A STUDY REGARDING THE EVOLUTION OF THE RED WINE DURING THE PERIOD OF AGEING AND MATURATION

Adriana Dabija, Ioana Rebenciuc, Amelia Buculei,Gabriela Constantinescu(Pop)
Ştefan cel Mare University of Suceava, Faculty of Food Engineering ,
Universităţii str., no. 13, Suceava, Romania;
E-mail: dadianadabija@yahoo.com, ioanar@usv.ro,

Abstract
The paper presents the main aspects regarding the evolution of the red wine during the period of maturation and ageing. It has been studied a red wine from the Husi vineyard, Cabernet Sauvignon type of different ages. The maturation and ageing of wine represents phases of its evolution that have a great importance for the definition of the wine's qualities: the formation of the bouquet, of the specific colour etc. the different ages wine samples were analyzed from the physico-chemical point of view. The transformations during the ageing and maturation suppose some modifications of the physico-chemical traits of the wine. At maturation the oxidizing processes that take place lead to severe transformations that alter the colour, smell and taste of the young wine. At ageing the reducing processes predominate the wine's bouquet being enhanced. for the simple and global characterization of the colour we proposed (on the basis of the optic density at the specific wave lengths) the determination of the chromatic traits of the wine (especially brick like colours) and that of its taste (diminishing the roughness).The study led show the positive effect of the maturation and ageing upon the red wine quality evolution.

Keywords: red wine, ageing, maturation, physico-chemical traits, red wine equality evolution

1. INTRODUCTION

The maturation and ageing represent the evolution phases that define the personality of the wine by conferring it those traits that differ it from a young wine [1]. The processes that take place in the maturation phase are led under the action of the oxygen in the air, of the temperature and of the different bio catalysts. This phase starts after the first decanting and lasts until the wine has the specific physico-chemical and organoleptic characteristics of the maturation. It lasts between 1 and 2 years in the cases of the red wines.[2] During maturation the wine suffers a series of complex and severe chemical and physico-chemical transformations for oxidizing processes, colour modifications, evaporating processes, esterifications and anthocyanins polymerization take all place. The oxygen penetration into the wine and its combination with different components trigger numerous reactions that lead to severe changes followed by the modification of the colour, smell and taste in such way that a wood barrel matured wine has almost nothing in common with the initial young wine. Researches have been led regarding the role of the oxygen in wine fabrication as well as regarding the exogenous using of oxygen at the red wine colouring with the specification of the administration phase, of the dosages used and of the technological effects pursued. [3,4].

The young red wines present an intense red colour sometimes with blue or purple shades given by the anthocyanins while for the old wines the colour is given by condensation products of the tannins and by the flavonic pigments that confer the red- orange like colour that sometimes can be even brick like or red brownish. Under the influence of the oxygen and some other factors the coagulation takes place and also the deposition of a part from the nitrogenous substances especially of phenolic compounds facts that all make the red wines to be less astringent and become more "round" from the taste point of view. [5] The ageing takes place only at the bottled wines being the longest process applied to wines in general. Unlike the previous phase where the oxidizing processes predominate during ageing reducing reactions take place having a decreased oxido reductive potential for the contact between the wine and the oxygen id interrupted. [6]

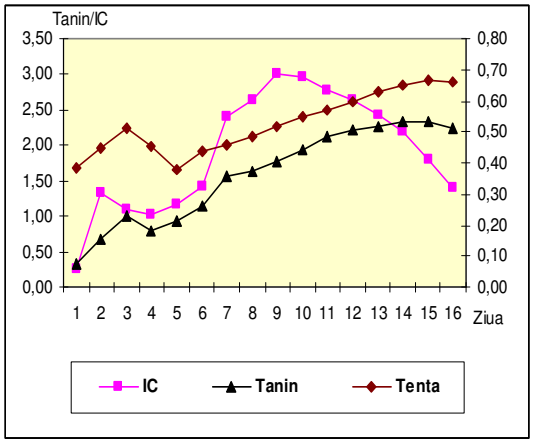

Fig 1. The graphic representation of the colour evolution in time

The bouquet of the bottled wines is amplified especially on the basis of the esterification and acetalization processes. In this way a contribution is brought by the slow oxidation of some substances under the action of the oxygen incorporated in the wine during the bottling. The bottle ageing can last many years until the maximum development of the organoleptic traits specific for the old wines. The evaluation of this moment can be made only in the organoleptic way. When ageing the colour of the red wines becomes red brick like the purple shades completely disappearing and being replaced with yellow-orange shades.

In the identical storage conditions the evolution of the wine colour depends on their polyphenolic background. In general the colour evolution is the defining parameter of the ageing but it is not enough for characterizing the sensory qualities of the wine. Thus, a brick like colour is a trait for an evolved wine but it can show many things from the sensory point of view: a wine too old and exceeded or too young and raw or exactly in the way it should be harmonious and well balanced. [7] after the reaching of the maximum for the organoleptic qualities the old wines preserve these traits for a longer or shorter period of time according to the type of wine, temperature of storage and quality of the bottle cork.

This paper presents a study upon the evolution of some compounds of the red wine from the Huşi vineyard, Cabernet Sauvignon type of different ages.

2. MATERIALS AND METHODS

In the experiments we used a red wine from Huşi vineyard, Cabernet Sauvignon type of different ages:

- sample A- red wine Cabernet Sauvignon- harvest year 2009;
- sample B- red wine Cabernet Sauvignon- harvest year 2007;
- sample C- red wine Cabernet Sauvignon- harvest year 2006;
- sample D- red wine Cabernet Sauvignon- harvest year 2005.

The wine samples were analyzed from the physico-chemical point of view using the following methods:

- for the colour- the spectrophotometric method which is base don the measurement of the optical density of wine at wave lengths of 420nm, 520nm and 620nm values with which the intensity of the colour and shade is calculated [1]; we used a spectrophotometer with optical fiber USB- Ocean Optics;
- the total acidity- the titrimetric method;
- the pH- the potetiometric method;
- the dry substance content- the refractometric method;
- the total dry extract content- the refractometric method.

3. RESULTS AND DISCUSSION

The results of the physico-chemical analyses led on the 4 wine samples are presented in table 1.

Table 1. The physico-chemical traits for the studied wine samples

Physico-chemical trait	Experimental results			
	A	B	C	D
Total acidity in g H_2SO_4/L	4,02	3,85	3,71	3,70
Total dry extract content g/L	28,10	27,24	26,95	26,89
pH	3,23	3,30	3,41	3,40

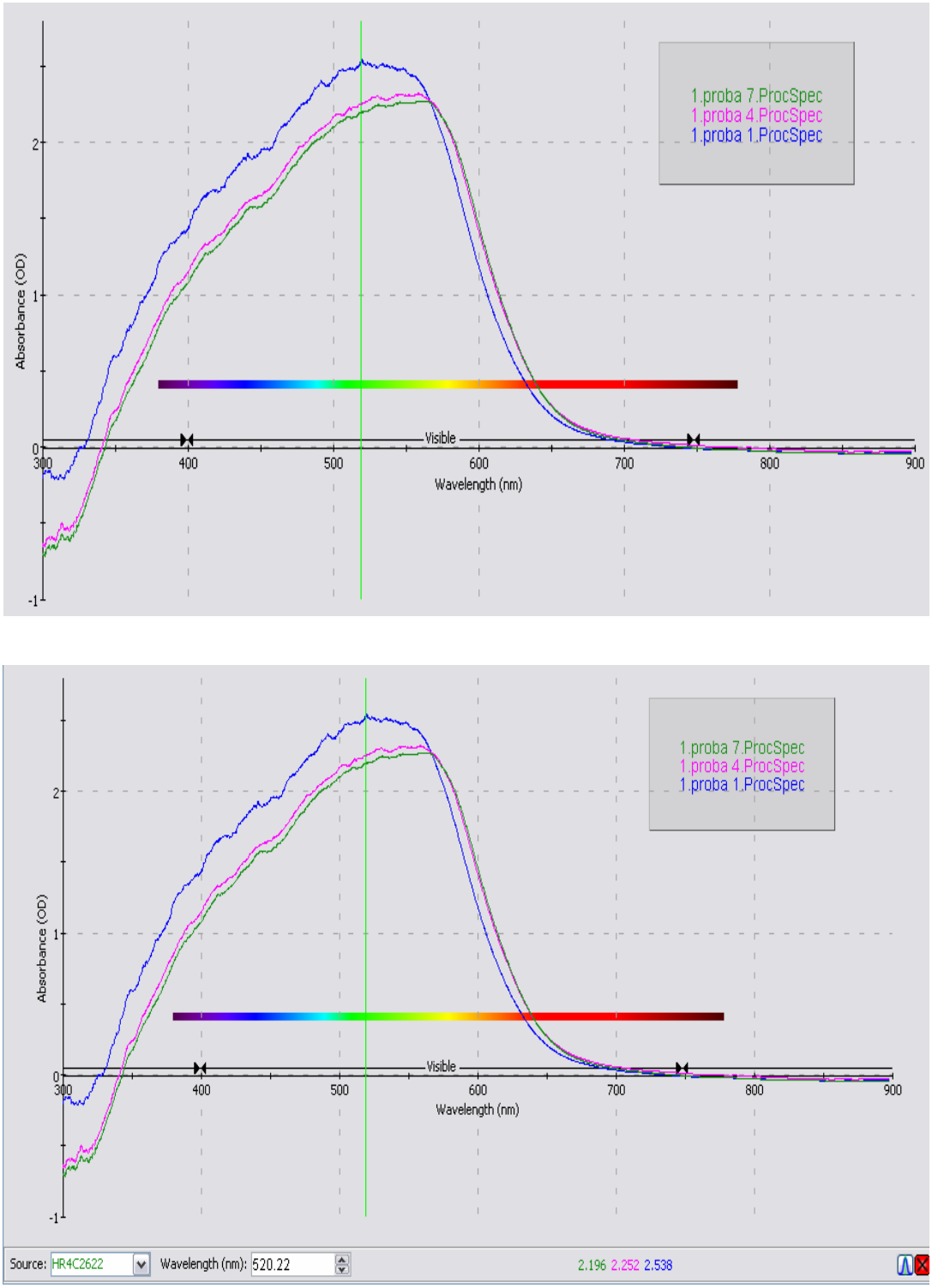

Fig 2. Two spectrophotometric results for sample 1- Cabernet sauvignon wine, 2007, sample 7- Cabernet sauvignon wine, 2006, sample 4- Cabernet sauvignon wine, 2005

We can see that due to the modification of the content in certain wine compounds the old, aged wine „loses" a part from the total dry extract. The fixed acidity decreases duet o the precipitation of the tartaric salts, of the combination of acids with alcohols and other reactions that take place in wine during its maturation and ageing. The polyphenolic compounds content of the wine decreases due to their participation at different reactions that even if slow produce important transformations in the wine itself. Some of the most important reactions of this type are:

- condensation and policondensation reactions between the specific phenolic compounds of the wine;
- condensation reactions between the phenolic compounds with the participation of acetaldehyde;
-oxidation reactions of the phenolic compounds with the formation of some xantiliu derivates of yellow color that generally modify the colour from red-purplish to red brick like;
- oxidation reactions with the formation of quinine compounds.

The colour represents an important trait for the wine quality. It characterizes the grade, composition and wine age. A great influence on the red wine it is held by the tanning substances, the acidity, the metals, the reducing substances: ascorbic acid SO_2 etc.

The objective appreciation of the colour was done by using the spectrophotometric method the expression being made by the absorption of some radiations from the visible spectrum characteristic for the colour given by the substances in the wine.

For the simple and global colour characterization we used the determination on the basis of the optical densities at the specific wave lenghts of the wine chromatic indicators: colouring intensity, colour shade, the degree of each colour at the wine's global colour. The extinction of the samples it was determine dat wave lengths of 420nm, 520nm and 620nm values that helped calculating the colour shade, intensity and degree in the global colour. For the samples analyzed there were calculated the chromatic traits from table 2.

Table 2. The chromatic traits of the analyzed wine samples

Chromatic traits	Wine samples			
	A	B	C	D
Colouring intensity	5,088	4,218	3,508	3,637
Colour shade	0,44	0,66	0,59	0,61
The degree of each color:				
Yellow colour	24,68	34,49	29,93	30,85
Red colour	55,70	51,81	50,10	50,23
Purple colour	19,62	13,68	19,96	18,90

In figure 1 it has been graphically presented the colouring intensity and the colour shade for the analyzed samples. We saw that at the wine sample D which had the greatest age (5 years) the colour shade is higher in comparison with sample A (the youngest wine- 10 months) being 2.27 higher. The degree of each sample reported to the global colour of the wine has been presented in figure 2. At ageing the red wines colour evolve tor ed brick like the purple shades becoming shallow and being replaced by those yellow –orange. The evolution towards orange of the red wines is explained by the anthocyanins decrease of concentration due to the direct condensation of the anthocyanins with flavonols that form orange mixtures.

4. CONCLUSIONS

The maturation and ageing of the wine represents the phases of wine evolution that have a great importance for the defining of the wine qualities: formation of the bouquet, of the specific colour etc. the transfiormations during the maturation and ageing come with the modification of some physico-chemical traits of the wine. At maturation the oxidizing processes that take place lead to severe transformations that alter the colour, smell and taste of the young wine.

At ageing the reducing processes predominate the wine's bouquet being enhanced.

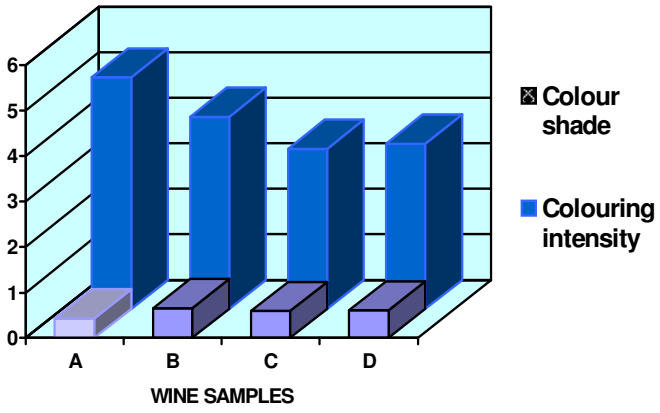

Fig 3. The graphic representation of the colouring intensity and the colour shade

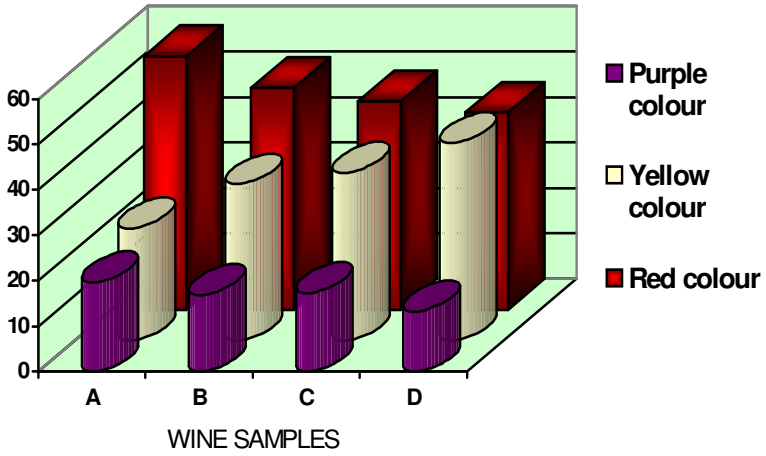

Fig 4. The degree of each sample in the global colour for the analyzed wine samples

The main compounds involved in the oxidation processes are the phenolic compounds and they bring the modification of the colour (towards brick like shades) and of the taste (diminishing the roughness).

The main compounds involved in the oxidation processes are the phenolic compounds and they bring the modification of the colour (towards brick like shades) and of the taste (diminishing the roughness). The study led on the red wine from Husi vineyard, Cabernet Sauvignon type of different ages show the positive effect of the maturation and ageing upon the red wine quality evolution.

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