

INFLUENCE OF TECHNOLOGICAL TREATMENTS ON PHENOLIC COMPLEX AND COLORS INDICES IN RAW RED WINES

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Abstract: The present work was performed study of the influence different strains of yeast from the National Collection of Microorganisms for Wine Industry, the physico-chemical parameters, content of phenolic substances and color indices of red sparkling wines.

Saccharomyces yeasts affect the content of phenolic substances and anthocyanins during alcoholic fermentation, which causes polyphenolic complex content reduction. Concomitantly it was established that yeasts are responsible for the enzymatic medium that catalyzes the oxidative condensation of phenolic substances.

Keywords: local yeast, dry raw red wine, phenolic substances, sparkling wine

Introduction

In the work are presented results of technological appreciation of different yeast strains from Collection of Microorganism for Wine Production Industry (CMWPI) of Scientific-Practical Institute of Horticulture and Food Technologies (SPIHFT). In order to highlight the influence of yeast strains on the content of phenolic substances in the production of red wines with moderate amounts of phenolic substances. Were studied following important technological properties: fermentation activity, biomass accumulation, yeasts influence on physical and chemical indices and phenolic complex.

It is known that the sorption of phenol connections slows diffusion of nutrients through the cell membrane of yeast, inhibits their physiological activity. Therefore, the high content of phenolic substances impressive influence on the kinetics of fermentation of must and reduce the growth of yeasts.[3]

Also *Saccharomyces* yeasts influence the content substances of phenolic and anthocyanins during fermentation, absorbing them into membrane leads to the reduction of the polyphenolic complex after sedimentation of yeast, and they respond of the enzyme environment that forms during fermentation which can lead to oxidation of different phenolic complex components, especially antiochians.

Therefore, for the production of red wines with moderate amounts of phenolic substances, it is necessary to use special yeast strain capable of maintaining the optimum fermentation and ensure production of quality red wines, with minimal impact on the phenolic complex.[3]

As result of researches were studied from 5 strains of yeast from CMWPI and are differentiated by their influence on fermentation activity and physicochemical content for the production red wines with moderate amounts of phenolic substances.

Given the aforementioned study and selection of local yeast strains for the production of quality red wines is actual also present scientific and practical interest in the Republic of Moldova.

Materials and methods

The research was conducted in the laboratory of "Sparkling wines and Microbiology" section "Micro winemaking" Scientific and Practical Institute of Horticulture and Food Technology in 2010-2011. As research objects were used dry red wine made from Merlot vine. Yeast strains were studied from Collection of Microorganism for Wine Production Industry of SPIHFT. When performing research were applied physico-chemical analysis methods recommended by the International Organisation of Vine and Wine and those modified in the SPIHFT [2].

Table 1. Quality indices of red grapes processed to produce raw material for sparkling red wines. (harvest year 2011)

Grape variety	Mass concentration:		Technological potential	
	of sugars, g/dm ³	titratable acidity, g/dm ³	Amount of phenolic compounds, mg/dm ³	concentration of anthocyanes, mg/dm ³
Merlot	214	7,45	2568	426

To produce raw material for sparkling red wines under "Micro winemaking" (SPIHFT) was used Merlot grape variety and local yeast strains № 64, № 88, № 9, № 81 and № 29.

Results and discussions

Based on the obtained results that are shown in Table 2 has been shown that yeast strains have a major influence on the basic physico-chemical parameters in the process of fermentation and maceration for the production of raw material red wines.

Table 2. Influence of yeast strain on the physico-chemical parameters of raw materials red wines made from Merlot grapes (y.h. 2011)

Grape variety	Experience	Description of experience Fermentation and maceration with	Alcoholic concentration, % vol.	Mass concentration of		pH	Potential OR, mV
				titratable acidity, g/dm ³	volatile acidity, g/dm ³		
Merlot	1	Yeast strain № 64	12,49	6,6	0.46	3,39	199
	2	Yeast strain № 88	12,22	7	0.3	3,33	203
	3	Yeast strain № 9	12,77	7,1	0.46	3,32	204
	4	Yeast strain № 81	12,02	7,3	0.3	3,33	202
	5	Yeast strain № 29	12,06	7	0.6	3,32	203

Volatile acidity is between range of 0.3-0.6 g/dm³ with a maximum of 0.6 g/dm³, recorded at 5 experience using strain № 29, the pH is constant only experience 1 (using strain № 64) has a higher value 3.39. Redox potential varies between 202 ± 2, the minimum

value is also recorded by yeast strain № 64. Titratable acidity varies depending on the yeast strain used, with a gap of up to 0.9 mg/dm³, maximum of 7.3 mg/dm³ being recorded at yeast strain № 81 and the minimum was obtained from the sample obtained by using strain yeast № 64. These disparities are obtained due to the specific fermentation particularities of yeasts strain.

To highlight the influence of yeast strain on alcoholic concentration data was shown in fig.1

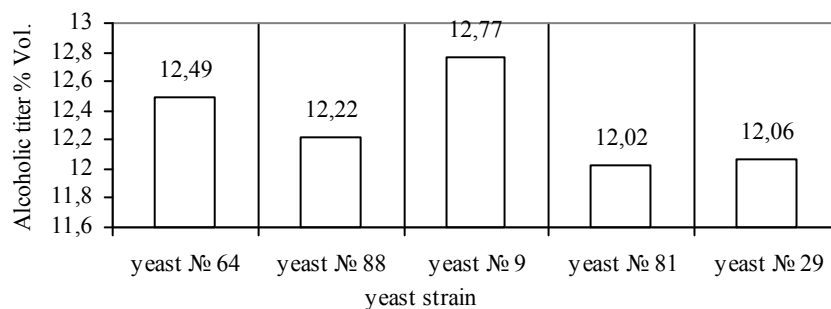


Fig. 1. Comparative analysis of alcoholic titre in the red wines raw materials obtained by using different yeast strains , h. y. 2011.

Analyzing obtained data of alcoholic concentration stands out yeast strain № 9 with maximum of 12.77% Vol alcohol and the minimum was recorded in the wines obtained using yeast strains № 81, 29 with concentrations from 12.02 to 12.06% Vol . therefore № 9 of yeast strain, 64 had the highest yield of fermentation of glucose to ethanol fermentation and higher resistance of studied environmental conditions.

The wines studied were determined content of phenolic substances, anthocyanes, color and organoleptic indices. The results are shown in table 3.

Analyzing the table, it can be shown that strains of yeast used in fermentation and major influence on color indices. Deviating color density to 6 points maximum being recorded at the wine fermented with yeast strain № 88 reaching 14.6 points followed by wines fermented by yeast strains № 64, 81. The lowest values being recorded in Ex. № 3,5 (used yeast strains 9;29), therefore we conclude that these two strains of yeast have major influence on the color indices diminishing this important parameter. Color hue is within the allowable limits characteristic for young wines.

The data represented in Figure 2 demonstrates that yeast strain № 88 favored extraction and keeping of phenolic substances in the studied sample registering the maximum amount of phenolic substances 1355 mg/dm³ and comparative high concentration of anthocyanins 247 mg/dm³ mg/dm³. Wine obtained with use of yeast strain № 64 also showed advanced phenolic substances content (1262 mg/dm³) but and having the lowest content of anthocyanes (202 mg/dm³), this indicates that this strain of yeast facilitates reduction of anthocyanins during fermentation. Yeast strains № 81 and 29 have almost identical results with a low content of phenolic substances (1106 to 1071 mg/dm³) and moderate amounts of anthocyanes.

Table 3. Phenolic substances content, color and organoleptic indices of raw material wines obtained with use of different strains of yeast (it 2011)

Grape variety	Experience	Description of experience Fermentation and maceration with	Amount of phenolic compounds ,mg/ dm ³	Antocian elor concentra tion,mg/d m ³	Color density (Cd=A420+ A520+A62 0)	Color hue (Ch=A420n m/ A520nm)	Note organolepti c Points
Merlot	1	Yeast strain № 64	1263	202	12,50	0,45	7,9
	2	Yeast strain № 88	1355	247	14,64	0,48	8,0
	3	Yeast strain № 9	1083	254	9,36	0,54	7,85
	4	Yeast strain № 81	1106	238	11,73	0,47	7,9
	5	Yeast strain № 29	1071	232	8,57	0,61	8,0

In Figure 2 is shown comparative analysis of concentration of phenolic substances and anthocyanes in raw materials red wines obtained by use of different yeast strains.

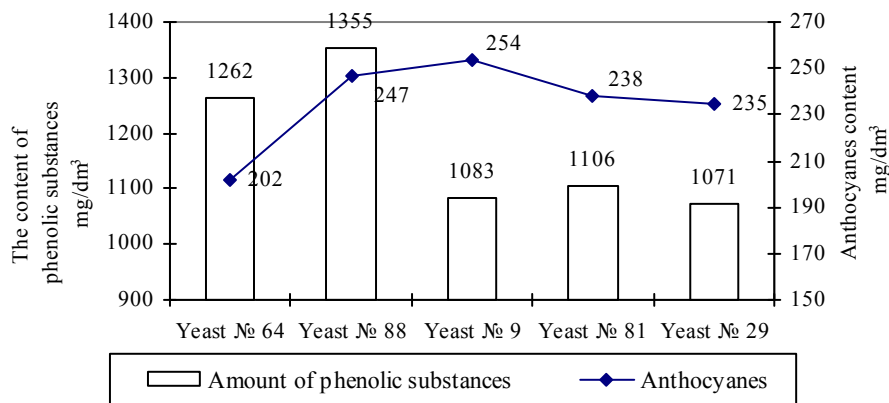


Fig. 2. The content of phenolic substances and anthocyanes in the red wines raw material obtained with the use of various yeast strains..

Should be mentioned that yeast strain № 9 is of particular interest because of its specificity: having a lower content of phenolic substances compared with the other samples (1083 mg/dm³) while in the sample is registered highest concentration of anthocyanes (254 mg/dm³) which in turn to be the main parameter that is responsible for the color of the wine and therefore report (anthocyanes / phenolic substances) is the most advanced compared to other yeast strains.

The studied wines were subjected to organoleptical analysis within the “Sparkling Wines and Microbiology” laboratory of SPIHFT, the results are shown in Fig. 3.

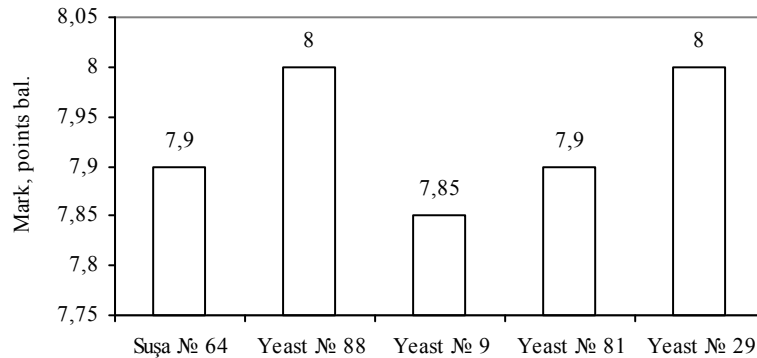


Fig. 3. Organoleptic analysis of raw material red wines obtained with the use of various yeast strains

Organoleptic analysis have showed that yeast strains № 88 and 29 were appreciated with to the highest mark of 8.0 points having in the taste, complex red fruit flavor, velvety ruby red color. Wines obtained with the use strains 81 and 64 were also obtained satisfactory mark 7.9 points, the lowest score it obtained the wine yeast strain obtained by 9 to 7.85 points.

CONCLUSIONS

1. Yeast strains have a major influence on fermentation and maceration process for the production of raw material red wines. Analyzing alcoholic concentration data where highlighted yeast strain № 9 and 64. And therefore best adapted to the specific conditions of experience and recorded to the highest yield of fermentation of glucose to alcohol.
2. Yeast strain selected for fermentation and maceration has a major influence on extraction and keeping of phenolic substances and anthocyanes, And also was highlighted influence on the concentration of these parameters with using yeast strain № 88 which have the highest concentration of phenolic substances and major level of anthocyanes. At yeast strain № 64 concentration relation of concentration of (anthocyanes / phenolic substances) have the lowest values of this parameter, and the yeast strain № 9 have highest ratio, therefore careful selection of yeast strain is a valuable winemaker tool for regulation of phenolic substances and anthocyanes content in production of raw material red wines.
3. Following laboratory testing the highest quality parameters were recorded in the red wines obtained with the use of yeast strain № 88 recorded high content of phenolic substances, anthocyanes and accumulated the highest score in organoleptical taste, which why yeast strain № 88, with the highest technological potential, it is recommended for primary fermentation of sparkling raw material red wines.

References

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