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MONITORING THE STORAGE CONDITIONS OF WINES – EFFICIENT METHOD FOR CONSUMER PROTECTION

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Abstract

To maintain constant the wine quality during its entire circulation until it meets the consumer, it is necessary that the wine must be preserved in certain conditions of temperature, atmospheric relative humidity and for limited period of time in all the stages of technical-economic circulation.

The monitoring of time evolution of wines quality level according to the level of main preservation parameters can identify some correlations in order to avoid selling products with harmful influence on consumer.

To emphasize the time evolution of wines quality characteristic levels preserved in standard storage conditions, the authors made a study which had as its main purpose monitoring the evolution of ten quality characteristics of Sauvignon Blanc wine during 60 days period.

The research underlined changes with negative influence on quality in all four sensory characteristics and one physicochemical characteristic. These findings made on samples preserved in standard conditions but in the maximum levels of preservation parameters, conclude that the wines quality level is not always constant during the period of validity, although the standard conditions are obeyed.

In this context, to ensure the wine consumer protection requires that the producers and competition companies must not only to obey the storage conditions but also to provide actions to improve the adjustment of parameters to wine preservation requirements, so that the initial wines quality level to be maintained or to have slight decreases.

Key words*: wine, quality, consumer protection, air temperature, atmospheric relative humidity, preservation period*

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Introduction

The wines periods of validity fluctuate according to its quality. These are between 15 days and 12 mounts, if it obeys the preservation conditions which have as main parameters air temperature 10-15°C and atmospheric relative humidity 75% (Diaconescu, et al., 2007, pp.231).

If the wines are preserved in the conditions mention above, it must maintain its quality level at values closest to original quality level. If the optimal storage conditions are disobeyed, it can generate changes in wine quality, whose trends and intensities are according to the nature of external factor and its intensity and period of influence.

Static Quality – Dynamic Quality Relation and the Requirements of Wine Consumer Protection

To monitor the time evolution of wines quality characteristics a research was conducted on samples of medium dry Sauvignon Blanc white wine which is a DOC superior quality wine with CMD. The sample was obtained by crushing the grapes from Dealu Mare vineyard (Prahova country), 2005 vintage. The product was packaged in 75 cl glass bottles, labeled with "Sauvignon Blanc, 2008" reference (Label of Sauvignon Blanc Wine, 2008).

The study consisted in preserving the wine in a storage chamber. Its parameters were in the maximum limits of normal storage conditions for DOC wines, i.e. the air temperature 15°C, atmospheric relative humidity 75% and preservation period 60 days (Dima, et al., 2006, pp.247). During the research, eight analyses have been carried out (i.e. four physicochemical analyses and four sensory analyses) at 0, 30, 45 and 60 days from the production date.

In the bottle day of wine (0 days) it has been undertaken two analyses (physicochemical and sensory) to obtain the blank test, i.e. the reference in which all the results of further analyses will be set against.

Changes in the Physicochemical Characteristics Level of Sauvignon Blanc Wine

In table 1 is shown the influence of maximum limits of normal storage conditions in physicochemical characteristics level of medium dry Sauvignon Blanc wine. Thus, it can point out that the preservation generates insignificant changes of physicochemical characteristics level.

Table 1. Influence of maximum limits of normal storage conditions in physicochemical characteristics level of Sauvignon Blanc wine

No.	Preservation period (days)	Physicochemical characteristics					
		Alcohol content (% alcohol by volume)	Reducing sugar (g/l)	Total acidity (g/l tartaric acid)	Volatile acidity (g/l tartaric acid)	Free SO_2 (mg/l)	Total SO_2 (mg/l)
1.	0	12.0	9.74	5.73	0.15	65	162
2.	30	12.0	9.74	5.73	0.15	50	162
3.	45	12.0	9.74	5.73	0.15	39	162
4.	60	12.0	9.74	5.73	0.15	23	162

Source: Data from own analysis

The figures 1-6 show that the level of main physicochemical characteristics remains constant during the preservation period, i.e. *alcohol content, reducing sugar, total acidity, volatile acidity* and *total sulphur dioxide*.

Figure 1. Evolution of Sauvignon Blanc alcohol content preserved at maximum limits of normal storage conditions

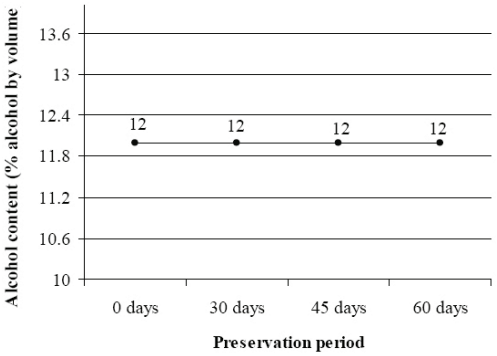


Figure 2. Evolution of Sauvignon Blanc reducing sugar preserved at maximum limits of normal storage conditions

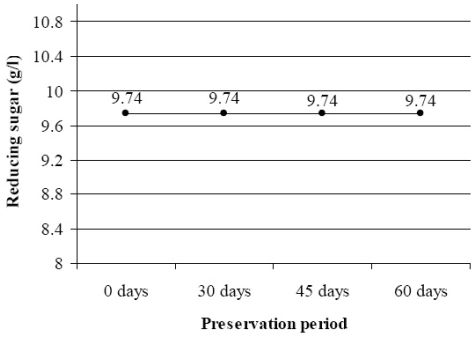


Figure 3. Evolution of Sauvignon Blanc total acidity preserved at maximum limits of normal storage conditions

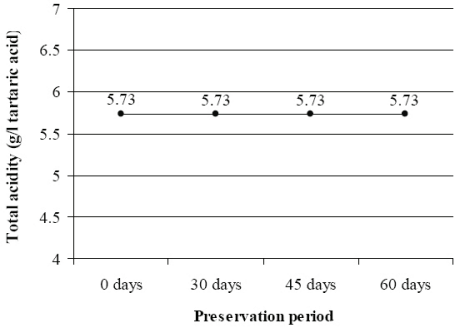


Figure 4. Evolution of Sauvignon Blanc volatile acidity preserved at maximum limits of normal storage conditions

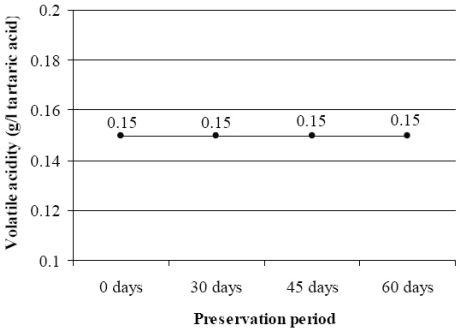


Figure 5. Evolution of Sauvignon Blanc free SO_2 preserved at maximum limits of normal storage conditions

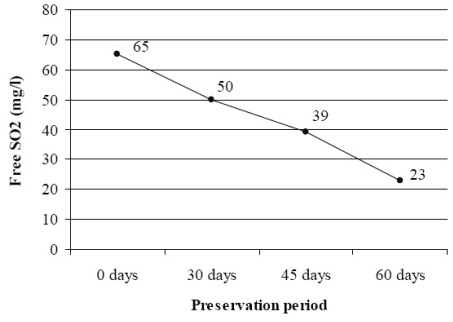
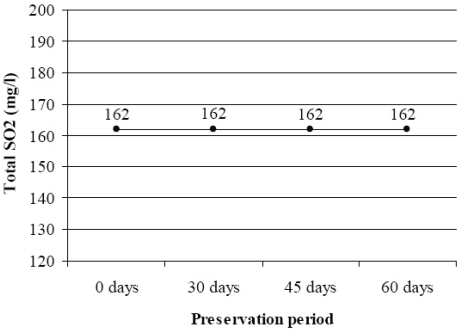


Figure 6. Evolution of Sauvignon Blanc total SO_2 preserved at maximum limits of normal storage conditions



Source: Data from own analysis

The only physicochemical characteristic that has changed throughout the preservation period was *free sulphur dioxide*. The absolute and relative changes of physicochemical characteristics level of Sauvignon Blanc wine are shown in table 2.

Table 2. Absolute and relative changes of physicochemical characteristics level of Sauvignon Blanc wine preserved at maximum limits of normal storage conditions

Physico-chemical characteristic	Preservation period												
	0 days	30 days		45 days				60 days					
		Change from 0 days		Change from 0 days		Change from 30 days		Change from 0 days		Change from 30 days		Change from 45 days	
	mg/l	mg/l	%	mg/l	%	mg/l	%	mg/l	%	mg/l	%	mg/l	%
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Free SO_2	65	-15	-23.08	-26	-40.00	-11	-22.00	-42	-64.62	-27	-54.00	-16	-41.03

Source: Own calculation based on data from Table 1

The level of free sulphur dioxide decreased with 23.08% in the 30th day preservation beside the original level; it declined with 40% in the 45th day preservation from the initial level and with 22% beside the 30th day level. Equally, the concentration of free sulphur dioxide decreased with 64.62% in the 60th day preservation from the original level, with 54% beside 30th day level and with 41.03% from the 45th day level.

It can be mention that the decrease of the free sulphur dioxide content in 30th, 45th and 60th day preservation from the original level is higher than the decline registered beside the levels from pervious days.

Changes in the Sensory Characteristics Level of Sauvignon Blanc Wine

Table 3 presents the influence of maximum limits of normal storage conditions in sensory characteristics level of medium dry Sauvignon Blanc wine. Thus, beside the physicochemical characteristics, all sensory characteristics have changed its level, but with different proportion.

Table 3. Influence of maximum limits of normal storage conditions in sensory characteristics level of Sauvignon Blanc wine

No.	Preservation period (days)	Sensory characteristics			
		Color (points)	Clarity (points)	Bouquet (points)	Taste (points)
1.	0	2.0	2.0	3.2	10.5
2.	30	2.0	2.0	3.2	10.5
3.	45	1.7	1.8	3.0	10.0
4.	60	1.2	1.8	2.5	10.0

Source: Data from own analysis

The figures 7-10 present the deviation of color, clarity, bouquet and taste level of Sauvignon Blanc wine during the 60 days storage period.

Figure 7. Evolution of Sauvignon Blanc color preserved at maximum limits of normal storage conditions

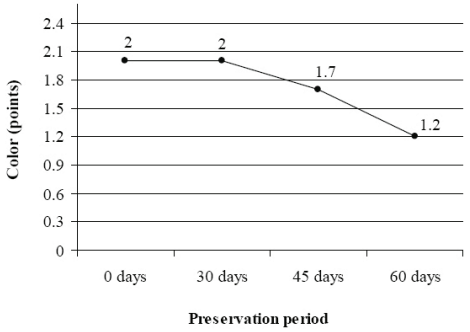


Figure 8. Evolution of Sauvignon Blanc clarity preserved at maximum limits of normal storage conditions

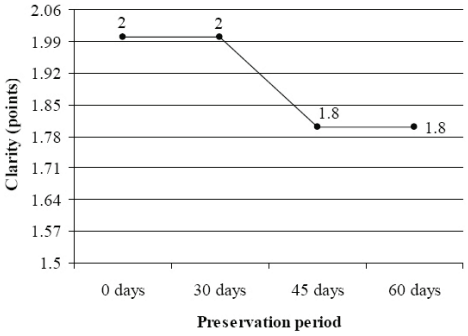


Figure 9. Evolution of Sauvignon Blanc bouquet preserved at maximum limits of normal storage conditions

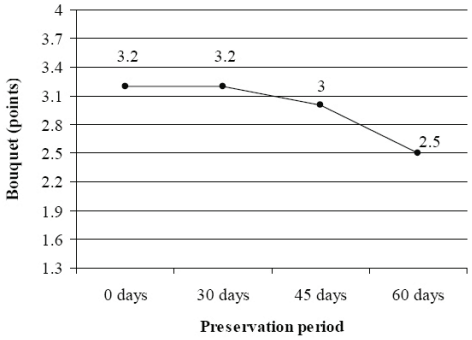
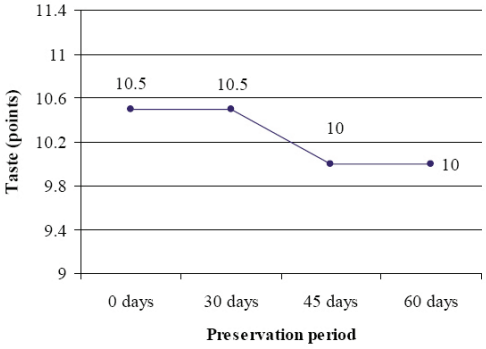


Figure 10. Evolution of Sauvignon Blanc taste preserved at maximum limits of normal storage conditions



Source: Data from own analysis

The figures 7-10 show that the sensory characteristics level has changed mainly in the second half of preservation period, i.e. after 45th day preservation.

In table 4 were calculated the absolute and relative changes of sensory characteristics level of medium dry Sauvignon Blanc wine to underline the ampleness of the variations. Thus, the level of wine color remained unchanged in the 30th day preservation; it decreased with 15% in the 45th day preservation from the initial and 30th day levels. It reduced with 40% in the 60th day preservation beside the original and 30th day levels and with 29.41% from 45th day level.

Table 4. Absolute and relative changes of sensory characteristics level of Sauvignon Blanc wine preserved at maximum limits of normal storage conditions

No.	Sensory characte-ristics	Preservation period												
		0 days	30 days		45 days				60 days					
			Change from 0 days		Change from 0 days		Change from 30 days		Change from 0 days		Change from 30 days		Change from 45 days	
		points	points	%	points	%	points	%	points	%	points	%	points	%
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Color	2.0	-	-	-0.3	-15.00	-0.3	-15.00	-0.8	-40.00	-0.8	-40.00	-0.5	-29.41
2.	Clarity	2.0	-	-	-0.2	-10.00	-0.2	-10.00	-0.2	-10.00	-0.2	-10.00	-	-
3.	Bouquet	3.2	-	-	-0.2	-6.25	-0.2	-6.25	-0.7	-21.88	-0.7	-21.88	-0.5	-16.67
4.	Taste	10.5	-	-	-0.5	-4.76	-0.5	-4.76	-0.5	-4.76	-0.5	-4.76	-	-

Source: Own calculation based on data from Table 3

The wine clarity had almost a similar evolution with the wine color, i.e. its level remained constant in the 30th day preservation beside the original level. In the 45th and 60th day preservation, the level of clarity decreased with 10% both from the initial level and from the 30th day level.

The level of wine bouquet remained unchanged in the 30th day preservation, but in the 45th day preservation it declined with 6.25% beside the original and the 30th day levels. In the 60th day preservation, it decreased with 21.88% from the initial and the 30th day levels, and with 16.67% beside the 45th day level.

The wine taste had a comparable evolution with the wine clarity, i.e. in the 30th day preservation its level was constant from initial level, and in the 45th and 60th day preservation it decreased with 4.76% beside the original and 30th day levels.

Conclusions

As an overall tendency, both the levels of physicochemical characteristics and sensory characteristics had only reduction. In the case of physicochemical characteristics, the most important decrease of free sulphur dioxide was with 64.62% (in the 60th day preservation from the original level) and 41.03% (in the 60th day preservation beside 45th day level).

For sensory characteristics, the most significant decrease was the wine color with 40% (in the 60th day preservation beside the initial level) and 29.41% (in the in the 60th day preservation from the 45th day level).

Regarding the sensory characteristics which registered numerous changes, it can be mentioned the wine color and bouquet, each with two decreases (in the 45th day preservation beside the initial level and in the 60th day preservation beside and 45th day level).

Overall, the Sauvignon Blanc wine preserved at maximum limits of normal storage conditions had three changes of physicochemical characteristics and six changes of sensory characteristics, which means that its quality reduced, ensuring a lower consumer protection. Therefore, the standards should prescribe lower values for the parameters of storage conditions through laboratory studies.

There are two possibilities. The fist one is to reduce the maximum air temperature (i.e. less than 15^{o}C) and the maximum atmospheric relative humidity (i.e. less than 75%) and to maintain the maximum preservation period at 60 days. The second option is to retain the maximum air temperature at 15^{o}C and the maximum atmospheric relative humidity at 75% and to decrease the maximum preservation period (i.e. less than 60 days). Whichever of the two ways is chosen, it will definitively ensure the consumer protection in the case of medium dry Sauvignon Blanc wine.

There are at least two future possibilities to extend the monitoring of storage conditions of wines in order to ensure the consumer protection by studying either other type of Sauvignon Blanc wine (e.g. dry, medium sweet, sweet etc.) or different white wines (e.g. Chardonnay, Aligoté, Pinot Blanc, Riesling, Pinot Gris etc.).

The results of this study cannot be adapted directly to other types of wines, because each type has its own quality characteristics levels which behave different at the same preservation conditions.

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