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STUDIES ON THE CHROMATIC CHARACTERISTICS OF RED WINES AND COLOR EVOLUTION DURING MATURATION

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Abstract

The chromatic profile of red wines are formed by the participation of various compounds phenolic: anthocyanins, tannins, flavones and phenolic acids, anthocyanins are polyphenolic substances with the most imported role in the color of young wines. The evolution of red wine leads to changes of structures and chromatic properties of wine due to polymerization reactions, condensation and oxidation. Also the red wine color is strongly influenced by wine region of origin, the wine grape variety and vintage year. There were studied chromatic characteristics of red wines as Merlot and Feteasca Neagra from two different vineyards in terms ecopedoclimatics, Dobrogea and Moldova, the 2008 year harvest. The polyphenolic composition of wines was judged by the content in polyphenols, tannins and anthocyanins. A wine tannin structure was analyzed by their concentration in condensed tannins, astringent tannins and tannin-polysaccharide complex. Analyzes have been carried out in the wine by UV-VIS spectrometry techniques. Total content of polyphenols have been determined by IPT technique. Tannins have been determined by the Ribereau-Gayon method (1996), tannin structure after Glories (1978) method; anthocyanins were determined by the discoloration technique with SO_2. Color intensity was determined at λ=420 nm and λ=520 nm. The study on color of red wines analyzed during their evolution referred to the study of chromatic parameters, the content of anthocyanin monomers and polymers (Glories method).

Keywords*: chromatic characteristics, anthocyanin monomers and polymers*

INTRODUCTION

In wines, although are find in low concentration compared with other components, the phenolic compounds have a very important role in the quality of wine. They influence the organoleptic characteristics of wines as color, taste, astringency, hardness, but even the feature stability of those. They have an important role in the protection of must and wines against oxidation (Bourzeix M., 1976, Mazue F., 2001).

The poliphenolic compounds have an important role in the evolution of wines during the mature time.

The evolution of red wines leads to the modification of the structure and chromatic proprieties tanks to polymerization reactions, condensation and oxidation. The content of wines in poliphenolic compounds depends of many factors, among of them the most important are from the originally region, the variety and year of harvest (Landrault N, 2001). Our studies concern the influence of the region (with different ecopedoclimatics conditions) and grape wine about the chromatic characteristics of two red quality wines, *Merlot* and *Feteasca Neagra*. Also, was studied the chromatic profile evolution of wines through the modification of structure of anthocyaninsin the mature curs of wine.

MATERIALS AND METHODS

Merlot and *Feteasca Neagra* wines, from two different vineyards in terms ecopedoclimatics, Dobrogea and Moldova, the 2008 year harvest, were analyzed in terms of physico-chemical: alcoholic strength (vol% alcohol), total acidity ($g \cdot L^{-1}$ sulfuric acid), volatile acidity ($mg \cdot L^{-}$

[1]acetic acid), total dry extract ($g \cdot L^{-1}$) and glycerol ($g \cdot L^{-1}$). Based analyzes were performed by standard methods ebulliometer method for alcoholic strength; titrimetric method for total acidity; distillation method *Saunier-Cazenave* for acidity volatile; *Tabarié* method for total dry extract and volumetric method for glycerol.

The polyphenolic composition of wines was judged by the content in polyphenols, tannins and anthocyanins. Analyzes have been carried out in the wine by UV-VIS spectrometry techniques (Giusti M, 2001).

Total content of polyphenols have been determined by IPT technique ($g \cdot L^{-1}$ gallic acid) (Ribereau-Gayon J, 1978). Tannins have been determined by the Ribereau-Gayon method (1996) and tannins structure after Glories method (1978), based on the following indicators: gelatin index (for astringenttannins); HCl index (for condensedtannins); ethanol index (for the macromolecular associations tannins -polysaccharides).

These indicators was determined by spectrophotometric method at λ = 280 nm (Glories Y, 1984). The anthocyanins were determined by the discoloration technique with SO_2 (Dallas C., 1994). Color intensity was determined at λ=420 nm and λ=520 nm. The study on color of red wines analyzed during their evolution referred to the study of chromatic parameters, the content of anthocyanin monomers and polymers (Glories method). Wines have been noted: M_1 – *Merlot Dobrogea region*; M_2 – *Merlot Moldova region*; FN_1 – *Feteasca neagra Dobrogea region*; FN_2 – *Feteasca neagra Moldova region.*

RESULTS AND DISCUSSIONS

The quality red wines, *Merlot* and *Feteasca Neagra* had a good behavior in the experimental year, in both regions. The studied parameters had recorded slightly superior values in Dobrogea region, at both wines (table1).

The *Merlot* wines were characterized that been a fruitful wines, of ruby color, with a discrete aroma of berries (raspberry) andalmond, average contentin extract. *Merlot* 1 (Dobrogea region) was characterized with more personality, and *Merlot* 2 (Moldova-Cotesti region) like a wine with more finesse, delicate and great softness (fig.1).

Feteasca Neagra was characterized like an ample wine, with personality. A higher alcoholic strength and a good balance between the components, was recorded in the wine from Dobrogea region (FN_1).

Table 1. Chemical parameters of red wines *Merlot* and *Feteasca neagra*

Wines	Chemical parameters of red wines				
	alcoholic strength (vol % alcohol)	total acidity ($g \cdot L^{-1}$ sulfuric acid)	volatile acidity ($mg \cdot L^{-1} CH_3COOH$)	dry extract ($g \cdot L^{-1}$)	glycerol ($g \cdot L^{-1}$)
M_1	12.5	3.6	0.3	27.0	8.2
M_2	12.5	3.4	0.4	26.2	8.5
FN_1	13.0	4.3	0.4	26.5	8.5
FN_2	12.8	4.2	0.45	24.2	8.0

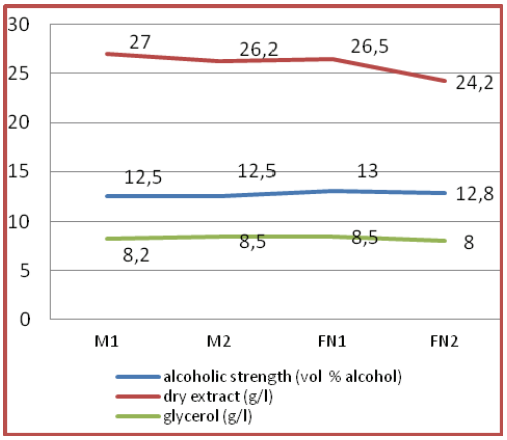


Figure 1. The main chemical parameters in red wines (*Merlot* and *Feteasca neagra)*

Content of poliphenolic compounds and tannins in wine is medium, the results showed that in both varieties a similar behavior: content in poliphenols and tannins is grater in Dobrogea region.

Both wines (M_1 and FN_1) were characterized as more astringent and with a intense color (fig. 2).

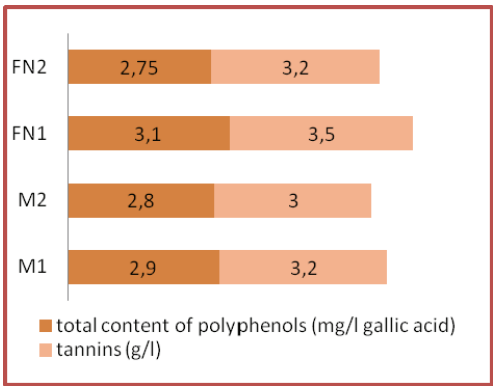


Figure 2. Total content of polyphenols and tannins in red wines (*Merlot* and *Feteasca neagra)*

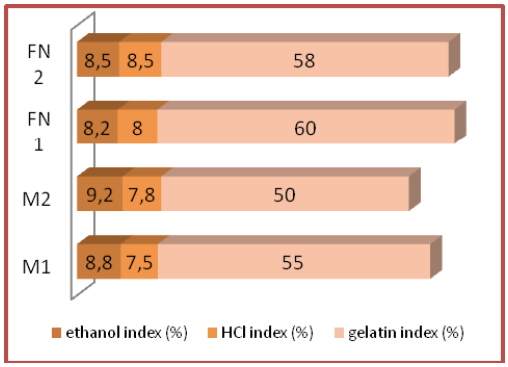


Figure 3. Ethanol index, HCl index and gelatin index

Regarding the tannins structure of wines, the results show that the *Merlot* wine has a grater ethanol index: the tannins proportion from the tannins-polysaccharides complex is higher than M_2 (Moldova-Cotesti region). The astringent tannins concentration is lowest than M_2 and FN_2 variants (fig.3).

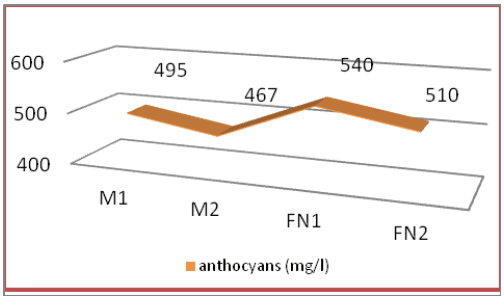


Figure 4. Anthocyanins ($mg \cdot L^{-1}$) content of red wines

The anthocyanins concentration and the intensity color from the wines (fig.4, fig.5) follows the same equation, the values been higher for Dobrogea region.

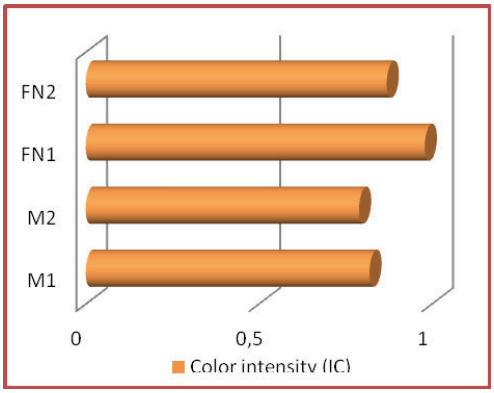


Figure 5. Color intensity (IC)

The poliphenols compounds structure is change during the wine maturation due to polymerization reactions, condensation and oxidation, leading to the change of the chromatic proprieties. As regarding anthocyanins, at the red wines color participate the anthocyanin monomers, polymersand copigmented, they change during wine maturation. Therefore, the anthocyanin monomers turns into the polymeric form.

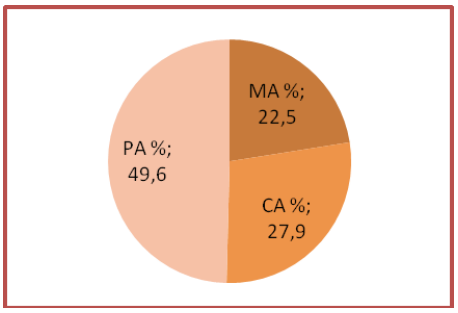


Figure 6. Percentage of anthocyanin monomers (MA%), polymers (PA%) and copigmented (CA%) in young *Merlot* wine

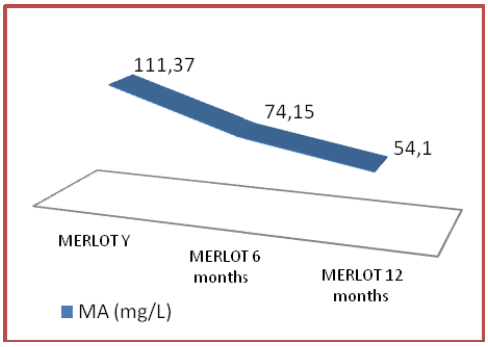
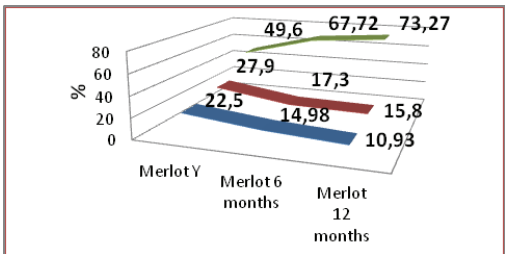


Figure 7. Evolution of anthocyanin monomers (mg·L^{-1}cianidin-3-glucozidă) during the *Merlot* wine maturation

If at the young *Merlot* (*Merlot Y*) wine the percent of anthocyanin monomers is 22,5% (fig.6) this records drops during the wine maturation, the value reach 10,93% (54,1 mg·L^{-1} cianidin-3-glucozidă) (fig. 7 and fig. 8). In the *Feteasca Neagra* wine the percent of anthocyanin monomers is lower (19,9%) than the *Merlot* wine case (fig.9); it also records drops of anthocyanin monomers, the drop is more visible than *Merlot*: 29,8 mg·L^{-1} cianidin-3-glucozidă (fig. 10, 11).



	Merlot Y	Merlot 6 months	Merlot 12 months
MA (%)	22,5	14,98	10,93
CA (%)	27,9	17,3	15,8
PA (%)	49,6	67,72	73,27

Figure 8. Evolution of anthocyanin (%) during the *Merlot* wine maturation

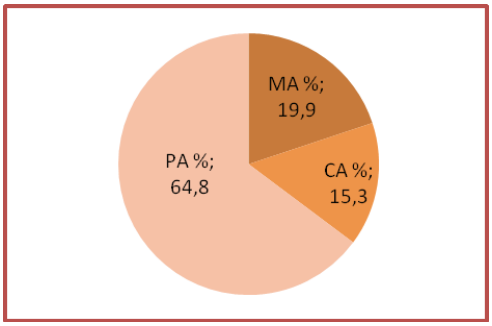


Figure 9. Percentage of anthocyanin monomers (MA%), polymers (PA%) and copigmented (CA%) in young *Feteasca neagra* wine

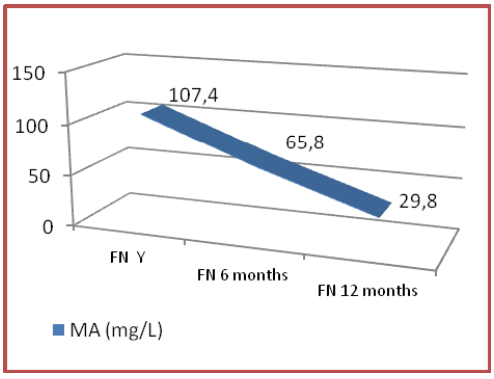
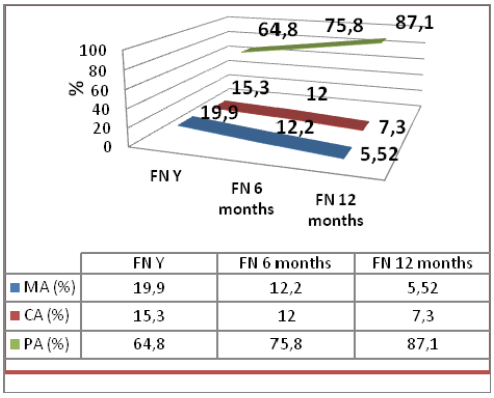


Figure 10. Evolution of anthocyanin monomers (mg·L^{-1}cianidin-3-glucozidă) during the *Feteasca neagra* wine maturation



	FN Y	FN 6 months	FN 12 months
MA (%)	19,9	12,2	5,52
CA (%)	15,3	12	7,3
PA (%)	64,8	75,8	87,1

Figure 11. Evolution of anthocyanin (%) during the *Feteasca neagra* wine maturation

CONCLUSIONS

The *Merlot* and *Feteasca Neagra* wines has recorded in the study year features of superior quality.

In the case of *Merlot* wine, the variety from the Moldova (Cotesti) region was of a remarkable quality under the finesse and flavor report and the balance between components; the *Feteasca Neagra* wine has performed better in Dobrogea region (FN_1), the wine had a great personality.

The content of wines in poliphenolic compounds and tannins is medium, the wines had similar behavior and it is recording grater values than the Dobrogea region.

Regarding the tannins structure of wines, the results show that *Merlot* has an higher ethanol index: the tannins proportion from (tannins-polysaccharides complex is higher for the region of Moldova-Cotesti, similar situation of *Feteasca Neagra* wine.

The astringent tannins concentration is lowest than for both wines is lowest, for the wines from Moldova region.

The chromatic evolution of wines during the wine maturation, has resulted in the drop of the percent of anthocyanin monomers and the higher percent of polymers in the both wines, the drop was visible for the *Feteasca Neagra* wine.

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