

**THE INFLUENCE OF THE MAIN BIOLOGICAL AND  
BIOCHEMICAL FACTORS OF THE PRIMARY  
VINIFICATION CONCERNING THE RED WINES  
COMPOSITION OBTAINED IN THE MAIN VITICULTURAL  
AREAS OF OLTENIA**

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**Abstract**

*The safe - food and olfacto-gustative valences, emphasized by the red wines, constituted justified reasons so that these produces to be more and more solicited by a considerable number of consumers spreaded almost in all geographical regions of the globe. The quality of red wines and their pozitive evolution during the years depend, in a decisive measure, on the quality of the raw material and on the way of proceeding the fermentation-maceration process. Regarding this last aspect it comes out that the involving of the selected yeasts, the pectolitic enzymes and of some fermentation activators, are factors with a defining influence concerning the red wines biotechnology.*

**Key words:** yeasts, enzymes, activators, fermentations-macerations, wine

**Introduction**

The interest for red wines has grown up rapidly because many specialists have found out the benefic effects in case of the temperate consumption of these produces.

Nowadays it is well established that the benefic role of red wines temperate consumption is accomplished by the phenolic complex, which exists in these produces in considerable bigger proportions comparatively with the white wines. The catechinic tannins and the anthocyanins – component of the phenolic complex – award the red wine the value of food that protects and defends the man's health. These constituents ensure an important antioxidant factor that exerts with high efficiency, protection concerning the cardiovascular diseases (Frankel, 1993; Fornari, 1995; Teissedre, 1996; Ravello, 1997).

Moreover the high qualitative level of the black grapes, defined by the contents of glucides, acidity and polyphenols, the processing techniques of the grapes and the modalities of inducing the complex fermentation – maceration process influence significantly the

The Influence of the Main Biological and Biochemical Factors of the Primary  
Vinification Concerning the Red Wines Composition Obtained in the Main  
Viticultural Areas of Oltenia

proportions of the polyphenolic constituents from the red wines and the ratios among them, that are considered to establish the categories and the types of such produces stipulated for the valid legislation.

The experiments, that are presented in this paper, refer to the way how the yeasts from the spontaneous micro flora and the selected ones in the presence of a fermentation activator and the pectolytic enzymes act in the black grapes must, with the reflection of their actions in the obtained wines composition.

### Experimental

The study was made on the yield of Cabernet Sauvignon variety (in the year 2002) and the one of Merlot variety (in the year 2003), both varieties were planted in vineyards with a high degree of favourability for red wines: Sâmburești – Olt, Drăgășani – Vâlcea, Banu Mărăcine – Dolj. The quality features proportions of the grapes used in experiments, expressed by the glucides contents, acidity and anthocyanins are shown in table 1.

For all the three areas, at the vinification moment, the grapes were richer in glucides and anthocyanins in the year 2003, although the complet ripeness and the technological ripeness, too, were reached 2 – 3 weeks earlier than the year 2002. For all the situations, in the view of taking place the fermentation – maceration it was adopted the following experimental model: the fermentation with the action of the native microflora yeasts (L.I.) and the fermentation determined by selected yeasts (L.S.A.), 7-8 millions viable cells/ml must. In the must were added pectolytic enzymes (3 g/hl) and a fermentation activator (20 g/hl) and SO<sub>2</sub> – 75 mg/l.

The fermentation – maceration took place during 80 hours, in containers of 60 liters, at the temperature of 27 – 28°C and with the homogenization of the must phases 5 times / 24 hours.

**Table 1.** The main quality features of the grapes (in the moment of vinification) from different viticultural areas of Oltenia

The variety	The vineyard	Glucides g/l	Total acidity g/l (H <sub>2</sub> SO <sub>4</sub> )	Anthocyanins mg/kg grapes
Cabernet Sauvignon 2002	Sâmburești	204	5.16	1151
	Drăgășani	208	5.09	1130
	Banu Mărăcine	214	4.83	1190
Merlot 2003	Sâmburești	221	4.97	1380
	Drăgășani	214	5.34	1198
	Banu Mărăcine	238	4.65	1313

## **Results and Discussions**

The influence of the biological and biochemical factors involved in the wines obtaining of Cabernet Sauvignon (in 2002) are found in the composition parameters levels, that are shown in table 2. The first finding is the one that at the same glucides content of the must, the selected yeasts (L.S.A.), as a singular factor of action, have a better fermentation output than the one determined by the yeasts from the spontaneous microflora (L.I.), this aspect being available for all the three vineyards.

Depending on the glucides contents of the grapes at the vinification moment, both the native yeasts and the selected ones produce more alcohol comparatively with the testifiers when near these there were pectolitic enzymes or fermentation activators. Concerning the alcohol production, in ratio with the glucides contents of the must, the best results were obtained when the selected yeasts of Bayanus type (L.S.A.) action together with pectolitic enyzmes and fermentation activators. From the two helping factors, a more important influence is exerted by the fermentation activator. For all the three viticultural areas at the variant in which the three factors acted together the alcoholic contents are bigger with 0.3 – 0.5 % vol.

The favourable influence of the selected yeasts together with the other two factors is recorded also at the glicerol, unreduced extract, mineral substances (ash) and anthocyan contents. At the adding of fermentation activators and the yeasts, the glicerol contents established higher increase, the moreover difference is, in general, between 1 and 1.5 g/l.

On the other hand the pectolitic enzymes represent a factor with more important influence concerning the increase of unreduced extract and ash. The increases of these composition parameters come out also in the presence of fermentation activators, as a result of a faster speed in the metabolism process of the glucides and of same bigger contents in resulted alcohol, itself being a dissolving agent of same compounds from the solid parts of the must.

Concerning the extract and the mineral substances – for the alcohol, too – the contents can increase with 10 – 17%, respectively with 12 – 16%, at the variants in which the three factors acted, the bigger values being reached in the variants with activators and enzymes together with the high alcoholic power selected yeasts and with killer factor.

The anthocyan contents emphasize the favourable influence concerning the extraction process of polyphenols from the must part consisting of peels. The increases of anthocyan are between 10 and 20% when the enzymes acted together with the native yeasts and between 12 – 17% when these biocatalysers have function together with the selected yeasts. On the whole experiment, the enzymes and activator action together with selected yeasts

## The Influence of the Main Biological and Biochemical Factors of the Primary Vinification Concerning the Red Wines Composition Obtained in the Main Viticultural Areas of Oltenia

L.S.A. have determined increases of the anthocyanins contents between 21 and 32% comparatively with the testifier (L.I.). The better colouring of the obtained wines using the simultaneous action of selected yeasts, enzymes and activator is explained by the same anthocyanins proportions extracted from the grapes peels, being between 64% (Banu Mărăciine) and 67% (Sâmburești), depending on these constituents.

The experiment that was made in 2003 with another variety for high quality red wines (Merlot), planted in the same areas (vineyards), has entirely confirmed the results obtained in 2002, but starting from another technological features of the grapes – raw material.

### Conclusions

In the complex fermentation – maceration process from which the red wine is "born" and of which the whole wines further evolution depends, rivals the biological, biochemical and technological factors and their action must be known and conducted in accordance with the present exactingness concerning this process. The adding of the high alcoholic power selected yeasts (7 – 8 millions viable cells / ml must), of a fermentation activator (15 – 20 g/hl) and of the pectolitic enzymes (3 g/hl) in the must involves advantages on many plans: composition, organoleptic and economic.

From the conjugated action of these three interventions factors we established: a better output of glucides metabolism, express by a certain increase in alcohol; increases of the glicerol contents, unreduced extract and mineral substances; a better colouring of the wines, because of the fermentation speed and the bigger proportions of extracted anthocyanins from the pectolitic enzymes action. In these situation the wines are more "corpulence" and with a well outlined "personality", comparatively with the ones when the fermentation – maceration process was let at the mercy of fate.

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**Table 2.** The main composition features of red wines - 2002

Variety and Vineyard	Variant	Alcohol % vol.	Total acidity g/l(H <sub>2</sub> SO <sub>4</sub> )	Glicerol g/l	Unreduced extract g/l	Ash g/l	Anthocyanins mg/l	% extracted anthocyanins
<b>Cabernet Sauvignon</b> -Sâmburești	Martor – L.I.	11.4	4.98	8.45	23.91	2.17	580	50.39
	L.I.+enzyme	11.5	4.97	8.51	24.89	2.21	698	60.64
	L.I.+ activators	11.6	4.88	8.83	24.05	2.30	660	57.34
	L.I.+enz+activ.	11.7	4.90	8.91	25.09	2.42	710	61.68
	L.S.A.	11.6	4.88	8.75	24.05	2.34	651	56.59
	L.S.A.+enzyme	11.7	4.91	8.91	25.44	2.46	743	64.55
	L.S.A.+activators	11.7	4.90	9.05	24.10	2.38	752	65.33
	L.S.A+enz+activ.	11.9	4.89	9.21	25.97	2.43	771	66.98
<b>Cabernet Sauvignon</b> -Drăgășani	Martor – L.I.	11.6	4.82	8.02	23.10	2.19	577	51.06
	L.I.+enzyme	11.7	4.80	8.10	24.60	2.29	672	59.46
	L.I.+ activators	11.8	4.79	9.05	24.55	2.30	654	57.87
	L.I.+enz+activ	11.9	4.81	9.11	25.90	2.34	732	64.77
	L.S.A.	11.8	4.87	9.10	24.10	2.26	610	53.98
	L.S.A.+enzyme	11.8	4.67	9.22	25.40	2.41	716	63.36
	L.S.A.+activators	11.9	4.79	9.31	25.10	2.38	702	62.12
	L.S.A+enz+activ.	12.0	4.81	9.35	27.05	2.54	741	65.57
<b>Cabernet Sauvignon</b> -Banu Mărăciine	Martor – L.I.	11.9	4.70	9.44	24.20	2.26	606	50.92
	L.I.+enzyme	11.9	4.66	9.51	25.44	2.41	675	56.72
	L.I.+ activators	12.0	4.71	9.33	25.30	2.40	670	56.30
	L.I.+enz+activ.	12.0	4.66	9.61	25.91	2.49	769	64.62
	L.S.A.	12.0	4.59	10.44	25.41	2.39	654	54.95
	L.S.A.+enzyme	12.0	4.61	10.51	26.31	2.51	735	61.76
	L.S.A.+activators	12.1	4.55	10.90	26.40	2.54	722	60.67
	L.S.A+enz+activ.	12.2	4.62	11.01	27.80	2.62	771	64.79

The Influence of the Main Biological and Biochemical Factors of the Primary Vinification Concerning the Red Wines Composition Obtained in the Main Viticultural Areas of Oltenia

**Table 3.** The main composition features of red wines - 2003

Variety and Vineyard	Variant	Alcohol % vol.	Total acidity g/l(H <sub>2</sub> SO <sub>4</sub> )	Glicerol g/l	Unreduced extract g/l	Ash g/l	Anthocyanins mg/l	% extracted anthocyanins
<b>Merlot</b> -Sâmburești	Martor – L.I.	12.0	4.75	10.21	23.87	2.18	610	44.20
	L.I.+enzyme	12.1	4.81	10.30	24.17	2.31	726	52.60
	L.I.+ activators	12.3	4.86	10.48	24.05	2.44	715	51.81
	L.I.+enz+activ	12.5	4.77	10.90	25.92	2.36	772	55.94
	L.S.A.	12.3	4.80	10.65	24.10	2.28	680	49.27
	L.S.A.+enzyme	12.3	4.75	10.72	25.72	2.31	816	59.13
	L.S.A.+activators	12.4	4.82	11.05	25.80	2.40	805	58.33
	L.S.A+enz+activ.	12.7	4.80	11.10	26.66	2.53	884	64.06
<b>Merlot</b> -Drăgășani	Martor – L.I.	11.4	4.96	9.26	23.77	2.20	595	49.60
	L.I.+enzyme	11.5	4.98	9.31	24.62	2.34	687	57.34
	L.I.+ activators	11.8	4.92	9.07	24.70	2.33	680	56.76
	L.I.+enz+activ	12.1	4.93	10.02	25.60	2.40	764	64.19
	L.S.A.	11.8	4.82	9.36	24.18	2.31	665	55.50
	L.S.A.+enzyme	12.0	4.96	9.71	25.92	2.40	718	59.93
	L.S.A.+activators	12.3	4.92	10.10	25.81	2.44	720	60.10
	L.S.A+enz+activ.	12.5	4.90	10.72	26.45	2.51	805	67.19
<b>Merlot</b> -Banu Mărăcine	Martor – L.I.	12.1	4.51	10.10	24.55	2.30	612	46.61
	L.I.+enzyme	12.4	4.49	10.12	25.10	2.41	791	60.24
	L.I.+ activators	12.6	4.50	11.01	25.25	2.38	788	60.01
	L.I.+enz+activ.	12.9	4.48	11.10	26.12	2.44	823	62.68
	L.S.A.	12.7	4.40	11.16	25.70	2.42	714	54.38
	L.S.A.+enzyme	13.1	4.47	12.06	26.16	2.51	892	67.93
	L.S.A.+activators	13.3	4.41	12.10	26.20	2.50	887	67.55
	L.S.A+enz+activ.	13.6	4.39	12.18	27.61	2.66	901	68.62