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PHENOLIC COMPOUNDS DYNAMIC DURING MACERATION-FERMENTATION PROCESS AT SUPERIORS RED WINES FROM BURGUND VARIETY

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ABSTRACT

The determinations that were done in this study regarded the evolution of phenolic compounds during the maceration fermentation process that took place in rotating metallic tanks of red grapes from Burgund variety. It was shown of that the must colour and tint intensity variation and partial fermented must fractions, with addition of different sulphur dioxide concentration.

In the purpose to obtain extractive wines and intensely coloured, pectolitic external enzymatic mixtures was experienced during the maceration and fermentative processes, and for some technological phases improvement for primary wine making process.

During the hole period of study the antocians content was determined, the total polyphenols and as well the colour intensity and tint, as for the wines obtained with external enzymatic mixtures used during the maceration – fermentation process, as for the one which weren't treated with enzymes.

The utilisation of exogenous enzymatic mixtures during the maceration fermentation process in correlation with optimal doses of SO_2 and an adequate regime of rotating metallic tank spinning generated an improving in phenolic compounds extraction improving and colour intensity increasing for the obtained superior red wines.

INTRODUCTION

The colour of young wines is generated mainly by the antocians and by the products generated as a result of chemical and physical processes that took place during de maceration – fermentation process. As a result of chemical reactions and balance modification between coloured and uncoloured balance under the influence of environment compounds, the wine colour is in a continuous modification. Colour formation and its stability doesn't depend just on antocians contents from wines but depend on other compounds from the environment, mainly phenolic compounds. Through wine making technology conditions it could be influenced the quantity of phenols extracted, their quality and colour during their evolution and their organoleptic characteristics. The elongations of maceration fermentation period of time allows the enrichment of wines in compounds that could stabilize the red wines colour, but it is contributing to wine astringency increasing due to a larger quantity of tannins from seeds.

The red wines obtained through maceration - fermentation in rotating metallic tanks are in general intensely coloured, with a higher content of antocians and polyphenols.

The phenolic compounds are taking part to colour, taste and flavour formation in the red wine. The evolution along the grapes maturation is a complex one generated by an appreciable number of compounds and their differentiate localisation in grapes parts. During the wine making process a small part of phenolic compounds (30-50%) is extracted from grapes, in function of grapes maturation stage and the maceration process duration.

MATERIAL AND METHOD

Regarding superior red wines obtaining by high quality from Burgund grapes variety they were harvested at full maturity, were processed with maceration – fermentation technology in metallic rotating tanks. The rotation regime of maceration fermentation jars was by 2x5 min./hour.

It was made a sulfatizinc substance using SO_2 solution by 6 % concentration, in two stages: 60% of the dose on grapes and 40% of the dose on must. The applied SO_2 doses were by 50 mg/kg, respectively by 80 mg/kg SO_2 .

The quantity of pectolitic enzymatic mixture added to must was by 2g/hl. After the alcoholic and malolactic fermentation, the obtained wine was conditioned.

Wine maturation was made in oak wood casks and the obsolescence in glass bottles. During the wine preservation a 25-35 mg/l free SO_2 was maintained.

The antocians content determination, colour intensity, tint, total polyphenols content were made using Helios UV-VIS spectrophotometer, as well for the variants treated with exogenous enzymatic mixtures and well for the ones without addition of pectolitic enzymatic mixtures.

RESULTS AND DISCUSSIONS

The effects of enzymatic mixtures utilisation in black wines wine depended by many factors within some of them are: antocianic and polyphenolic potential for grapes varieties, harvesting particularities for that year, primary wine making, the nature of enzymatic mixture used and the doses which were used.

Following the phenolic compounds evolution during the maceration fermentation process, it could be concluded that the enzymatic pectolitic mixtures added in the must influenced in a favourable way the antocians and polyphenols extraction from peel grapes (table no.1), having positive effects of total and raw must efficiency (first must fraction), comparative with maceration-fermentation variants without adding enzymatic pectolitic mixtures. It is gradual distinguished a colour intensity increasing during the maceration fermentation process and tent diminishing.

As well, higher SO_2 doses had a stimulating effect upon the antocians and total polyphenols extraction.

The chromatic characteristics of must fractions shown that at raw must (first resulted fraction) the colour intensity and antocians content had higher values comparative with the unregistered at raw +pump nozzle I (second resulted fraction), respectively pump nozzle II (a third resulted fraction), as well for the variants treated with pectolitic enzymatic mixtures, as well for the ones without adding pectolitic enzymatic mixtures (table no. 2). The content in total polyphenols is lower in raw must and is increasing at pump nozzle I and pump nozzle II.

Table 1. The evolution of phenolic compounds during the maceration fermentation process at Burgund variety (average values)

Analyses / Time (h)		12	24	36	48	Phases separation	12	24	36	48	Phases separation
Antocians mg/l	with enzimatic mixtures	291	358	405	483	571	303	389	497	585	646
	without enzimatic mixtures	261	296	370	422	546	278	418	486	574	627
Total polyphenols g/l	with enzimatic mixtures	0,98	1,12	1,49	1,85	2,10	0,91	1,34	1,72	2,06	2,21
	without enzimatic mixtures	0,95	1,01	1,41	1,80	2,05	0,83	1,21	1,66	1,91	2,14
Colour intensity	with enzimatic mixtures	0,435	0,624	0,770	0,862	1,212	0,413	0,597	0,870	1,045	1,230
	without enzimatic mixtures	0,340	0,412	0,571	0,923	1,120	0,385	0,541	0,711	0,954	1,190
Tint	with enzimatic mixtures	0,77	0,67	0,52	0,59	0,48	0,73	0,67	0,52	0,56	0,47
	without enzimatic mixtures	0,71	0,62	0,51	0,54	0,44	0,64	0,57	0,48	0,53	0,41
SO_2 doses mg/kg		50					80				

Following further wine evolution after phases separation and malolactic fermentation finality it is concluded a gradually diminishing of colour intensity and antocians content, alongside by a tent value increasing both for treated variants with pectolitic enzymatic mixtures, and for the one without adding pectolitic enzymatic mixtures.

CONCLUSIONS

The utilisation of pectolitic enzymatic mixtures during the maceration fermentation process for the grapes from Burgund variety in rotating metallic tanks, contributed at colour intensity increasing, at antocians and total polyphenols content, having favourable effects upon the efficiency of total must and raw must as well as on polyphenolic substances extraction and solubility from grapes (an increasing of 15-20 %).

The higher content in SO_2 used for wine making will have a favourable influence on phenolic compounds extraction, contributing at antocians and total polyphenols content with 20-25% in collaboration with pectolitic enzymatic mixtures utilisation.

The wine which was treated with external enzymatic mixtures is more intense coloured, with a higher content in antocians (cca. 12-15%) and total polyphenols comparative with the ones which weren't enzymatic treated.

Table 2. Chromatic characteristics at must fractions half fermented (partially fermented) in rotating metallic tanks at Burgund variety (average values)

Analyses / Time (h)		R	R + S I	S II	R	R + S I	S II
Antocians mg/l	with enzimatic mixtures	571	522	430	646	585	489
	without enzimatic mixtures	546	513	417	627	568	471
Total polyphenols g/l	with enzimatic mixtures	2,10	2,47	2,98	2,21	2,65	3,23
	without enzimatic mixtures	2,05	2,22	2,63	2,14	2,45	3,01
Colour intensity	with enzimatic mixtures	1,212	1,100	0,910	1,230	1,085	0,968
	without enzimatic mixtures	1,120	1,045	0,880	1,190	1,065	0,913
Tint	with enzimatic mixtures	0,48	0,53	0,51	0,47	0,50	0,46
	without enzimatic mixtures	0,44	0,46	0,49	0,41	0,45	0,44
SO_2 doses mg/kg		50			80		

R - raw must; S I - pump nozzle I must; S II - pump nozzle II must.

The colour intensity and the antocians have higher values at raw and pump nuzzle I fractions comparative with pump nozzle II as well for variants treated with pectolitic enzymatic mixtures, as for the ones without adding pectolitic enzymatic mixtures. These values will be diminished till the end of malolactic fermentation finality and during the wine maturation, and in the same time the tint values are increasing.

Using the external enzymatic mixtures during the maceration fermentation process in rotating metallic tanks is accomplishing a technological optimisation for red wines obtaining, influencing in a positive way the sensorial features, physical and chemical features and their stability.

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