EVOLUTION OF POLIPHENOLIC COMPLEX OF WINES DURING AGING IN CONTACT WITH OAK WOOD

EVOLUŢIA COMPLEXULUI POLIFENOLIC AL VINURILOR LA MATURAREA LOR ÎN CONTACT CU LEMNUL DE STEJAR

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Abstract. *The study of phisico-chemical process at accelerated aging by modern procedure in a white and red wines proves that mentaining in a contact wiht oak chips the wines evolves more quickly that modifications of phenolic compounds and organoleptical characteristics remarks. It was determine the optimum lenth of wine maintaining on chips depending on phisical-chemical size studied were: summary of poliphenolic compounds, the concentration of total anthocyans in red wines, the chromatic characteristics, and the sensorial profile.*

Key words: oak chips, maturation, poliphenol complex, profile sensorial.

Rezumat. *Studierea proceselor fizico-chimice la maturarea accelerată printr-un procedeu modern in vinurile albe şi roşii a demonstrat ca la menţinerea în contact cu talaşul de stejar vinurile evoluează mai rapid fapt remarcat de modificările compuşilor fenolici şi ale caracteristicilor organoleptice. S-a determinat durata optimă de menţinere a vinului pe talaşul de stejar în dependenţă de indicii fizico-chimici studiaţi: suma compuşilor fenolici, concentraţia antocianilor în vinurile roşii, caracteristicile cromatice, profilul sensorial.*

Cuvinte-cheie: talaş de stejar, maturare, complex polifenolic, profil sensorial.

INTRODUCTION

Moldova was and continues to be famous for its white wines, as well as for its young red wines, with pronounced aspect of grape variety or matured with shades of oak. Young, fresh and aromatic white wines from the localities of origin Cricova, Hînceşti, Mereni, Oneşti, as well as red wines Romaneşti, Purcari, Cahul, which are associated with old wines, matured in barrels for several years, enjoy a wide popularity in the world.

Today, the former practice of wine aging in oak containers is becoming more and more abandoned in many wine-making countries; it was replaced by modern procedures of accelerated aging, such as wine micro oxygenation, the administration of oak wood in various forms or oenological tannin, in red and white wines.

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The impact of oak on the processes taking place in wine and on its organoleptic characteristics, have been the subject of numerous latest researches (Chatonnet P., DubourdieuD., 1998; Mosedale J.R., FeuillatF., 2001; Prida A., Grina B., Puesh, 2005).

The purpose of this work was to study changes in polyphenolic complex of white and red wines at their aging in the presence of oak chips.

MATERIAL AND METHOD

As material we used raw white wine of grape variety Feteasca, cultivated on wine region of Center (Codru) of Republic of Moldova, raw red wines of grape variety Cabernet-Sauvignon and Merlot from South region (Cahul) and locally made oak chips belonging to the category of quality - standard (in accordance with technical prescriptions 67-38473646-004:2006PT).

The administrated doses of oak chips in wines was about 1,2 and 3 g/L; the white wine remained in contact over a ranging period between 20 and 45 days at the temperature of 14-16°C, and the red ones - from 10 to 30 at the temperature of 18-20°C. As control served the wines that were stored in wooden casks, with 300 L capacity.

In samples taken at certain times was determinate the amount of phenolic compounds with Folin-Ciocalteu reagent, the concentration in anthocyans; wines were analyzed with spectrometer and on this basis we determined the chromatic characteristics (intensity and hue), then the expert-tasters jury determined sensory profile.

Basic physico-chemical indices were determined by methods conformable to applicable standards.

RESULTS AND DISCUSSIONS

Basic physico-chemical indices and those specifically to the studied wines are presented in table 1.

Table 1

Physico-chemical indices of wines

No.	Determined index	Feteasca	Cabernet-Sauvinon	Merlot
1.	Alcohol concentration, % vol. Mass concentration of:	11,4	12,7	11,8
2.	Reducing sugars, g/L	2.7	2.8	2.0
3.	Non reducing dry extract, g / L	18.2	21.0	19.8
4.	Titrables acids (expressed in tartaric acid), g/L	7.3	5.6	6.2
5.	Volatile acids (expressed in acetic acid), g/L	0.28	0.45	0.53
6.	Sulfuric acid total / free, mg /L	168/24	100/12	112/15
7.	Iron, mg/ L	4	7	6
8.	The amount of phenolic compounds, mg / L	97	2340	1312
9.	Anthocyans concentration, mg/ L	-	265	90
10.	Report anthocyanin / tannin A / T x 100, units	-	10.9	6.87
11.	Staining intensity	0.123	0.94	0.92
12.	Hue	-	0.71	0.65

It should be noticed, that wines have had a fairly high alcoholic degree, the titratable and the volatile acidity are characteristic for this type of wine. Regarding specific indications, Cabernet Sauvignon wine was much richer in polyphenolic compounds, including anthocyanins, and greater color intensity than Merlot wine.

During maintenance of wine on oak chips increased negligible the concentration of phenolic substances in comparison with their value in witness sample.

Note that with increasing dose of oak chips and duration of maintenance in contact of analyzed wine occurs the increase of the total extract, including the amount of phenolic compounds and the color intensity. During the wine tasting we have already noted that after 15 days appeared light oak nuances, that after 30 days became quite intense and after 45 days was a easily perceptible taste of bitterness (table 2).

Coming out the results of organoleptic characteristics was recommended version II for the production of, which aims to keep wine Feteasca in contact with the oak chips administered in dose of 2 g /L for a period of 30 days.

In variants with red wines ware observed similar changes in behavior of the main calculations. Thus, after 10 d of keeping Cabernet Sauvignon wine on oak chips (dose of 1 g / L, was registered as light extraction, the concentration of phenolic compounds increased with 2-3%. On the 20th day the phenolic compounds were 6.6% more than in witness sample, but after 30 days – on average with 8%. In the variants with doses of 2 and 3 g/L, the growth of the phenolic concentration was higher, the color and intensity of it was also higher (fig.1).

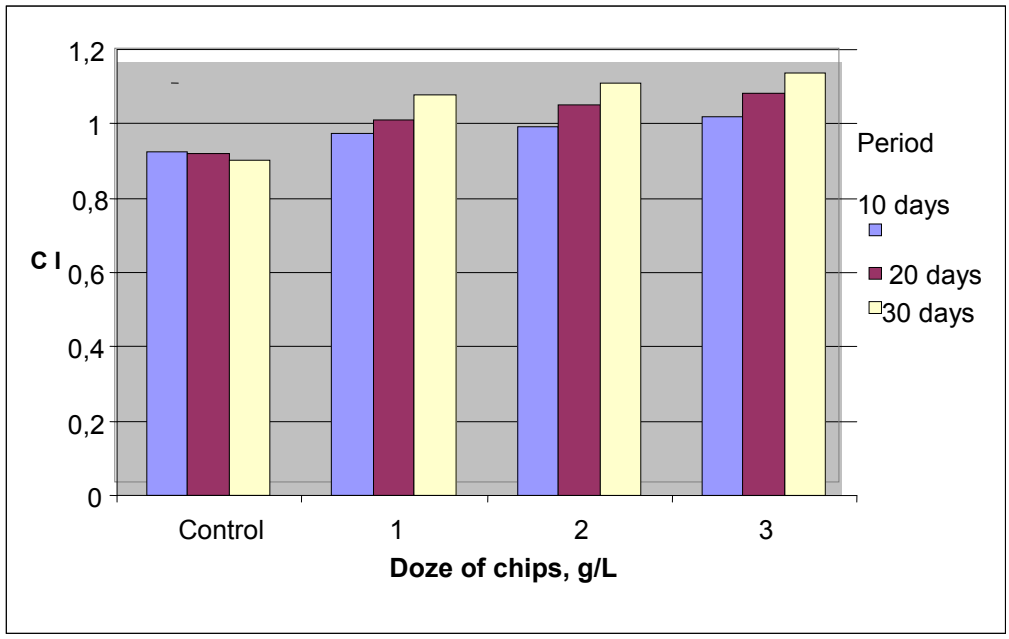

Fig. 1-Evolution of color intensity in red wines of mentenance in contact with oak chips

Table 2

Specific changes of the characteristics of the wine Feteasca at the maintenance on oak chips

No	Determined index	Period, days								
		15			30			45		
	Dose of oak chips, g/L	1	2	3	1	2	3	1	2	3
1.	Non reducing dry extract, g /L	18.388	18.357	18.372	18.354	18.367	18.385	18.452	18.491	18.526
2.	Volatileacids, g /L	0.32	0.35	0.35	0.33	0.37	0.36	0.36	0.38	0.38
3.	Phenolic compounds, mg/L	112	123	129	126	146	161	131	152	160
4.	Color intensity CI	0.142	0.163	0.179	0.156	0.174	0.185	0.173	0.187	0.199

The modifications of the color intensity in red wines means the enrichment of the polyphenolic wine's complex with polyphenolic compounds extracted from the oak wood and their combination with colored substances. This way, the totality of pigments increase, equivalent to the growth of colored intensity ant the concentration of colored substances. At the same time rise and the value of color depth thanks to the increase of brown pigments, determined at the 420 nm wavelength.

From the table 3 was observed that with the rise concentration of colored substances, the rapport anthocyans/tannins in the witness wine decreases, but at the maintenance on oak chips – rises.

Table 3

Evolution of caracteristic specific of wine Cabernet Sauvignon

Variant	Period,d	Colored substances, mg/L	A/T x 100 %	C I	Nc
Control	Original	89,82	5,126	0,942	0,645
	10	90,03	5,134	0,936	0,647
	20	88,26	5,023	0,921	0,650
	30	86,72	4,932	0,901	0,653
Doze 1 g/L	10	92,10	4,962	0,964	0,691
	20	95,70	5,131	0,980	0,690
	30	97,80	5,244	0,993	0,698
Doze 2 g/L	10	96,38	4,933	0,969	0,704
	20	98,75	5,103	0,985	0,710
	30	100,07	5,117	1,002	0,718
Doze 3 g/L	10	100,38	4,869	1,007	0,712
	20	104,67	4,924	1,021	0,725
	30	106,22	5,018	1,102	0,731

From the figure 2 is observed the variation of the rapport anthocyans/tannins (A/T) in all cases that depends on the period of maintenance and on the doses of oak chips. The most optimal rapport was enregistrated in the wine kept in contact with 2g/L on a period of 20-39 days. This result was confirmed by the organoleptic analysis.

So, the optimal variant for red wines will be the dose of 2 g/l, but the optimal period of maintenance - 20 days.

Mathematic processing of obtained results by the Student method and the determination of regression equations emphasized the linear dependence by the organoleptic points and color depth of red Merlot and Cabernet Sauvignon wines. The correlation coefficient presented values extent between 0,64- 0,992, what confirm that the selected factors are the most significant.

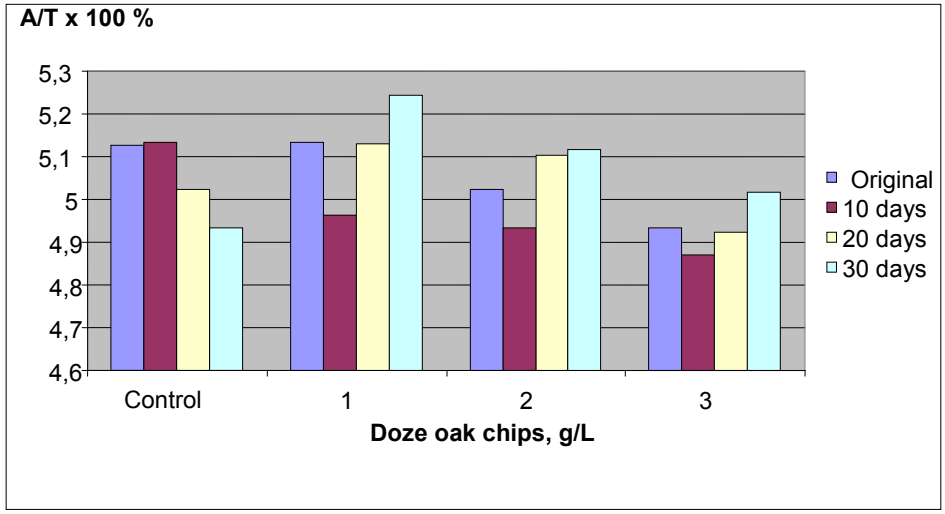

Fig. 2 Modification of report antocyans/tannins in red wine Merlot

CONCLUSIONS

The researches' results allowed recommending the optimal variants that provide the maintenance in contact with oak chips administrated in dose of 2g/L on a period of 30 days to Feteasca wine, but to red ones, Merlot and Cabernet Sauvignon wines -20 days. These technological process parameters assure the fortification of organoleptic qualities, in way to obtain an expressive wine, intense in taste, equilibrate and complex in a short period of time.

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