The regulation doses of sulfur dioxide with the aid of preparations, based on glutathione of yeasts in the production of pink table wine

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ABSTRACT

This research article presents study the influence of partial sulfur dioxide replacement by preparations based on yeast glutathione and tannin on the quality of rose table wine. The objects of research were rose table dry wine, made of Cabernet Sauvignon. The samples were prepared in conditions of micro winemaking by the scheme that included processing without maceration using preparations, based on glutathione of yeasts, tannin and sulfur dioxide. The preparations were added to the must before clarification at doses of 2 g/dal tannin, 2 g/dal preparation of glutathione and 50-75 mg/l sulfur dioxide.

The influence of preparations and their doses in oxidation induced on change of the redox state of this type of wine was analyzed. The model system consisted of rose table wine, in which were added sulfur dioxide, glutathione of yeast and tannin.

The influence of preparations on the organoleptic and physico-chemical quality and on the color change of rose wine was set.

The use of preparations based on glutathione of yeast can increase the level of free sulfur dioxide, which will lead to better protection from oxidation, or the possibility of reduction the dose of sulphitation for equal level of protection

Introduction

Industrial production of wine involves the use of sulfur dioxide as a powerful antioxidant and antiseptic. However, scientists are looking for alternatives of its using. This is especially relevant in the fast-growing world of organic winemaking.

The main difference between biowine and industrial wine is the reduction of doses of sulfur dioxide. Its complete absence could lead to oxidation of fine table wines as white and pink [1].

The world-wide practice is to protect such wines from oxidation with help of sulfur dioxide and other organic-original antioxidants [1,2]. These include glutathione of yeast and tannin. Glutathione – is the tripeptide that formed by the remains of the glutamic acid, cysteine

and glycine - three amino acids. The presence of γ-peptide linkage protects tripeptide from decay by intracellular peptidases. Glutathione reduces disulfide bonds formed within cytoplasmic proteins to cysteines by serving as an electron donor. Its providing reductant properties to glutathione and the ability to inhibit the process of free radical oxidation of phenolic compounds. [1,3]. The tannins, in turn, remove natural oxidase of grape - tyrosinase and laccase. Since these enzymes in their chemical nature are the proteins, the tannins react with them at the classic reaction of tannin-protein. Due to its ability to capture oxygen tannins also have strong antioxidant properties and protects the wine from oxidation of its components [2,4].

Therefore, the aim of this work was to study the influence of partial sulfur dioxide replacement by preparations based on yeast glutathione and tannin on the quality of rose table wine.

Material and methods

Objectives of the work included:

• To analyze the influence of preparations and their doses in oxidation induced, on change of the redox state of this type of wine;

• To set the influence of preparations on the organoleptic and physico-chemical quality of rose wine;

• To set the influence of preparations on the color change of rose table wine.

The objects of research were rose table dry wine, made of Cabernet Sauvignon. The samples were prepared in conditions of micro winemaking by the scheme that included processing without maceration using preparations, based on glutathione of yeasts, tannin and sulfur dioxide. The preparations were added to the must before clarification at doses of 2 g/dal tannin, 2 g/dal preparation of glutathione and 50-75 mg/l sulfur dioxide.

Induced oxidation of model systems was carried out in furnaces at t= 45 ± 5 ° C for 6 days with free air flow. The model system consisted of rose table wine, in which were added sulfur dioxide, glutathione of yeast and tannin. The scheme of induced oxidation presented in Table 1.

Table 1. Diagram of experiments

Series №1			**Series №2**		
The mass concentration			**The mass concentration**		
	Glutathione, g/dm^3	Sulfur dioxide, mg/dm^3		Glutathione, g/dm^3	Sulfur dioxide, mg/dm^3
control	-	150	control	-	150
experiment 1	0,1	150	experiment 5	0,2	50
experiment 2	0,2	150	experiment 6	0,2	75
experiment 3	0,3	150	experiment 7	0,2	100
experiment 4	0,4	150	experiment 8	0,2	125
			experiment 9	0,2	150

Results and discussions

Figure 1 shows that the mass concentration of free sulfur dioxide was higher and remained at the initial level of 2 days in samples where preparation of glutathione was added, The mass concentration of coloring substances (Fig. 2) was reduced by 20-42% in the case of the addition of glutathione and by 3 times, where in addition to sulfur dioxide, antioxidants were not used.

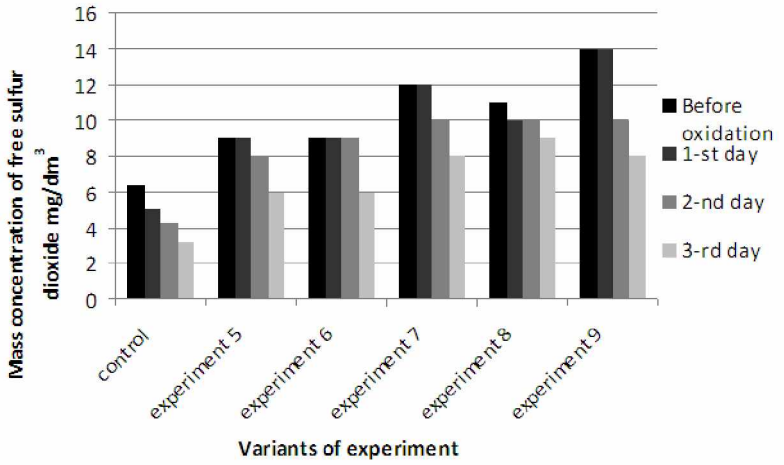

Fig.1. Effect of adding glutathione of yeast on the content of free sulfur dioxide and it changing in the process of induced oxidation

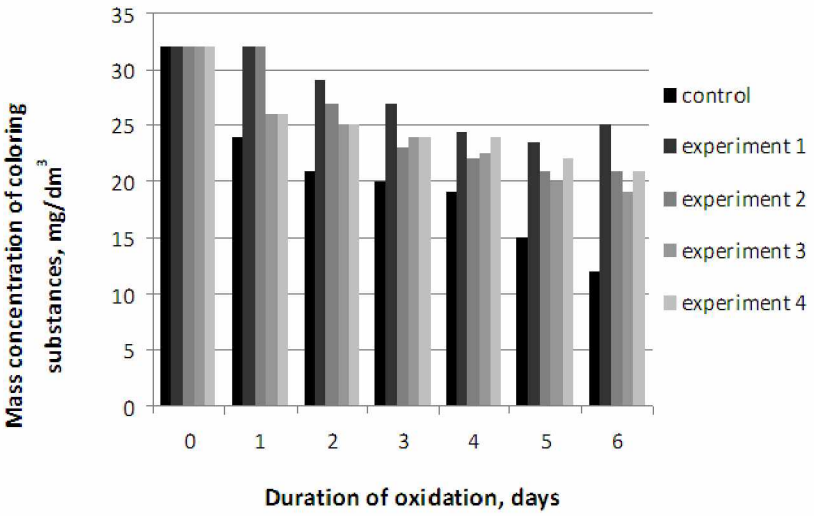

Fig.2. Effect of adding glutathione of yeast on the mass concentration of coloring substances in the process of induced oxidation

The redox potential of wine was lower than the control while adding glutathione, even after oxidation did not rise to the level of the original wine in which was added only sulfur dioxide (Fig. 3).

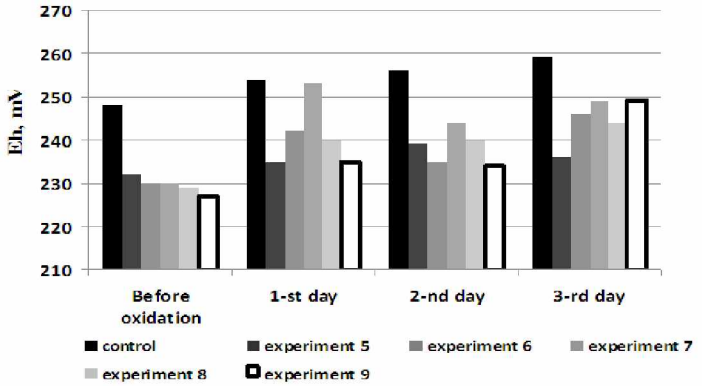

Fig.3. Effect of adding glutathione of yeast on the changing of redox potential in the process of induced oxidation

Also should be noticed the positive effect of the addition of glutathione to the optical performance of wine. As can be seen from Table 2 the optical characteristics of the samples with glutathione after oxidation are significantly lower than in controls. The values of Δ G are especially indicative, which means the protective effect of glutathione on the phenol system of rose wine.

Table 2. Optical characteristics of rose wine before and after induced oxidation

Variants of experiment	Before oxidation			Δ G
	I	T	G	
control	0,1	0,57	6,1	-
After oxidation				
control	0,62	1,2	24,1	18,0
experiment 1	0,37	1,0	16,3	10,1
experiment 2	0,50	1,0	20,6	14,5
experiment 3	0,40	1,1	19,8	13,7
experiment 4	0,34	1,1	19,7	13,6

Based on these facts, rose table wines were prepared with using researched antioxidants. Analysis of physical and chemical quality indicators (Table 3) allowed to establish a positive impact on the quality of wine, which was shown in the concentration of anthocyanins, the free sulfur dioxide and reducing redox potential Eh. Experimental samples were marked by tasters higher than controls.

Likewise be mentioned that the use of preparations based on glutathione of yeast and tannin make it possible to get rose wine with different shades of pink, which is especially appreciated in their production (Fig. 6).

Thus, the use of preparations based on glutathione of yeast can increase the level of free sulfur dioxide, which will lead to better protection from oxidation, or the possibility of reduction the dose sulphitation for equal level of protection. Therefore this method is effective

in preservation anthocyanins, reduction the appearance level of yellow colors - shades of oxidation; promotion tasting characteristic and variation for different shades of rose table wines.

Table 3. Quality indicators of rose table wine which are made by adding reduction actions preparations

Research variants	Physico-chemical quality of wine							Eh, mV	Tasting scores
	The volume fraction, %	The mass concentration of							
	alcohol	titratable acids, g/dm^3	volatile acids, g/dm^3	phenolics, mg/dm^3	coloring substances mg/dm^3	sulfur dioxide, mg/dm^3			
						free	total		
Control	13,0	8,9	0,6	380	23	11	50	210	7,6
Gl	12,9	9,0	0,5	280	35	14	50	198	7,8
Gl+T	13,2	8,8	0,5	586	33	12	52	205	7,75
T	13,2	9,2	0,4	618	29	14	47	201	7,75

Also noted lower rates of yellow shades and yellow in the test specimens, which are indicate about oxidation of rose wines (Fig. 4, 5).

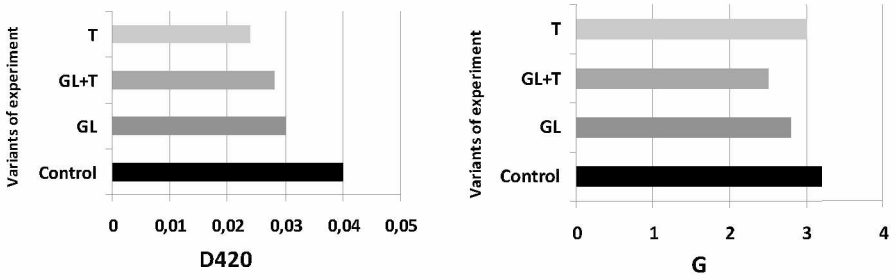

Fig. 4, 5. Effect of antioxidants on the formation of yellow shades of rose table wine

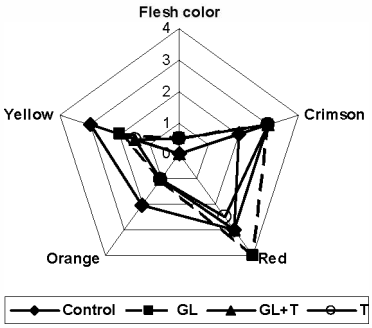

Fig. 6. Diagram of color shades of rose table wine, made with the usage of antioxidants

Conclusions

The use of preparations based on glutathione of yeast can increase the level of free sulfur dioxide, which will lead to better protection from oxidation, or the possibility of reduction the dose of sulphitation for equal level of protection

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