding the values of the density of wines treated with maturation products compared to the control samples, a small decrease was registered.

Concerning the color parameters, it is observed that the color intensity recorded a slight increase correlated with the dosage of maturation product used, in the case of Busuioacă de Bohotin wines, the samples V12B, V7B and V1B (maturation product composition: for sample V12B used POWERLESS ROUGE –inactivated yeast and in membrane protein HSp 12

and a β-glucanase; V7B used the product maturation SPHÈRE EXPRESS – rich in inactivated yeasts and specific mannoproteins; V1B used BÂTONNAGE PLUS 20KD- rich in polysaccharides and nitrogen compounds, used for fuller and more complex wines).

Table 1

Physical-chemical parameters of analyzed samples

Sample	Ethanol %vol.alc.	Total acidity	Volatile acidity	Total sugar g/L	Total dry extract	Non-reducing dry extract	Density δ	pH
V1S	13.4	6.73	0.31	1.6	18.5	16.9	0.98965	2.93
V2S	13.3	6.73	0.3	1.9	18.8	16.9	0.98994	2.92
V3S	13.3	6.73	0.32	1.2	19.6	18.4	0.99021	2.98
V4S	13.4	6.89	0.3	1.6	18.8	17.2	0.98983	2.95
V5S	13.4	6.73	0.31	1.2	18.8	17.6	0.98978	2.95
V6S	13.4	6.73	0.3	0.9	18	17.1	0.98952	2.91
V7S	13.2	6.73	0.31	1.6	18	16.4	0.98977	2.93
V8S	13	6.43	0.3	1.6	17.2	15.6	0.98971	3
V9S	13.2	6.89	0.31	1.3	18.5	17.2	0.99003	2.95
V10S	13.2	6.73	0.32	1	17.7	16.7	0.9897	2.96
V11S	13.4	6.73	0.3	1.4	18.3	16.9	0.98958	2.93
V12S	13.3	6.89	1.4	1.4	18.8	17.4	0.98994	2.93
V13S	13.4	6.89	0.31	1.1	18	16.9	0.9895	2.93
V1B	13.9	6.43	0.3	1.6	21.6	20	0.99035	3.1
V2B	14	6.43	0.32	1.2	22.2	21	0.99041	3.13
V3B	14	6.56	0.29	1.7	21.6	19.9	0.99019	3.11
V4B	14	6.43	0.3	1.5	22.4	20.9	0.9905	3.14
V5B	14	6.43	0.34	0.6	22.2	21.6	0.99041	3.16
V6B	13.7	6.43	0.31	1.6	21.1	19.5	0.99039	3.11
V7B	14	6.56	0.31	1.5	21.6	20.1	0.99018	3.13
V8B	14	6.12	0.31	1.1	21.4	20.3	0.99005	3.18
V9B	13.9	6.43	0.31	1.6	21.9	20.3	0.99053	3.12
V10B	14.1	6.43	0.29	1.5	22.2	20.7	0.99029	3.1
V11B	14	6.43	0.31	1.3	21.9	20.6	0.9903	3.12
V12B	14	6.43	0.31	1.5	22.7	21.2	0.99058	3.11
V13B	14	6,43	0.3	1.4	22.4	21	0.99047	3.11

In the case of Sauvignon blanc wines, the intensity of color recorded a slow decrease as can be seen in samples V10S, V8S (an association of yeast cell walls, chitosan and PVI/PVP – adsorbent copolymers and yeast cell wall extract).

Table 2

Chromatic parameters of analyzed samples

Samples	Luminosity L (0-100)	Colorimetric coordinates		Chroma C	Tone H	Intensity	Tint	Colour simulation
		a red (+) green (-)	b yellow (+) blue (-)					
V1S	99.26	2.68	2.65	3.77	44.66	0.22	1.35	
V2S	99.32	4.19	3.03	5.17	35.83	0.31	1.14	
V3S	99.36	3.89	3	4.92	37.71	0.29	1.18	
V4S	99.3	3.73	3.42	5.06	42.48	0.31	1.26	
V5S	99.34	4.06	3.16	5.14	37.9	0.31	1.18	
V6S	99.63	4.13	2.97	5.08	35.76	0.31	1.14	
V7S	99.3	4.46	3.03	5.4	34.15	0.32	1.11	
V8S	99.56	3.46	2.81	4.46	39.13	0.27	1.19	
V9S	99.59	3.87	3.05	4.93	38.31	0.3	1.19	
V10S	99.65	3.83	2.98	4.85	37.85	0.29	1.18	
V11S	99.43	4.08	3.07	5.11	36.93	0.3	1.16	
V12S	99.16	4.68	3.09	5.61	33.48	0.33	1.09	
V13S	99.51	4.93	3	5.77	31.37	0.33	1.05	
V1B	97.64	-0.16	2.48	2.49	-86.25	0.11	3.75	
V2B	96.54	-0.22	2.47	2.48	-88.94	0.1	4	
V3B	96.71	-0.22	2.44	2.45	-84.73	0.1	4.11	
V4B	96.6	-0.22	2.53	2.54	-88.06	0.1	3.97	
V5B	96.55	-0.23	2.56	2.57	-84.87	0.1	4.15	
V6B	96.53	-0.37	2.08	2.12	-79.86	0.07	6.03	
V7B	96.37	-0.24	2.69	2.7	-84.92	0.11	4.14	
V8B	97.01	-0.3	2.05	2.07	-81.92	0.08	5.03	
V9B	96.67	-0.33	2.07	2.1	-81.02	0.07	5.43	
V10 B	96.76	-0.36	1.98	2.01	-79.67	0.07	6.14	
V11 B	96.57	-0.29	2.36	2.38	-82.88	0.09	4.52	
V12 B	96.27	-0.26	2.65	2.67	-84.47	0.12	3.74	
V13 B	96.15	-0.35	2.24	2.27	-81.07	0.09	5.05	

Ageing on less is now a common vinification technique can also modify the colour of wine due to loss of wine anthocyanins, compounds adsorbed on yeast cell walls.

Coloris one of the main parameters of the quality of wines and has an important influence on the overall acceptability by consumers.

In this study, no differences perceptible to the human eye were observed between the wines treated with the different doses of maturation products after the two months' period of ageing on lees in bottle (Martinez *et al.*, 2001).

The aspect regarding the influence of the maturation products on the color of wines ageing on lees as was discussed in Guzmán-Alfeo (2010), when pointing out that highest values of luminosity (L*) are well correlated with the clarity of the wines because the L* parameter is the chromatic coordinate that explains the lightness of the wines or their ability to reflect the white color.

CONCLUSIONS

The addition of maturation products in this study shows a positive effect on the color of the wines, due to different compounds released by autolysis process.

On the basis of their chemical composition, all the selected wines can be considered as dry before the period of ageing on lees using maturation products.

Following the analyses performed on the samples obtained after the maturation process on yeasts with different doses of oenological products, small differences regarding physical-chemical composition as well as color profile were registered.

Further studies should be carried out in this field to improve knowledge on how applying different doses of maturation products affects aroma profile of white and rosé wines.

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