Evolution of several biochemical compounds during the development of Merlot wine in the vinegrowing "Terroir" of Valea Cãlugãreasã

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The qualitative and quantitative distribution of the phenolic compounds in red wines depends on cultivars features, on grapes maturation state, on grapes processing technology including must obtention, as well as on maceration-fermentation method (Margheri, 1981). The last two factors are responsible for the different phenolic composition of the wines produced from the same cultivar.

Dealu Mare vineyard offers favourable conditions for a higher capitalization of Cabernet Sauvignon, Pinot noir, Merlot and Feteascã neagrã cultivars. The red wines having a middle or high content in phenolic compounds and a well-balanced phenolic composition are advisable for being developed in oak barrels (Sommers and Pocock, 1990).

The study which was undertaken at the Research Institute for Viticulture and Enology, Valea Calugareasca, during 1987-1995 was pursuing both the evolution of phenolic composition and wines color, and the influence of the keeping container on the quality of Merlot wine.

MATERIALS AND METHODS

Merlot grapes had been harvested when the berries had reached their adequate ripening stage, and the wine was made by using the ordinary technology. The wines were kept in new and old barrels, in casks of 5000 l and in stainless steel tanks. In the end of their malolactic fermentation, the wines were stored inside the winery containers, being then pursued during 9 months (the first stage of their period of development (Feuillat and al.,1981)). Their storage temperature was of 14°C, and the level of free SO_2 was of 25-35 mg/l.

Each 3 months, the phenolic composition of the wines was assessed (OD280, IF, tannin (Leucoanthocyanidins), anthocyanins, reaction with vanillin), as well as their color (by official standardized method and chromatic characteristics in CIELab system (Sudraud, 1989)). It was figured out the quantitative ratio tannin/anthocyanins, the apparent maturity index (I_{ma}) (Garolio,1973)' the ratio V/La, HCl index (I_{HCL}) and the index of polymers pigments (I_{pp}) (Glories, 1978).

The assessment of wines sensory qualities was performed by a specialized tasting staff made up of 11 panelists. Each wine was shown only once, without any detail concerning the technological variant. The tasting paper included an overall estimation of 20 scores related to visualization, smell and aroma, as well as taste and relish.

RESULTATS AND DISCUSSION

Variation of the physico-chemical composition of Merlot wines produced in Dealu Mare vineyard.

The statistical study concerning the phenolic potential of Merlot wine obtained during 1985-1995 period shows that in the vine-growing area of Valea Calugareasca, there are produced (with a frequency of 53%) wines having a Folin Index ranging between 50 and 70.

The analysis of wines physico-chemical composition depending on the weather condition of the vintage year (Table 1) highlights significant distinctions for all the studied parameters. In the extraordinarily good and very good years, the well-balanced phenolic composition (tannin/anthocyanins ratio =1.42 ÷1.56) and the most propitious structure of the tannins (I_{HCL} =12.3 ÷15.5 and I_{pp}=49.7÷55.0) supply favorable conditions for a good evolution of the wines stored in barrels.

Table 1. Physico-chemical composition (average data) of Merlot, wines in Dealu Mare vineyard

Component	Outstanding	Very good	Good
Alcohol (% vol)	12.60	12.30	11.70
pH	3.49	3.69	3.40
Reduced extract (g/L)	25.80	24.10	23.90
IF	87.00	75.00	63.00
Tannin (La) (g/L)	1.30	1.20	1.50
Anthocyanins (mg/L)	915	768	469
I_{HCl}	15.50	14.30	12.30
I_{pp}	49.70	55.00	60.50
Color density (10 mm)	14.50	8.30	7.50
Hue	0.52	0.60	0.45

Evolution of phenolic composition and color during wines development in casks.

The evolution of wines phenolic composition (fig.1) and color (fig.2) (average polyphenolic potential :50<IF<70) presents specific elements.

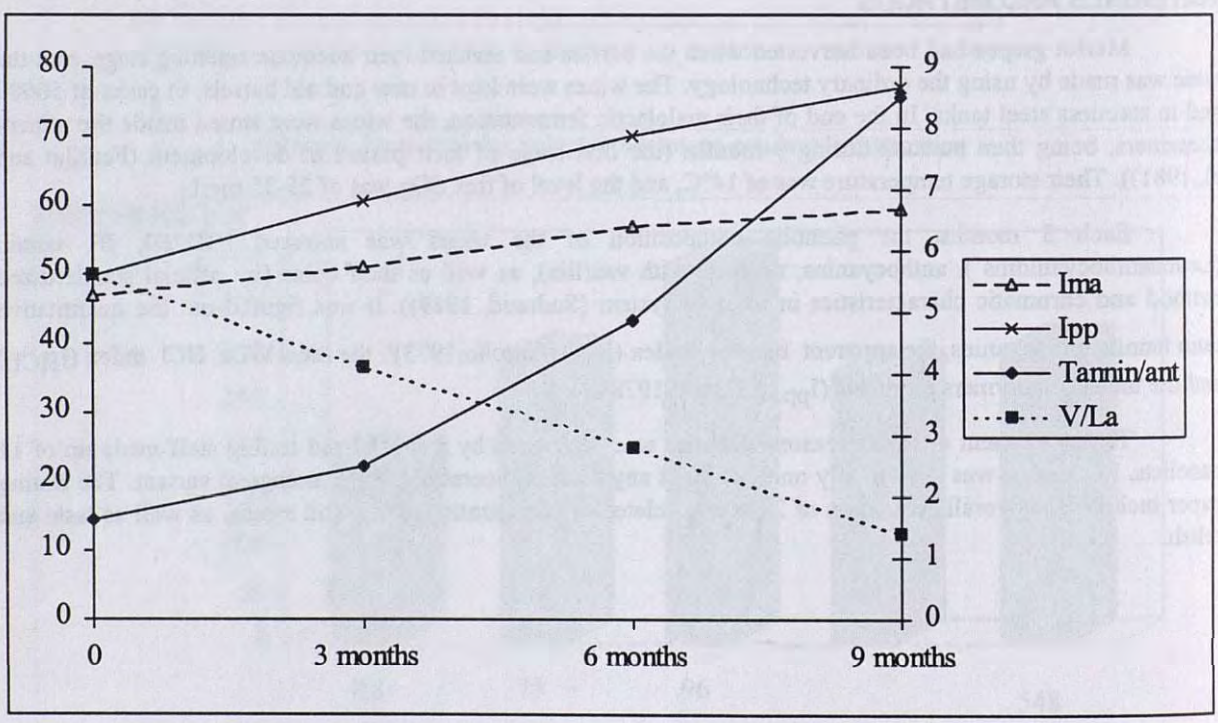

Figure 1. Evolution of the phenolic composition and structure during wine development

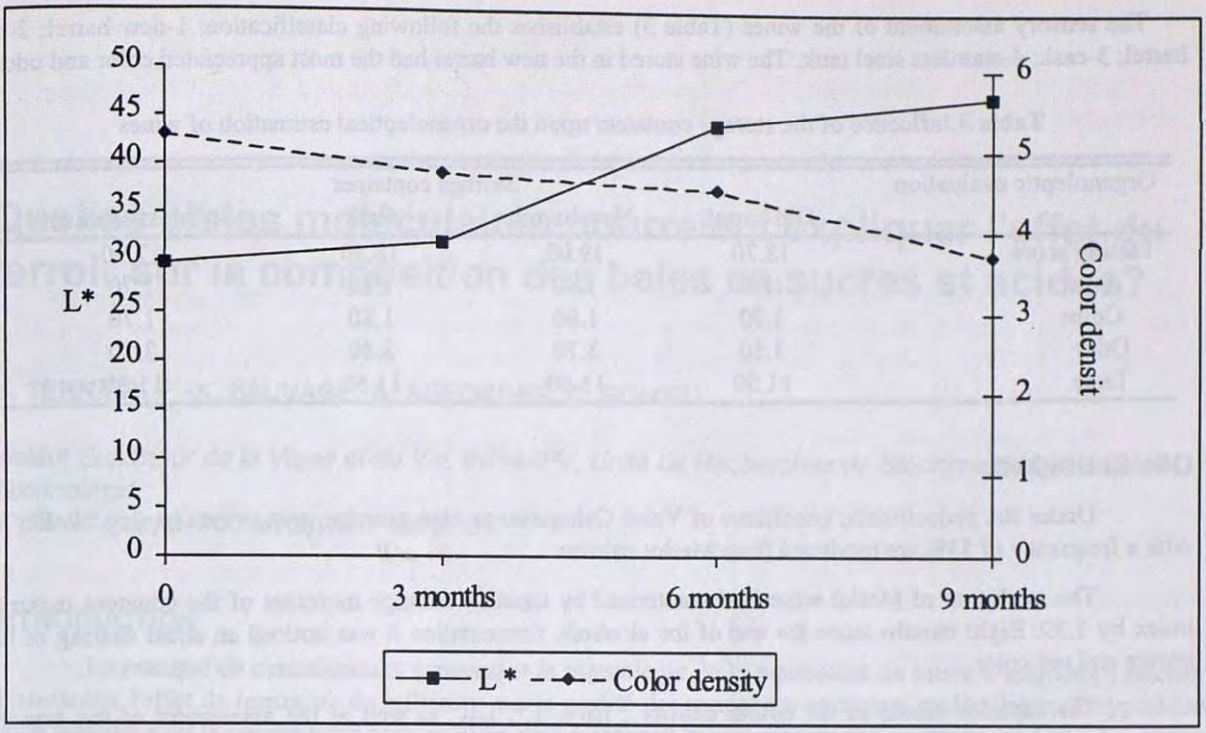

Figure 2. Evolution of wine color during its development

Tannin/anthocyanins ratio has an ascending evolution, with a smaller increase rate during the first three months and a greater one during the next period. The index of apparent development of wines, as well as the index of polymer pigments, have a slow evolution, each month registering 1.39, respectively 3.01 on the average. During wines development, V/La ratio rapidly decreases by a monthly rate of 0.47.

Color density (OD 420+OD 520+OD 620 against the blank in 10 mm cells) gradually diminishes, scoring a decrease of 28.41% after 9 months. L* monthly increases by 1.96.

During wines development, the composition of the red color evolves from a favourable ratio for the red component part towards a favourable ratio for the brown one. After 8 months, brown and red color had an equal sharing. The blue one had unsignificant variations.

Influence of the winery containers.

From the analysis of the physico-chemical parameters (Table 2) it's easily noticeable that OD 280 differentiates the variants into two homogenous groups: the former group -the wine stored in big casks and in stainless steel tanks, and the latter group - the wine stored in new and old barrels.

Table 2. Influence of the storage container upon wines phenolic composition and color

Component	Storage container			
	Old barrel	New barrel	Cask	Stainless steel tank
OD 280	49.5	48.27	50.49	50.37
Tannin (g/L)	2.10	1.69	2.17	1.84
I_{HCl}	36.73	42.67	32.34	26.10
Anthocyanins (mg/L)	150	148	130	182
I_{pp}	83	84	73.7	63.9
Color density	5.90	6.78	6.2	7.16
L*	22.49	23.08	23.08	19.6
I_{ma}	58.38	59.62	56.31	44.28

The discrimination between the old and new barrels is given by their tannin content (higher for the old one), by HCl index, colour density, L* and apparent maturity index (higher for the new barrels). All these characteristics prove the qualitative superiority of the wine stored in the new barrel.

The sensory assessment of the wines (Table 3) establishes the following classification: 1-new barrel; 2-old barrel; 3-cask; 4-stainless steel tank. The wine stored in the new barrel had the most appreciated color and odor.

Table 3.Influence of the storage container upon the organoleptical estimation of wines

Organoleptic evaluation	Storage container			
	Old barrel	New barrel	Cask	Stainless steel tank
Tasting score	18.70	19.00	18.50	17.90
Aspect	1.90	1.90	1.80	1.70
Color	1.80	1.90	1.80	1.70
Odor	3.50	3.70	3.40	3.20
Taste	11.50	11.50	11.50	11.30

CONCLUSIONS

Under the pedoclimatic conditions of Valea Calugareasca vine-growing area, wines having 50<IF<70, with a frequency of 53% are produced from Merlot cultivar.

The evolution of Merlot wine is characterized by monthly average increases of the apparent maturity index by 1.39. Eight months since the end of the alcoholic fermentation it was noticed an equal sharing of the brown and red color.

The superior values of the colour density , I_{HCl}, L*, I_{ma}, as well as the assessment of the sensory qualities emphasize the quality of the wine stored in new barrels.

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