

THE INFLUENCE OF INITIAL ALCOHOL CONTENT IN WINE ON DEALCOHOLIZATION PROCESS

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Abstract: Promotion of the natural wines with reduced alcohol content for the young people, elders and for people with health problems as well as substitution of soft beverages obtained by adding of preservatives, colorants and flavoring substances is one of the global winemaking trends taken by the Republic of Moldova. Furthermore, customers are aware of the harmful effect of alcohol on health, personal behavior, road safety: the demand for wines with lower alcohol content is strongly increasing. Wine partially dealcoholized is a product obtained by eliminating of the alcohol from wines using physical separation processes. In particular, in this work distillation under vacuum for obtaining of wines with low alcohol content was studied. Dealcoholization process depends on different parameters one of which is initial alcohol content of wines. Aim of the present work was to study the influence of initial alcohol content on dealcoholization process.

Keywords: dealcoholization, wine, alcohol, separation processes, distillation

Introduction

Dealcoholization of wine is a very actual and important problem for modern winemaking. A vast number of researches were carried out in order to establish the influence of global warming on modern viticulture and winemaking. According to the Christian Seely (Directeur Général Château Pichon-Longueville) the increase of the alcohol level in wine related to climate change is one of them. It is now common to see quality wines with an alcohol by volume (ABV) of 13, 14 or even 15 %. Since the eighties, each ten years, alcohol level gained almost 1 % with an average increase of 2 to 3 %, if not more [1]. The growing interest of wine industry to reduce the ethyl alcohol concentration in wines has led to an increasing attention to dealcoholization techniques. In this context, the European Commission introduced the partial dealcoholization of wine by physical separation techniques as an oenological practice performed for the reduction of not more than 2% vol of the actual alcoholic strength. Moreover, the requirements of regulation lay down that wines treated must have no organoleptic faults and must be suitable for direct human consumption [2]. Hence, production of dealcoholized wine without altering its quality and while preserving its specificity is now essential for the whole sector worldwide. The process of dealcoholization was carried in laboratory conditions using rotary evaporator. Dealcoholization process depends on different physical parameters one of which is initial alcohol content of wines. Hence, the influence of the initial alcohol content on the dealcoholization process was studied.

Materials and method

Investigations on this scientific paper was conducted in the laboratory “Biotechnology and Wine Microbiology” of the Scientific and Practical Institute of Horticulture and Food Technologies and on the wine producer FCP «ASCONI» SRL Republic of Moldova.

In capacity of the subject of research white dry wine Aligote and red dry wines Merlot, white and red wines with different content of alcohol was used.

Basic chemical–physical parameters was determined using methods accepted by the modern winemaking practice. During the study some of chemical–physical parameters of obtained wines was determined using up–to–date apparatus FOSS WineScan™ SO₂ (Denmark).

Results and Discussion

In this paper, the influence of initial alcohol content on the dealcoholization process of white and red wines was studied. Dealcoholization process was carried out in laboratory conditions using a vacuum rotary evaporator at a constant temperature, pressure, the volume of wine and duration of the process. In order to determine the influence of initial alcohol content on the dealcoholization process in the samples of white and red dealcoholized wines, the main chemical–physical parameters were determined. Obtained results are presented in Table 1.2.

Table 1. Chemical–physical parametres of white dealcoholized wines with different alcohol content in the initial wine

Parameter	Alcoholic content, % vol.			
	13	14	15	16
Titratable acidity, g/dm ³	6,4	6,3	6,3	6,3
Volatile acidity, g/dm ³	0,32	0,33	0,33	0,33
Residual sugar, g/dm ³	1,3	1,3	1,3	1,3
pH	3,23	3,23	3,23	3,23
Tartric acid, g/dm ³	3,6	3,6	3,6	3,6
Malic acid, g/dm ³	1,20	1,18	1,18	1,18
Lactic acid, g/dm ³	0,52	0,49	0,48	0,48
Citric acid, g/m ³	0,28	0,28	0,28	0,28

Table 1 presents the influence of initial alcohol content on chemical–physical indices of dealcoholized white wines. According to the obtained results mass concentration of titratable acids, residual sugars remain unperceivable and varies within the permissible range in obtained dealcoholized white wines. Mass concentration of volatile acids remain constant and constitutes 0,33 g/dm³. The changes of one of the most important components of the chemical composition – organic acids were studied. From these results, there is a insignificant increase in the content of lactic and malic acids from 0,48 to 0,52 g/dm³ and 1,18 to 1,20 g/dm³ respectively , the content of tartric and citric acid does not change in the process of dealcoholization.

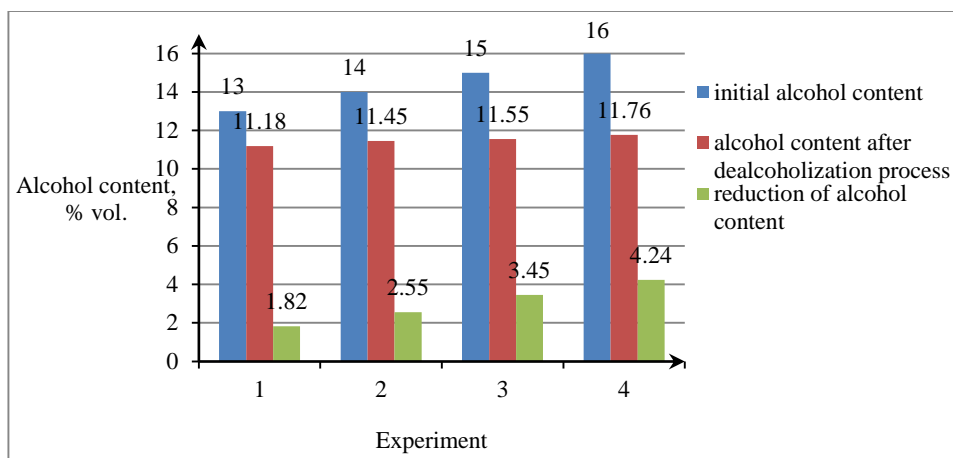


Fig.1. Influence of initial alcohol content on dealcoholization process of white dry wines

Fig. 1 shows the influence of the initial alcohol content on the rate of its removal during the dealcoholization process. Concomitantly with increasing of the initial alcohol content the fraction of removed alcohol from wines in the process of dealcoholization increases too. Realization of the experiment and analysis of obtained data has shown, that in initial wine with alcohol content 13% vol. the fraction of removed alcohol consists 1.82% vol and at 16% vol. fraction of removed alcohol content increased significantly and consists 4.24% vol.

Table 2. Chemical–physical parameters of red dealcoholized wines with different alcohol content in the initial wine

Parameter	Alcohol content , % vol.		
	14	15	16
Titrateable acidity, g/dm ³	6,1	6,1	6,0
Volatile acidity, g/dm ³	0,36	0,36	0,36
Residual sugar, g/dm ³	2,7	2,7	2,6
pH	3,3	3,3	3,3
Tartric acid, g/dm ³	2,9	2,7	2,7
Malic acid, g/dm ³	1,89	1,86	1,84
Lactic acid, g/dm ³	0,72	0,63	0,62
Citric acid, g/m ³	0,24	0,23	0,23

According to the obtained results there are no significant changes in physical and chemical composition of the obtained wines with reduced alcohol content. There is an insignificant varying of mass concentration and concentration of residual sugar is observed. Volatile acidity and pH remain unchanged in the process of dealcoholization. Organic acids composition change was studied. According to the obtained results concentration of tartaric acid varies from 2,7 g/dm³ to 2,9 g/dm³, malic acid – from 1,84

g/dm³ to 1,89 g/dm³, lactic acid from 0,62 g/dm³ to 0,72 g/dm³ and citric acid varies from 0,23 g/dm³ to 0,24 g/dm³.

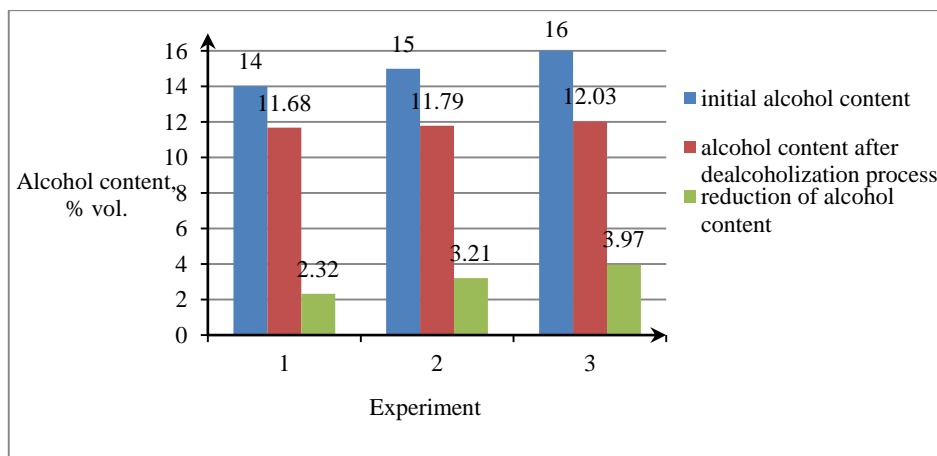


Fig.2. Influence of initial alcohol content on dealcoholization process of red dry wines

Fig. 2 shows the influence of the initial alcohol content on the rate of its removal during the dealcoholization process. As well as in the case of white wines, initial alcohol concentration influences on the rate of removal of alcohol in the dealcoholization process. Realization of the experiment and analysis of obtained data has shown, that in initial wine with alcohol content 14% vol. the fraction of removed alcohol consists 2,32%.vol and at 16% vol. fraction of removed alcohol content increased significantly and consists 3,97% vol.

Conclusion

Some preliminary general conclusions from experimental observations can be made, it was found that the initial alcohol content has influence on the rate of removal of ethanol from wine. Increasing of the alcohol content lead to increasing of the rate of ethanol removal from wines in the dealcoholization process. (at 16% vol. fraction of removed alcohol content increased significantly and consists 4,24% vol. for white wines and 3,97% vol. for red wines).

Acknowledgements: The authors wish to thank World Federation of Scientists for the financial support given.

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