CONSIDERATIONS REGARDING THE OPTIMIZATION OF THE TECHNOLOGY FOR THE OBTAINING OF BĂBEASCĂ NEAGRĂ RED WINES

CONSIDERAŢII CU PRIVIRE LA OPTIMIZAREA TEHNOLOGIEI DE OBŢINERE A VINURILOR ROŞII DE BĂBEASCĂ NEAGRĂ

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Abstract. *This study focuses on the optimization of the processing technologies for black grapes from Băbească neagră variety harvested from Odobeşti vineyard in 2010. The paper intends to establish the level of influence of the maceration-fermentation technology on the characteristics of obtained wines and the comparison of wines in order to highlight the oenological potential of the variety. The wines were obtained using the different procedures of maceration-fermentation (classical maceration as a blank test, maceration in rotating cisterns, thermal maceration, carbonic maceration, the variant of concentration of color intensity, maceration by means of ultrasounds and maceration by means of microwaves). The results of tests run showed that the process of maceration-fermentation influence the composition characteristics of wines. All maceration-fermentation variants produced wines superior to the black test. The variant by thermal maceration and the maceration by microwaves stood out in the global evaluation.*

Key words: Băbească neagră, maceration fermentation, chromatic parameters, optimization of technology.

Rezumat. *Studiul de faţă urmăreşte să optimizeze tehnologiile de prelucrare a strugurilor negri din soiul Băbească neagră, recoltaţi din podgoria Odobeşti, producţia anului 2010. Lucrarea se axează pe stabilirea gradului de influenţă a tehnologiei de macerare-fermentare asupra caracteristicilor vinurilor obţinute şi compararea vinurilor în vederea evidenţierii potenţialului oenologic al soiului. Vinurile au fost obţinute folosind diferite procedee de macerare-fermentare (macerare clasică ca variantă martor, macerare în cisterne rotative, termomaceraţie, maceraţie carbonică, varianta de concentrare a intensităţii colorante, macerare cu ajutorul ultrasunetelor şi macerare cu ajutorul microundelor). Rezultatele analizelor efectuate au arătat că procedeul de macerare-fermentare influenţează caracteristicile de compoziţie ale vinurilor. Toate variantele de macerare-fermentare au dat vinuri superioare martorului. La o evaluare globală, între acestea se evidenţiază varianta termomaceraţiei şi cea de macerare cu ajutorul microundelor.*

Cuvinte cheie: Băbească neagră, macerare fermentare, parametri cromatici, optimizarea tehnologiei.

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INTRODUCTION

The physical-chemical parameters of wines vary very much depending on the composition characteristics of grapes when harvested and the technology used.

For this purpose, in order to maximally turn the characteristics of the variety to good use (potential of sugars accumulation, adaptation to the eco-pedoclimatic conditions of Moldavian vineyards, productivity), it is necessary to optimize technology to obtain red wines of a constant quality every year.

MATERIAL AND METHOD

In the elaboration of this study, we used black grapes from the Romanian variety Băbească neagră harvested from Odobeşti vineyard (Cotea D.V. et al., 2000), the viticultural center of Odobeşti, year of production 2010, having the following composition characteristics: 201.82 g/L reducing sugars and a total acidity expressed in g/L $C_4H_6O_6$, of 9.03 g/L. Harvesting was made manually and the grapes were put in wooden cases. The grapes were then transported and processed at the pilot Station for vinification of the Faculty of Horticulture, Iaşi.

Grapes were mashed and detached from bunches and the obtained must was homogenized and processed differently, as follows:

In case of the **maceration-fermentation technology** – **the blank test** - the must was inseminated with selected yeasts of *Saccharomyces cerevisiae*, in proportion of 30 g/100 kg, must and pectolitic enzymes in proportion of 1.5 g/100 kg of mashed grapes. Maceration-fermentation was made in stainless steel cisterns for 120 hours with the refitting of must four times a day for 30 minutes. After the process of maceration-fermentation stopped, the mashed grapes were pressed by means of a hydraulic press and the must obtained was put into stainless steel containers where it finished the alcoholic and malolactic fermentation. After the malolactic fermentation ended, the wine was drawn off from its lees and conditioned according to its quality category. Bottling was made after the preliminary filtering by means of a plate filter.

The variant of **concentration of the coloring intensity** (improvement of chromatic parameters) was made through the extraction of 10% from the must obtained without pressing the grapes, but subsequently the technological operations were identical to the ones from the classical maceration-fermentation.

As for the technology of **maceration-fermentation in rotating cisterns,** after having obtained the mashed grapes they were put into stainless steel containers for 72 hours and homogenization took place by rotation for six times a day, every rotation lasting for 20 minutes**.** After this process, the mashed grapes followed the same method as in the case of classical vinification variant.

Thermal maceration was made by heating the partially sieved mashed grapes at 70˚C for 30 minutes and its mixing with the non-heated previously separated must. After cooling at 20˚C, insemination took place and the technological flow was almost identical as for the blank test variant.

Experiments showed and reality confirmed that heating the mashed grapes at 70˚C for 15-30 minutes makes the extraction of anthocians easy and oxidases are inactivated (Cotea V. D., 1985).

The technological variant of **carbonic maceration** was carried out without smashing the grapes or detaching them from bunches. Thus, the whole and good grapes were put into a closed container provided in its lower part with a grid situated at a 20 cm distance from the bottom of the vessel. Under the grid we put Băbească neagră must inseminated with yeast and in full alcoholic fermentation to provide the CO_2 atmosphere

necessary for the good unfolding of the carbonic maceration process. The carbonic maceration process was considered as finished when the grapes had a brick-like colour (Cotea V.V. and Cotea D.V., 2006), the skins of grapes were partially or totally discolored and grapes could be easily mashed. At that moment, the resulted mashed grapes were processed in a manner similar to the blank test. We must mention that the process took place at a temperature of 28-30˚C for 12 days.

In case of the **maceration technology by means of ultrasounds**, we used the power of 2000 W and the frequency of 35 kHz for 15 minutes. Then, the mashed grapes followed the same technologic flow as in the case of classical vinification technology.

In case of the **maceration technology by means of microwaves,** the mashed grapes were subjected to the irradiation energy of 750 W for 15 minutes. After 30 minutes, the mashed grapes were brought to the temperature of 20°C, and a third of the mashed grapes were not heated. The subsequent operations were identical as in the case of the technology of classical maceration fermentation.

The physical-chemical tests were run on the basis of the methods indicated by the international and state standards and the specialized literature as well. We determined the alcoholic concentration, the reducing sugars, total acidity, volatile acidity, the relative density, total dry extract and non-reducing extract for the variants of wines obtained. We also calculated the values of the chromatic parameters, the content in total phenolic compounds and anthocians. In this paper we used the following abbreviations: classical maceration-fermentation – M – blank test, variant of concentration of the coloring intensity (improvement of chromatic parameters) – V1; maceration-fermentation in rotating cisterns – variant V2; thermal maceration – variant V3; carbonic maceration – variant V4; maceration by ultrasounds – variant V5; maceration by microwaves – variant V6.

RESULTS AND DISCUSSIONS

The main composition characteristics of the wines obtained from Băbească neagră variety by different maceration-fermentation technologies are presented in table 1. The alcoholic concentration of wines varied from the minimal value of 10.6% vol. for V3 to the maximal value of 12.24% vol. for V6 (tab.1). From the viewpoint of content in reducing sugars, wines fall into the category of dry wines having a maximum content of 4g/L. as for the non-reducing extract of wines, this parameter is superior for the blank test, except V3, the highest value being registered by V6 – 23.05 g/L. By comparing the maceration-fermentation technologies, in terms of total acidity of wines expressed in g/L $C_4H_6O_6$, we might notice that the lowest value was registered by the wine obtained through carbonic maceration technology (V3) - 5.56 g/L and to the opposite pole was the wine obtained by classical maceration fermentation (M) – 7.08 g/L; as for the other technologies, the values obtained were relatively close. We may also notice that for pH, the highest value was registered by V3, a sample obtained by carbonic maceration.

L clarity, a colour component measured through CIE Lab 76 method (tab. 2), characterizes the visual aspect more or less “bright” of wine colour and it may range between zero for a black-opaque sample and 100 for transparent colourless samples. In our case, it varied between 36.89 for V6 and 78.35 for V3. If we compare technologies among them, we may notice that, except for the carbonic maceration, variants V2, V4 and V6 had close values showing the efficiency of these maceration-fermentation technologies in the obtaining of more intensely colored wines.

Table 1

Compositional characteristics of red wines

No	Technological variant	Alcohol conc. (% vol.)	Reductive sugars (g/L)	Relative density at 20ºC	Total dry extract (g/L)	Non reductive extract (g/L)	Total acidity g/L $C_4H_6O_6$	Volatile acidity g/L $C_2H_4O_2$	pH	SO_2 free (mg/L)	SO_2 total (mg/L
1	M	11,92	3,23	0,9938	24,8	21,57	7,08	0,18	3,42	14,25	45,83
2	V 1	12,1	2,56	0,9938	25,3	22,74	6,57	0,16	3,56	13,16	38,12
3	V 2	12,19	3,29	0,9941	26,1	22,81	6,19	0,32	3,64	14,84	45,36
4	V 3	10,6	1,43	0,9927	17,7	16,27	5,56	0,64	3,71	12,54	49,21
5	V 4	12,05	2,19	0,9938	25	22,81	6,63	0,20	3,52	15,31	48,14
6	V 5	12,03	2,87	0,9938	25	22,13	6,42	0,29	3,47	14,28	44,85
7	V 6	12,24	3,25	0,9940	26,3	23,05	6,24	0,31	3,61	10,72	32,16

Table 2

Values of the chromatic parameters of red wines obtained from Băbească neagră

No	Technological variant	Clarity L	Color coordinates		Saturation C	Tonality H	Luminosity	Hue
			a red(+) - green(-)	a red(+) - green(-)				
1.	M	64.07	59.28	20.51	56.93	13.85	1.85	0.84
2.	V 1	51.30	40.62	10.97	42.08	15.12	2.48	0.76
3.	V 2	38.89	56.47	15.63	59.54	18.49	3.30	0.63
4.	V 3	78.35	21.79	34.81	24.19	31.56	0.96	0.89
5.	V 4	43.14	48.45	16.14	51.07	18.43	2.79	0.71
6.	V 5	52.95	52.11	15.39	54.33	16.46	2.46	0.77
7.	V 6	40.61	52.85	16.52	55.37	17.36	2.87	0.65

As for the content in anthocians (tab. 3) of Băbească neagră wines obtained by different maceration-fermentation methods, we may notice that the highest values of anthocians were registered by variants V2 (321.16 mg/L), V6 (317.95 mg/L) V4 (308.83 mg/L), V1 (299.34), V5 (297.41) and M (278.75 mg/L). Carbonic maceration (V3) registered the lowest value of 171.29 mg/L for the content in anthocians meaning that this maceration-fermentation variant does not favor the extraction of colour compounds and so we may obtain low alcohol poorly extractive wines having a low coloring density (Cotea D.V. et al, 2009).

In case of the content of total phenolic compounds (tab. 4), expressed both quantitatively in mg/L and by characteristic indices (D280, IFC), one may notice the same order for the content in anthocians since the maximum value was 2324.48 for V2, and the minimum value was 1495.53 for V3.

Table 3

Anthocyans content

No	Technological variant	Anthocyans mg/L
1.	M	278.75
2.	V 1	299.34
3.	V 2	321.16
4.	V 3	171.29
5.	V 4	308.83
6.	V 5	297.41
7.	V 6	317.95

Table 4

Pehnolic compounds content in obtained wines

No	Technological variant	CFT mg/L	D_{280}	IFc
1.	M	2183.24	21.12	15.09
2.	V 1	2226.17	21.37	15.26
3.	V 2	2324.48	21.97	15.69
4.	V 3	1495.53	14.86	10.61
5.	V 4	2257.93	21.54	15.39
6.	V 5	2213.45	21.35	15.25
7.	V 6	2291.62	21.93	15.66

CONCLUSIONS

1. There is a technological advantage related to the accumulation of colour compounds for the more severe maceration and extraction methods: thermal maceration, maceration by microwaves and concentration of coloring intensity.

2. The results for the maceration-fermentation variants are superior to the blank test, and V2 (thermal maceration) and V6 (maceration by microwaves) exceptionally stood out.

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