

ESTABLISHING OF RED WINES QUALITY OBTAINED IN RECAS AND MINIS VINEYARD ON THE BASIS OF ANTIOXIDANT AND CHROMATIC CHARACTERISTICS

STABILIREA CARACTERISTICILOR ANTIOXIDANTE ȘI CROMATICE ALE UNOR VINURI ROȘII OBTINUTE ÎN PODGORIILE RECAȘ ȘI MINIȘ

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Abstract. *In this paper it was determined total antioxidant capacity, total polyphenols content and monomeric anthocyanins amount, as well as the chromatic characteristics of red wines processing in Recas and Minis wine making centers from tree grapes varieties Cabernet Sauvignon, Merlot and Pinot Noir. It was analyzed the young and aged in bottle wines. The polyphenols content it was determined by Folin-Ciocalteu method (expressed such as mM/L acid gallic. Total antioxidant capacity it was determined by FRAP method, being expressed as mM Fe²⁺/L. The monomeric anthocyanins it was spectrometric determined by differential pH method. Chromatic parameters were comparatively determined by standardized methods and Glories method. Our study will permit establishing of some correlations between chromatic and antioxidant characteristics of red wines in different evolution stages, processing in two different vineyards from different black grapes varieties.*

Rezumat. *În această lucrare s-a determinat capacitatea antioxidantă totală, conținutul de polifenoli și de antociani, precum și caracteristicile cromatice ale vinurilor roșii produse în centrele de vinificație Recaş și Miniș din trei soiuri de struguri negrii: Cabernet Sauvignon, Merlot și Pinot Noir. Au fost luate în analiză vinuri tinere și vinuri învechite în butelie. Conținutul de polifenoli totali s-a determinat spectrofotometric prin metoda Folin-Ciocalteu și s-a exprimat în mM acid galic/L. Capacitatea antioxidantă totală s-a determinat prin metoda FRAP fiind exprimată în mM Fe²⁺/L. Conținutul de antociani monomeri s-a determinat spectrofotometric prin metoda pH-ului diferențial. Parametrii cromatici s-au determinat comparativ prin metodele standardizate A și B și prin metoda Glories. Studiul nostru permite stabilirea unor corelații între caracteristicile cromatice și antioxidante ale vinurilor roșii obținute în două podgorii, din diferite soiuri de struguri negrii și aflate în diferite stadii de evoluție.*

The determination of chromatic features of red wines and their adequate interpretation is very important for quality establishing of red wines (both young red wines and aged red wines). The modification of chromatic characteristics of red wines during their evolution is in strong correlation with their antioxidant properties [1,2,8].

The studies made till this moment contain the fact that from all the foods and drink consumed by humans, the wine represents the most important source of substances with protective role against cardiovascular diseases that represent the principal cause of mortality in developed countries. The greatest degree of cardioprotection is related to ingestion of red wine rather than white wine, beer or spirits. Quality and quantity of polyphenols are related to the variety vineyard, weather, soil and cultivation practices. It may tell, that the polyphenols contribute to the definition of organoleptic quality, to the food-hygiene and to the wines particularization [7]. The chemical structure of polyphenols is specially adapted for antioxidant activity (these are donators of hydrogen or electrons, or they capture free radicals present human organism that may cause oxidative degradation of some lipids molecules, proteins, nucleic acids, inducing in this way the appearance of degenerative diseases) [1,6,11]. Many studies have demonstrated that through wines aging, because oxidation and condensation processes, it was diminished the monomer polyphenols content (which has the antioxidant properties); also, it was monitoring the evolution of substances with antioxidant role during wine's evolution, it was studied the influence of different factors (biological, biochemical, technological) about wine quality, but not made correlation between the content of compounds with antioxidant power, wine's antioxidant capacity, chromatic properties depending on the evolution stage of wine obtained from different wine variety and in different vineyards [1,7,8].

MATERIALS AND METHODS

In this study were analyzed red wines processed of Recas and Minis wine making centers in 2005 harvest year. The selected wines were obtained from Cabernet Sauvignon (CS), Pinot Noir (PN) and Merlot (M) grapes varieties. The investigations were effected about both red wines categories: young and aging in bottle for one year. For these wines it were determined the chromatic parameters, total antioxidant capacity, total polyphenols content and monomeric anthocyanins amount, as well as the chromatic characteristics.

Reagent and equipment: All chemicals and reagents were analytical grade or purest quality purchased from Merck, Fluka, Sigma. Was used distilled water. Absorption determination for FRAP and total polyphenol content was made using Spectrophotometer Specord 205 by Analytik Jena.

Determination of Total Antioxidant Capacity - TAC (Adaptation of FRAP method - Ferric reducing ability of plasma) [3]. The Total antioxidant capacity in wine samples was calculated in mM Fe^{2+} /L. Correlation coefficient (r^2) for calibration curve was 0.9958.

Determination of phenolic compounds. The content of total polyphenolic compounds was determined by Folin-Ciocalteu method [3]. Total content of polyphenols in wines was calculated in mM gallic acid/L. Correlation coefficient (r^2) for calibration curve was 0.995.

Determination of total monomeric anthocyanins. The total monomeric anthocyanins will be spectrometric determined by differential pH method [4]. The pigments content was calculated as *cyanidin-3-glucoside*.

Chromatic properties will he determine through high performance spectrophotometer analysis with a Analytic Jena Specord 205. It will be done the following determinations depending on used method: Standard method A and B [9, 12] and Glories method [5, 9].

RESULTS AND DISCUSSIONS

In the table 1 it was presented the chromatic parameters obtained by application of A and B standardized methods.

Table 1

Chromatic properties of red wine determined by standardized A and B methods

Grape variety	Method A		Method B						
	λd	Wine color	A ₄₂₀	A ₅₂₀	I.C	tg α	α	Wine color	
Recas ¹	CS	614	red	3.3147	3.4013	6.7160	0.0866	4,95	red
	M	620	red	3.1473	3.2071	6.3544	0.0598	3,421	red
	PN	624	red	2.7795	3.0147	5.7942	0.2352	13,24	red
Recas ²	CS	635	red	3.2147	3.8492	7.0639	0.6345	32,40	red
	M	631	red	3.0079	3.6122	6.6201	0.6043	31,14	red
	PN	626	red	2.6789	3.3971	6.076	0.7182	35,69	red
Minis ¹	CS	595	brawny	3,8125	3,6289	7.4414	-0.1836	-10,40	brawny
	M	592	brawny	3,5113	3.4731	6.9844	-0.0382	-2,19	brawny
	PN	597	brawny	3.3111	3,2249	6.536	-0.0862	-4,93	brawny
Minis ²	CS	620	red	3.5473	4.3897	7.937	0.8424	40,11	red
	M	630	red	3.3697	3.9387	7.3084	0.569	29,64	red
	PN	615	red	3.2083	3.4228	6.6311	0.2145	12,11	red

1- red wines aged in bottle for 12 months; 2- young red wines

The dates from the table 2 show the chromatic structure obtained by Glories method. By this method application, it was determined the percent with that each pigment category (yellow, red and blue) contribute to the total wine color. The results obtained for these methods are in perfect accord, namely, the wine shade identified by these methods is the same.

For all young red wines it was obtained the red shades, the wines from Recas even after 12 months for aging have the red color while the color of wine processing in Minis vineyard through aging became brawny.

As a rule, for red wines age, the absorbance at 520nm decreases while the absorbance at 420nm and 620nm increases, due to the shift from monomeric to polymeric anthocyanins [9]. Although all analysed samples proceeded from the same harvest year, 2005, the wines from Minis vineyard have the brawny color and for the wines from Recas vineyard the color which results after aging is red.

Regarding the influence of evolution stages of the wine it was observed that the structure of phenolic compounds varies very much during wine's maturation and aging. For wine that were aged for 12 months, the percent of yellow pigments which participate to the red wine total color formation is more than red pigments percent.

Table 2

Chromatic properties of red wine determined by Glories method

Grape variety		A ₄₂₀	A ₅₂₀	A ₆₂₀	I.C*	T	Chromatic structure		
							% yellow pigments	% Red pigments	% Blue pigments
Resas ¹	CS	3.3147	3.4013	0.8146	7.6306	0.97	43.44	44.57	10.68
	M	3.1473	3.2071	0.7103	7.0647	0.98	44.55	45.40	10.05
	PN	2.7795	3.0147	0.5894	6.3836	0.92	43.54	47.23	9.23
Recas ²	CS	3.2147	3.8492	0.7208	7.7847	0.84	41.30	49.45	9.26
	M	3.0079	3.6122	0.5873	7.2074	0.83	41.73	50.12	8.15
	PN	2.6789	3.3971	0.4283	6.5043	0.79	41.19	52.23	6.58
Minis ¹	CS	3.8125	3.6289	1.8983	9.3397	1.05	40.82	38.85	20.33
	M	3.5113	3.4731	1.6112	8.5956	1.01	40.85	40.41	18.74
	PN	3.3111	3.2249	0.8016	7.3376	1.03	45.13	43.95	10.92
Minis ²	CS	3.5473	4.3897	1.6307	9.5677	0.81	37.08	45.88	17.04
	M	3.3697	3.9387	1.4986	8.807	0.86	38.26	44.72	17.02
	PN	3.2083	3.4228	0.9844	7.6155	0.94	42.13	44.95	12.93

2- red wines aged in bottle for 12 months; ¹- young red wines

IC and IC* have the same direction of evolution (the values decreased for aged wine). For all cases, the highest values of color intensity it was obtained for red wine from Cabernet Sauvignon grape variety and the smaller values for Pinot Noir red wine. The tonality present values between 0.6-1.0 for wines with red shade and the values more than 1 for wines with brawny shade. From the dates showed in the table 2 it was observed that the pigments structure reflects exactly the chromatic features of analyzed red wines. In general case, for wine with red shade, the red pigment class participates in more measure (over 40%) to underline of wine color, for wine with brawny shade, the red pigments percent decrease being accompanied of yellow-orange pigments percent increasing. The class of blue pigments participates at total color of wine in measure of 6-10% for red wine from Recas vineyard and in measure of 10-20% for red wine from Minis. For aged red wine the yellow pigments percent increase and the red pigments percent decrease, the both pigments classes are more equilibrate in aged wine.

In the table 3 are presented the values of total antioxidant capacity, total polyphenols content and total monomeric anthocyanins.

Table 3

The values of polyphenols, total antioxidant capacity and monomeric anthocyanins

Grape variety		Total polyphenols (mM acid gallic/L)	Antioxidant capacity (mM Fe ²⁺ /L)	Monomeric anthocyanins (mg/L)
Resas ¹	CS	19.87	25.59	81.42
	M	17.65	22.03	76.43
	PN	16.30	18.72	71.29
Recas ²	CS	22.89	28.11	152.23
	M	20.70	26.54	135.29
	PN	17.88	21.49	120.47
Minis ¹	CS	19.35	25.45	98.14
	M	18.21	23.89	89.71
	PN	16.09	18.16	81.04
Minis ²	CS	26.91	32.89	189.76
	M	23.07	28.54	140.79
	PN	20.16	26.12	129.87

3- red wines aged in bottle for 12 months; ²- young red wines

From these results it was observed that, by aging for one year, the antioxidant properties of analysed red wines decrease with 10-15% (for the case of Recas vineyard) and with 17-30% (for the case of Minis vineyard). This finding is very important because supplies the information regarding the evolution of antioxidant characteristics for red wines from Recas and Minis vineyards through aging. In all cases, the polyphenols content has the same direction of evolution with total antioxidant capacity (the TAC increases at once increasing of total polyphenols content). It was observed a linear correlation between these parameters, the correlation coefficient was R=0.96779. Particularly, it was distinguished a different evolution depending on the grapes variety used for wine making. The highest values for antioxidant capacity were founding in young red wine (in particular from Cabernet Sauvignon grape's variety).

Through aging the polyphenols content, the total antioxidant capacity and the total monomeric anthocyanins content were decreased. For the case of Recas and Minis vineyards, the biggest values of monomeric anthocyanins were founding in red wine from Cabernet Sauvignon grape variety, followed of red wines from Merlot and Pinot Noir grape varieties.

For young wines, the anthocyanins amounts were situated between 130-190 mg/L for wines from Recas vineyard and between (120-150mg/L) for wines from Recas vineyard. Through aging for one year, the content of monomeric anthocyanins decrease until (70-80mg/L) for wines from Recas vineyard and (80-100mg/L) for wines from Minis vineyard. The values of anthocyanins content are very different in rapport with grape's variety, wine evolution stage and origin place.

CONCLUSIONS

The highest values of color intensity it was obtained for red wine from Cabernet Sauvignon grape variety and the smaller values for Pinot Noir.

Total antioxidant capacity, polyphenols and anthocyanins content were showed different values in rapport with origin place (vineyard), grape's variety and evolution stage of red wine.

The polyphenols content has the same direction of evolution with total antioxidant capacity. Between these parameters it was observed a linear correlation for both red wine categories: young and aged in bottle.

Through aging decrease the total antioxidant capacity, total polyphenols content and total monomeric anthocyanins. The highest values for antioxidant capacity were founding in young red wines (in particular for red wine from Cabernet Sauvignon grape's variety).

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