

## **Evolution over the time of the main phenolic components of red wines of cabernet sauvignon and Merlot from Sîmburești – Olt vineyard**

**Camelia Muntean<sup>a\*</sup>, Marin Gheorghiu<sup>a</sup>**

<sup>a</sup>*University of Craiova*

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### **Abstract**

As it is well-known, Sîmburești-Olt vineyard is famous for the red wines of high quality obtained from the Cabernet Sauvignon, Merlot, Pinot noir breeds. It is also known that red wines – generally – improve radically their organoleptic characteristics as they pass through the ripening and obsolescence stages stored in wooden pots. The most important transformations which lead to the improvement of the quality of Sîmburești wines are connected to the ways in which the phenolic compounds are evolving.

Within the phenolic composition of Sîmburești red wines, during ripening and obsolescence take place modifications related to: diminution of connected contents in complete antocians; within the antocianic complex the proportions of free antocians decrease permanently and the proportions of mixed antocians increase; the proportions of yellow and red antocians decrease permanently and in exchange the ratio between them increases, in favour of the yellow component, aspect pointed out through the values of colour tonality; the proportions of tannins mixed with the polysaccharides increase, which leads to the improvement of the gustative character.

**Keywords:** red wine, composition, polyphenols, antocians, tannin

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### **1. Introduction**

The main stages of red wines evolution, having a definitive role in achieving the compositional balance, but especially in the significant improvement of organoleptic characteristics are those denominated by oenologists as “ripening” and “obsolescence”.

During the “ripening” stage the numerous modifications from the composition of red wines take place under the influence of oxygen from the air and in a certain manner with temperature contribution, of some biocatalyzers and some elements with variable bond. Unlike the ripening stage, the obsolescence is dominated by reactions with reducing character (COTEA D.V. and the co-workers, 1988, GHEORGHIU M. and the co-workers, 2002).

The “spectacular” transformations bear by the polyphenolic constituents during the ripening and obsolescence stages, which engage the increasing of the qualitative value of red wines (and also mentioned within the summary) have been “expressed” in works of an authentic scientific value made both abroad and also in our country (GLORIES Y. 1980; SOMERS C.T. 1983; RIBEREAU-GAYON. P. and the co-workers, 1988; BADEA P., 1998; VLADU Cristina, 2007).

Due to the fact that Sîmburești-Olt vineyard is both remarked in the country and also abroad through red wines of the highest rank, the evolutive aspects of the phenolic compounds of these products have been taken into account, in the framework of the present advancement of science and oenological technique.

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\* Corresponding author: *e-mail address:* [camelia\\_muntean@yahoo.com](mailto:camelia_muntean@yahoo.com)

## **2. Experimental**

The study has been made upon Cabernet Sauvignon and Merlot wines, from Sîmburești-Olt vineyard, yield 2003, obtained from over-ripped grapes, in a perfect phytosanitary status, ripped for 12 months in oak wood wine casks and obsolesced at the bottle for 18 months.

Inferring modern methods of analysis and control, each 6 months there were determined: contents in complete antocians; contents and proportions of free and mixed antocians (mg and %); indices of antocians (mixture antocians – tannin and antocians level of polymerization); absolute and relative contributions of yellow, red and blue pigments; chromatic characteristics (tinctorial intensity, colour tonality, flavilium cations); the contents in polyphenols and tannin; tannin indices (condensed tannins, astringent tannins and tannins mixed with polysaccharides).

## **3. Results and Discussion**

The polyphenolic constituents from Cabernet Sauvignon wines during ripening and obsolescence evaluate according to the data enlisted in table 1.

Both during ripening and also during obsolescence, the tinctorial antocianic substance decreases permanently. Within the 9 months of ripening the content in antocians decreases with 139 mg/l, and the obsolescence period the diminution still registers 91 mg/l, which means that within the 27 months of ripening and obsolescence the antocianic complex attains a total loss of 28,20%.

The proportions of free antocians decrease from one stage to another, and those of mixed antocians increase.

The antocians mixing rhythms with other constituents are much higher in the ripening stage than in those produced at obsolescence. Thus, during the ripening stage (within 9 months) the mixing proportions reach the value over 50%, and those from the obsolescence stage (within

18 months) exceed with a little value over 10%.

The higher mixing speed of antocians with tannins during the ripening stage is also emphasised by the values of the index mixture antocians – tannin: with 12% within the 9 months of ripening and only 5% within 18 months of obsolescence. It concludes that the oxygen is the factor which leads to the antocians polymerization. In fact, also the values of the index antocians level of polymerization “expresses” the differences of intensity of the polymerization process of antocians with the tannins within the two stages of wine evolution.

Important modifications during ripening and obsolescence also take place in the close chromatic structure of the tinctorial complex. As absolute values, both the yellow-orange component and also the red component decrease permanently. But as relative values, within the tinctorial intensity, the yellow-orange component increases, with the visual improvement of this chromatic parameter.

Corresponsive to the diminution of antocians in contents, the values of tinctorial intensity decrease also, with 18% during the ripening stage and with 10,3% more during the obsolescence stage.

As a consequence of the diminutions of the red component, the flavilium cations (synthetic indices of chromatic type) also register corresponsive diminutions, which in relative values represent (within the 27 months) almost 13%.

During ripening the wines grow rich in complete polyphenols, through the extraction of certain quantities of gaelic tannins from the wine cask staves. During obsolescence this oenological size decreases, the level at 30 months still being higher than the one recorded at 3 months age (with 0,2 g/l). Keeping the proportions, the same evolution is also registered to the tannin contents (increasings during ripening, decreasing during obsolescence).

The flavour characteristics of red wines are radically influenced by the evolution of tannins. They are portrayed by the values of the tannin indices. It is acknowledged that: condensed tannins (index of HCl%)

increase, more rapidly during ripening, slower during obsolescence; astringent tannins which confer toughness and coarseness, decrease permanently within the two stages (index of gelatine %); the tannins mixed with polysaccharides (index EtOH) increase from the quantitative point of view, which means a significant improvement of the gustative character.

For Merlot wine the evolutions of polyphenolic compounds during ripening and obsolescence stages are presented in table 2. Keeping the specific levels of the phenolic constituents of Merlot wines, their evolutions along the two stages are similar, as senses, to those mentioned about the Cabernet Sauvignon wines.

**Table 1.** The evolution of polyphenolic characteristics of Cabernet Sauvignon wine, of Sîmburești vineyard, during the stages of ripening and obsolescence

Polyphenolic sizes		Wines age - months					
		3	6	12	18	24	30
		Ripening			Obsolescence		
Antocianic complex	Complete antocians mg/l	816	731	677	651	605	586
	Free antocians mg/l	636	471	406	365	309	270
	Free antocians %	78	65	60	56	51	46
	Mixed antocians mg/l	180	256	271	286	296	316
	Mixed antocians %	22	35	40	44	49	54
Indices of antocians	Mixture antocians – tannin index %	20	29	32	34	36	39
	Antocians level of polymerization index %	32	36	42	45	51	56
Colour	DO 420 nm	0,472	0,449	0,406	0,390	0,375	0,362
	DO 520 nm	0,911	0,807	0,722	0,655	0,613	0,570
	DO 620 nm	0,199	0,183	0,170	0,163	0,159	0,151
	Yellow pigments %	29,84	31,20	31,28	32,28	32,70	33,48
	Red pigments %	57,58	56,08	55,62	54,22	53,44	52,63
	Blue pigments %	12,58	12,72	13,09	13,49	13,86	13,94
	Ic	1,582	1,439	1,298	1,208	1,147	1,083
	Tc	0,518	0,556	0,562	0,595	0,611	0,635
Complete polyphenols and tannin	Complete polyphenols g/l	3,19	3,49	3,56	3,50	3,43	3,40
	Tannin g/l	2,76	2,93	3,06	3,01	2,96	2,93
Indices of tannin	Condensed tannins index %	17,1	23,9	27,1	27,6	28,4	28,6
	Gelatine index	53,2	51,4	48,4	47,2	46,8	40,1
	Tannins mixed with polysaccharides index %	16,2	17,1	17,9	18,3	18,9	19,4

**Table 2.** The evolution of polyphenolic characteristics of Merlot wine, of Sîmburești vineyard, during the ripening and obsolescence stages

Polyphenolic sizes		Wines age - months					
		3	6	12	18	24	30
		Ripening			Obsolescence		
Antocianic complex	Complete antocians mg/l	738	675	623	584	561	538
	Free antocians mg/l	554	459	374	315	281	242
	Free antocians %	75	68	60	54	50	45
	Mixed antocians mg/l	184	216	249	269	280	296
	Mixed antocians %	25	32	40	46	50	55
Indices of antocians	Mixture antocians – tannin index %	24	31	34	37	39	41
	Antocians level of polymerization index %	33	38	41	44	50	54
Colour	DO 420 nm	0,451	0,432	0,413	0,382	0,374	0,351
	DO 520 nm	0,813	0,732	0,690	0,622	0,583	0,547
	DO 620 nm	0,161	0,153	0,144	0,143	0,140	0,138
	Yellow pigments %	31,65	32,80	33,12	33,30	34,10	33,88
	Red pigments %	57,05	55,58	55,33	54,22	53,14	52,80
	Blue pigments %	11,30	11,62	11,55	12,46	12,76	13,32
	Ic	1,425	1,317	1,247	1,147	1,097	1,036
	Tc	0,554	0,590	0,598	0,614	0,641	0,641
	dA %	62,36	60,10	59,70	57,85	55,91	55,39
Complete polyphenols and tannin	Complete polyphenols g/l	3,02	3,07	3,11	3,03	3,00	2,97
	Tannin g/l	2,79	2,82	2,84	2,79	2,70	2,66
Indices of tannin	Condensed tannins index %	17,2	19,2	21,0	22,1	22,8	23,5
	Gelatine index	48,6	45,1	44,7	44,1	43,9	43,2
	Tannins mixed with polysaccharides index %	18,1	18,6	19,0	19,2	19,7	20,8

Ic= tinctorial intensity (DO 420 + DO 520 + DO 620 nm)

Tc= colour tonality (DO 420/DO 520 nm)

dA%= flavilium cations DO520 -

$$\left( \frac{Do420 + Do620}{2} \right) \times \frac{1}{Do520} \times 100$$

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