

## ASPECTS REGARDING THE EVOLUTION OF RED WINES DURING THE AGING PROCESS

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**Abstract:** The total content in polyphenols, total acidity, and coloring intensity at the beginning and at the end of the maturation – aging process were analyzed. The samples were also analyzed from a sensorial point of view. The wines with a lower content in alcohol (11.5 – 12 % vol. alc.) undergoing a maturation – aging process, presented a lower coloring intensity, a more important decrease of the total content in polyphenols and of the total acidity, compared to the wines which were more alcoholic (13 – 13.6 % vol. alc.) and they obtained a better appreciation from a sensorial point of view. Higher levels of the wines’ acidity gaved them a better organoleptic appreciation at the end of the maturation – aging process.

**Keywords:** *maturation, aging, coloring intensity, sensorial assessment, conditioning.*

### INTRODUCTION

The maturation and aging processes are influenced by a series of factors like: the preservation temperature of the wine, the type of wine, the physical - chemical composition, the access possibility of the air, the material of which the containers are made and their capacity, the sulphitation degree. After the alcoholic fermentation in the wine’s mass, many physical, chemical and biochemical processes continue to take place conditioning its composition and quality characteristics [1].

Researches had in view the influence of the main factors which condition a better evolution of wines during their maturation and aging processes: the physical - chemical composition, the best stage for the wine's distribution for preserving, the nature and size of the containers.

## **MATERIALS AND METHODS**

After the alcoholic fermentation is finished, in the wine's mass many physical, chemical and biochemical processes that influence the wine's composition and quality continue to take place [2].

The Merlot and Pinot Noir wines that were analyzed, were divided into four groups according to the phase when the wine for preserving was distributed:

L<sub>1</sub> – the first decade of December, after the premature rack, having the malolactic fermentation unfinished;

L<sub>2</sub> – the first decade of February, after the first rack, with the malolactic fermentation half-finished;

L<sub>3</sub> – the first decade of January, after the first rack, with the malolactic fermentation finished;

L<sub>4</sub> – the first decade of May, after the second rack, with the malolactic fermentation finished.

The polyphenols total content, the total acidity, the coloring intensity for the beginning and the end of the maturation and aging processes were studied. For each analyzed sample, tasting was made, before and after the maturation – aging processes, the results being marked with marks from 1 to 10. The wines were kept for maturation in wooden vessels in the *a* alternative and in stainless steel vessels in the *b* alternative. Vessels were of different sizes. The coloring intensity was determined spectrophotometrically as a sum of the radiations' absorption with  $\lambda_{420\text{ nm}}$  and  $\lambda_{520\text{ nm}}$ .

## **RESULTS AND DISCUSSIONS**

Wines with a lower alcoholic concentration (11.5-12 % vol.) submitted to maturation and aging processes have a reduced coloring intensity, a more important decrease in the total polyphenols content and total acidity, compared to more alcoholic wines (13-13.6 % vol.) [3-4]. From a sensorial point of view, the more alcoholic the wines were, the better they were appreciated, obtaining higher marks when they were tasted. At the end of the maturation – aging step, the wines with a higher acidity have a better coloring intensity, a suitable tint, with a lower content in polyphenols and a good sensorial appreciation when the SO<sub>2</sub> quantity is at a high level, at the end of the maturation – aging process, it can be noticed that the wines are intensely colored, they contain more tannin, but are less appreciated from the sensorial point of view. The physical-chemical evolution of the wines during the maturation process is shown in Table 1. The first decade of January can be considered as being the most favorable step for preserving the wines for maturation – aging processes, assuring that these have finished their malolactic fermentation. A constant equilibrium of the physical-chemical components can be noticed, according to a good sensorial appreciation as it can be seen from the data shown in Table 2.

**Table 1.** The evolution of the physical-chemical composition of the wines during the maturation period

maturation period						
Variant		Maturation alternative	Coloring intensity	Total polyphenols g/L	Total acidity g/L	Appreciation mark 1-10
Merlot						
Alcohol %vol.	11.5	a	0.645	1.65	4.3	8.0
		b	0.523	1.6	3.8	9.0
	12-12.2	a	0.545	1.85	4.2	8.5
		b	0.485	1.82	3.9	9.0
	13-13.6	a	0.505	1.65	4.0	8.0
		b	0.468	1.63	3.9	9.5
Total acidity g/L H <sub>2</sub> SO <sub>4</sub>	3.5-3.7	a	0.583	1.73	3.7	7.5
		b	0.345	1.66	3.5	8.5
	4.2-4.5	a	0.612	1.76	4.2	8.5
		b	0.455	1.68	4.0	9.5
	5	a	0.655	1.80	5.0	7.5
		b	0.512	1.74	4.7	8.5
Free SO <sub>2</sub> /Total SO <sub>2</sub>	25-30/100-120	a	0.625	1.65	4.5	7.0
		b	0.601	1.54	4.3	8.5
	24-25 / 78-88	a	0.610	1.64	4.5	7.0
		b	0.573	1.50	4.2	9.0
Pinot noir						
Alcohol %vol.	11.5	a	0.598	1.45	3.6	9.0
		b	0.483	1.36	3.4	9.0
	12-12.2	a	0.553	1.45	4.5	9.0
		b	0.486	1.42	4.4	9.5
Total acidity g/L H <sub>2</sub> SO <sub>4</sub>	3.5-3.7	a	0.483	1.26	3.5	8.5
		b	0.365	1.08	3.3	9.0
	4.2-4.5	a	0.583	1.53	4.5	9.0
		b	0.511	1.33	4.2	9.5
Free SO <sub>2</sub> /Total SO <sub>2</sub>	25-30/100-120	a	0.583	1.36	3.6	7.0
		b	0.504	1.35	3.5	8.5
	24-25 / 78-88	a	0.534	1.35	3.6	7.0
		b	0.460	1.31	3.4	9.0

a- The maturation process takes place in wooden vessels

b- The maturation process takes place in stainless steel vessels

Wooden vessels ensure the best conditions for maturation concerning the color, the polyphenols content and the sensorial point of view. The best vessels have proved to be those with a capacity of 450 – 2,000 L. Larger vessels, with a capacity of 5,000 – 10,000 L burden the wine's maturation.

**Table 2.** The evolution of the physical-chemical composition of the wines during the maturation period as a function of the period in which the wine was distributed for preserving

Index	L <sub>1</sub>		L <sub>2</sub>		L <sub>3</sub>		L <sub>4</sub>	
	a	b	a	b	a	b	a	b
Coloring intensity	0.783	0.432	0.683	0.514	0.654	0.525	0.528	0.440
Total poly-phenols, g/L	1.72	1.46	1.69	1.47	1.62	1.52	1.39	1.14
Total acidity, g/L H <sub>2</sub> SO <sub>4</sub>	4.5	4.3	4.2	4.0	4.0	3.8	3.9	3.4
Extract, g/L	26.5	24.3	26.4	24.6	25.8	24.5	25.4	24.0
Appreciation mark	7.0	7.5	7.5	8.0	8.5	9.5	7.0	7.5

a- The maturation process takes place in wooden vessels

b- The maturation process takes place in stainless steel vessels

Compared to the old vessels used for keeping for several years, the new ones ensure a very good color of the wine, higher polyphenols content and superior sensorial characteristics.

## CONCLUSIONS

1. Wines with a higher alcoholic concentration (13–13.6 % vol. alc.) evolved better in the maturation aging processes, from a sensorial and physical-chemical point of view.
2. Wines with a higher acidity have a good coloring intensity, an adequate tint, a total content in polyphenols which was not that dominant, but also a good sensorial appreciation.
3. A higher content in sulfur dioxide gives the wines after the maturation – aging process a higher coloring intensity, but from a sensorial point of view they were not appreciated to the same extent.
4. The wines' distribution at maturation – aging it is preferred to be accomplished after the malolactic fermentation and in the first decade of January.

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