ASPECTS REGARDING THE INFLUENCE OF GELATIN TREATMENT ON THE PHYSICAL-CHEMICAL COMPOSITION OF WINES PRODUCED IN THE COTNARI VINEYARD

ASPECTE PRIVIND INFLUENŢA TRATAMENTULUI CU GELATINĂ ASUPRA COMPOZIŢIEI FIZICO-CHIMICE A VINURILOR DE COTNARI

GHERGHINĂ Nicoleta[1], COTEA V.V.[1], GEORGESCU O.[1], COLIBABA Cintia[1], NICULAUA M.[2]
e-mail: nicodal@yahoo.com

Abstract. *This paper presents data on the influence of gelatin on the physical-chemical composition of Cotnari wines evidenced by: main compositional characteristics (alcoholic concentration, reducing sugars content, total acidity, pH, relative density, total dry extract, non-reducing extract, free and total sulphur dioxide), index of total polyphenols, Folin-Ciocalteu index and chromatic characteristics. For this study, white wines made from Francusa, Feteasca alba, Grasa de Cotnari grape varieties from Cotnari vineyard.*

Key words: Cotnari, gelatin, white wine

Rezumat. *În această lucrare sunt prezentate date referitoare la influenţa tratamentului cu gelatină asupra compoziţiei fizico-chimice a vinurilor de Cotnari evidenţiată prin: principalele caracteristici de compoziţie (concentraţia alcoolică, conţinutul în zaharuri reducătoare, aciditatea totală, pH-ul, densitatea relativă, extractul sec total, extractul nereducător, dioxidul de sulf liber şi total), indicele de polifenoli totali, indicele Folin-Ciocâlteu şi caracteristicile cromatice. Pentru acest studiu s-au utilizat vinuri albe obţinute din soiurile: Frâncuşă, Fetească albă, Grasă de Cotnari şi Tămâioasă românească din podgoria Cotnari.*

Cuvinte cheie: Cotnari, gelatină, vinuri albe

INTRODUCTION

Gluing with gelatine is a very old practice. In time, it has been tried to replace it with other techniques of clearing, such as filtering and centrifugation. It is true that, from the point of view of clearing the wines, these latest techniques are irreplaceable. Yet, during the latest years, the specialists rediscover the gluing, since it has been noticed that it is not only a simple procedure of clearing.

Apart from clearing, the gluing with gelatine has the property to involve momentarily soluble substances, however with the risk to precipitate also the

[1] University of Agricultural Sciences and Veterinary Medicine Iaşi, Romania
[2] Research Centre for Oenology - Iaşi branch of Romanian Academy

unclear form subsequently, phenomenon that can be extremely serious when it appears in the bottle. These substances are generically called "colloids." Even though these molecules have high molecular weight, they are not eliminated by filters (Barbara Scotti, Poinsaut P, 1997).

Gluing with gelatine also has the property to react with the tannins in the wine and thus influence positively the taste, by eliminating the substances responsible by astringent and bitter tastes (Cotea V. D. et al., 2009).

By this study, it was followed the way the treatment with gelatine influences the physical and chemical composition of the white wines obtained from the varieties Francusa, Feteasca white, Grasa de Cotnari and Romanian Tamaioasa in the Cotnari vineyard.

MATERIAL AND METHOD

This study was done on a variety of four white wines produced from the Cotnari vineyard, namely: Francusa (dry wine), Feteasca white (semisweet wine), Grasa de Cotnari (semisweet wine) and Romanian Tamaioasa (semisweet wine).The treatment with gelatine was done in industrial regime, being necessary a previous enrichment of the wine with oenological tannin, knowing the fact that white wines are poor in tannin. Thus, firstly the tannin was introduced (Tanvin W1) in quantity of 8 g/hL, dispersed in the white in proportion of 1:10, and after homogenization, it was also added the gelatine in quantity of 12 g/hL. After 21 days, it was separated the deposit formed by filtering, afterwards the wines were analyzed physically and chemically.

In the variants thus obtained, it was analyzed the main physical and chemical parameters (based on the methods indicated in the international and national standards, and also in the specialty literature): the alcoholic concentration, the content in reducing sugars (R.S.), volatile acidity (V.A.), total acidity (T.A.), pH, relative density, total dry extract (TDE), non-reducing extract (NE), dioxide of sulphur free and total. Also, it was calculated the index of total poly phenols (D_{280}), index Folin-Ciocalteu (IFC) and chromatic parameters.

The chromatic parameters were calculated according to the methods CIE Lab 76, according to the spectre of transmittance recorded for each wine. The latter was obtained with a spectre photometer SPECORD S200 coupled with a computer. Thus, it was realized the automatic numbering and recording of the spectre of transmittance in a file. To minimize the errors of analysis, at determining the transmittances it was used some vats with optic itinerary, appropriate for each wine sample, 0.2 and 1 cm respectively. The spectres were treated with a programme realized in the frame of the research team, in view of obtaining the chromatic parameters (**L, a, b, C**, **H),** luminosity and hue. The analysis of the physical and chemical parameters of the variants taking for study was done in the Laboratory of Oenology of the University of Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad" of Iasi.

RESULTS AND DISCUSSIONS

The main physical and chemical characteristics of the witness variants, as well as the ones obtained following the treatment with gelatine, are presented in table 1.

Table1

Influence of gelatin on physicochemical characteristics of wines Cotnari

Variety	Var.	Alc. % vol.	Z.R. g/L	A.V. g/L	A.T. g/L	pH	D. rel.	EST g/L	EN g/L	SO_2 mg/L	
										free	Total
Francusa	Witness	11,90	2,10	0,22	7,12	3,47	0,9934	23,70	21,60	37	115
	Treat	11,85	2,08	0,20	7,08	3,45	0,9934	23,50	21,42	33	108
Feteasca white	Witness	11,75	28,00	0.28	7,27	3,35	1,0038	50,10	22,10	43	164
	Treat	11,64	28,00	0.30	7,42	3,33	1,0036	49,40	21,40	31	149
Grasa de Cotnari	Witness	11,72	43,00	0,35	7,35	3,30	1,0112	69,40	26,40	47	149
	Treat	11,74	43,00	0,32	7,57	3,28	1,0110	68,90	25,90	25	143
Romanian Tamaioasa	Witness	11,65	64,20	0,32	7,35	3,30	1,0189	89,10	24,90	46	197
	Treat	11,82	64,20	0,30	7,50	3,26	1,0188	89,40	25,20	44	189

Table 2

Influence of gelatin on total polyphenol content (IPT) and anthocyanins (IFC) in wines Cotnari

Variety	Var.	A280	Total phenol g ac. galic/L	A750	IPT/ IFC	IFC g/L ac galic	ΔIFC treat/ witness %	IPT g/L ac galic	ΔIPT treat/ Witness %
Francusa	Witness	3,4994	105,68	3,1305	1,12	4,14	-	0,106	-
	Treat	3,3677	101,81	3,0165	1,12	3,99	-3,64	0,102	-3,66
Feteasca white	Witness	3,423	103,44	3,516	0,97	4,65	-	0,103	-
	Treat	3,4803	105,12	3,3325	1,04	4,41	-5,22	0,105	1,62
Grasa de Cotnari	Witness	3,494	105,52	2,4164	1,45	3,20	-	0,106	-
	Treat	3,5389	106,84	2,3296	1,52	3,08	-3,59	0,107	1,25
Romanian Tamaioasa	Witness	3,5541	107,29	3,1049	1,14	4,11	-	0,107	-
	Treat	3,457	104,44	3,4938	0,99	4,62	12,52	0,104	-2,66

Following the analysis of the information obtained, it has been noticed that the treatment with gelatine did not influence significantly the main physical and chemical indexes. Thus, the alcoholic concentration suffered slight diminishing in the varieties Francusa (11.85% vol. comparing with the witness with 11.90% vol.) and Feteasca white (11.75% vol. comparing with the witness that recorded the value of 11.64% vol.).

In the other two varieties, the alcoholic concentration recorded an increase, namely: 11.74% vol. comparing with the witness variant (11.72% vol.) in the variety Grasa de Cotnari and 11.82% vol. comparing with the witness (11.65% vol.) in the variety Romanian Tamaioasa.

Regarding the content of reducing sugars, it has been noticed that it did not suffer any modifications, except for the variety Francusa, where it was noticed a minor decrease (2.08 g/L comparing with the witness sample with 2.10 g/L). The treatment of wine with gelatine did not influence significantly the values of volatile acidity and the pH.

Another parameter taking in the study was the total acidity, which suffered the biggest variations, respectively an increase of its values, in the varieties Feteasca white, Grasa de Cotnari and Romanian Tamaioasa and a decrease in the variety Francusa. The non-reducing extract recorded a minimum of 21.40 g/L in the variety Feteasca white and the maximum value in the variety Grasa de Cotnari (25.90 g/L). The values of the content of phenol compounds in the variants studied are presented in table 2.

The content in phenol compounds is expressed in this case, by characteristic indexes: D_{280} and F_C.

The index D_{280} expresses the content in total phenol compounds (phenol acids, tanning and colouring substances) and it is expressed by the optical density or the absorbance measured for the wavelength of 280 nm. The lowest values were recorded in the variety Francusa (0.102 g/L gallic acid), and the maximum value in the variety Grasa de Cotnari (0.102 g/L gallic acid). This fact is explained by the fact that in the variety Grasa de Cotnari it is necessary a slight pre-fermentative maceration in the process of wine making and thus, a part of the poly phenols from the grapes migrated in the wine.

The index Folin-Ciocalteu (F_C) is specific only to the phenol compounds with reducing characteristics. The values of this index had minimum value at the variety Grasa de Cotnari (3.08 g/L gallic acid) and maximum one at the variety Romanian Tamaioasa (4.62 g/L gallic acid). The influence of the treatment with gelatine on the parameters of colour in the Cotnari wines is presented in table 3.

Table 3

Influence of gelatin on the color parameters of wines Cotnari

Variety	Var.	Clari-ty L	Color coordonates		Satu-ration C	Tone H	Brightness	Tempt	Δ E	Δ H
			a	b						
Francusa	Witness	98,7	-0,33	4,45	4,46	-85,66	0,09	3,68	-	-
	Treat	98,8	-0,45	3,97	3,99	-83,5	0,08	3,75	0,5	0,14
Feteasca white	Witness	97	-0,43	6,86	6,87	-86,4	0,17	2,81	-	-
	Treat	97,3	-0,74	5,71	5,76	-82,55	0,15	2,97	1,23	0,44
Grasa de Cotnari	Witness	97,7	-0,56	7,59	7,61	-85,77	0,15	3,57	-	-
	Treat	97,8	-0,48	7,07	7,08	-86,07	0,14	3,49	0,54	0,03
Romanian Tamaioasa	Witness	97,5	-0,62	8,88	8,9	-85,95	0,17	3,66	-	-
	Treat	98,4	-0,95	6,5	6,57	-81,63	0,12	4,54	2,57	0,6

The chromatic characteristics of the samples studied are expressed by luminosity (psychometric clarity) **L**, colour coordinates **a** and **b**, chromaticity (chrome or colour saturation) **C** and tonality **H.** It was noticed that parameter **L** had an increase at all the four varieties taken in the study, this fact being due to the better clarity of the wine after the treatment with gelatine. The values of the parameter **a,** were diminished, reflecting obviously the preponderance of the green tonalities comparing with the red ones.

The chromatic parameter **b**, situated on the coordinate of the colours blue-yellow, presents a similar evolution to the one of the parameter **a**. The chromaticity **C** of the samples analysed, being calculated based on the chromatic parameters **a** and **b** corresponding to each wine, presents decreasing values after the treatment with gelatine.

CONCLUSIONS

The treatment with gelatine proved to have great importance in the process of wine making, assuring clear wines without influencing negatively the other characteristics of the physical and chemical composition.

Acknowledgments*.This study was realised and published within the research project POSCCE-A2-O2.1.2-2009-2 ID.653, code SMIS-CSNR 12596.*

REFERENCES

1. **Barbara Scotti, Poinsaut P., 1997 –** *Le collage å la gélatine: entre science et traditions.* Revue des Oenologues n^0 85;
2. **Cotea V. D., Zănoagă C. V., Cotea V.V**., 2009 - *Tratat de Oenochimie, vol.2.* Editura Academiei Române, Bucureşti, p. 204 – 210;
3. *****, 2011** - *Recueil des methodes internationales d'analyse des vins et des mouts*, Edition 2011, vol. 1, O.I.V.