COMPARATIVE STUDY OF RED BĂBEASCĂ NEAGRĂ WINES FROM NICOREŞTI VINEYARD OBTAINED THROUGH CLASSICAL TECHNOLOGY OF MACERATION FERMENTATION AND THROUGH INNOVATIVE MACERATION TECHNOLOGIES

STUDIU COMPARATIV AL VINURILOR ROŞII DE BĂBEASCĂ NEAGRĂ DIN PODGORIA NICOREŞTI OBŢINUTE PRIN TEHNOLOGIA CLASICĂ DE MACERARE-FERMENTARE ŞI PRIN TEHNOLOGII NECONVENŢIONALE DE MACERARE

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Abstract *This study presents comparative results of Băbească neagră wines obtained through the classical maceration-fermentation process and those obtained through innovative maceration technologies – microwave and ultrasounds maceration. The analyses' results differ, proving that the maceration-fermentation technology and contact time between must and grape skins greatly influence the physical-chemical characteristics of obtained wines.*
Keywords: Băbească neagră, red wine, maceration-fermentation, color.

Rezumat*: În acest studiu se prezintă rezultate comparative între vinurile roşii de Băbească neagră obţinute prin procedeul clasic de macerare-fermentare şi cele obţinute prin tehnologiile neconvenţionale de macerare: macerare cu microunde şi macerare cu ultrasunete. Rezultatele analizelor efectuate evidenţiază, prin diferenţele care apar la vinuri, că tehnologia de macerare-fermentare şi durata de menţinere a mustului pe boştină influenţează în mare măsură caracteristicile fizico-chimice ale vinurilor obţinute.*
Cuvinte cheie: Băbească neagră, vin roşu, macerare-fermentare, culoare.

INTRODUCERE

Maceration-fermentation is a particularly important technological step in the production of red wines. The two processes, maceration and fermentation, influence each other and their mechanism is influenced by many factors, among which the period of the extraction process of phenolic compounds (Cotea D.V., 2009) and the technological variant of maceration-fermentation. This study presents comparative results of Băbească neagră wines obtained through different technologies. By applying different technologies for obtaining Băbească neagră wines, by studying and comparison of samples obtained by these technologies, you can recommend the most appropriate variant of wine-making.

MATERIAL AND METHOD

Băbească neagră (Rotaru Liliana, 2009) local grapes variety were harvested in 2009 from Nicoreşti vineyard (Cotea D.V., 2000), Nicoreşti center.

The grapes were manually harvested, in wooden crates and transported to Iaşi Pilot Research Station where they were processed by different technologies (Cotea V.V., Cotea D.V., 2006).

Compositional characteristics of grapes at harvest are presented below (table 1).

Table 1

Compositional characteristics of grapes at harvest

No.	Vineyard	Harvest date	Reductive sugars (g/L)	Total acidity (g/L) $C_4H_6O_6$
1.	Nicoreşti	19.09.2009	206,14	7,83

The grapes were processed by different technologies: classical maceration-fermentation (control sample = M), and through innovative maceration technologies – microwave and ultrasounds maceration. The grapes were de-stemmed and crushed, marc homogenization is realized and then the grapes were processed by different technologies:

In the case of classical maceration (Cotea D.V. 1985), selected yeasts of the Saccharomyces cerevisiae sort were added (30 g/100 kg), as well as pectolytic enzymes (1,5 g/100 kg). Maceration - fermentation was performed in stainless steel tanks, for 120 hours, with pumping over four times daily. At the end of the maceration process, the marc was pressed by a hydraulic press, the working pressure being no more than 2 bar. The obtained must has been kept in stainless steel tanks for finishing its alcoholic and malo - lactic fermentation (Ţârdea C. ş.a., 2000). After finishing its malo - lactic fermentation, the wine was racked and conditioned (Pomohaci ş.a., 2001). Bottling was done after filtering.

In the case of ultrasounds maceration, the process took place at 2000 W in an ultrasonic cavity, with a frequency of 35 kHz at different times for 15 minutes and then for 22 minutes. After this treatment the marc undertook the same technological operations as in classical maceration-fermentation procedures.

In the case of microwave maceration the marc was irradiated at 750 W at different times: 15 minutes and then after 30 minutes. After this, the marc was cooled at 20˚C, with a third of its unheated volume and Saccharomyces cerevisiae (30 g/100 kg) and pectolytic enzymes (1,5 g/100 kg) were added.

Physical - chemical analyses were done according to international standards (Compendium of International Methods of Analysis of Wine and Musts, 2009 - O.I.V., Paris).

Chromatic parameters of wine samples were calculated according to CIE Lab 76 method, also taking into consideration the absorption spectrum registered for each wine sample. SPECORD S200 spectrophotometer was used. Automatic quantification and registration of the absorption spectrum was done. To minimize analysis errors, absorbance determination was done by using vials with adequate optic characteristics for each wine sample.

RESULTS AND DISCUSSIONS

Alcoholic strength, reductive sugars, relative density, total acidity, volatile acidity, pH, non - reductive extract, total dry and variation of chromatic parameters extract were registered.

The main compositional characteristics of Băbească neagră wines obtained through different maceration-fermentation technologies are presented in table 2.

The following abbreviations were used in this study: M = classical maceration (control sample); V1 = ultrasounds maceration 15 minutes; V2 = ultrasounds maceration 22 minutes; V3 = microwave maceration 750 W – 15 minutes; V4 = microwave maceration 750 W – 30 minutes.

The alcoholic concentration varies from 11,57 % vol. in the control sample (M) -classical maceration- up to 12,26 la V4 (fig. 1.).

The values presented in graphic 2 shows that the obtained wines are dry, with a content of maximum 4g/L reductive sugars, with a maximum value at V2 (3,24g/L).

The values of total acidity (tab. 2), which varies from 5,84 g/L tartaric acid in the control sample (M) up to 6,47 g/L tartaric acid at V3 together with those of the pH underline the fact that the malo-lactic fermentation of the wines did not occur.

Regarding the non reductive extract content of studied wines (tab. 2), one can observe that he has a minimum value of 20, 92 g/L at V1 ultrasounds maceration 15 minutes and a maximum of 21,89 g/L at V4 microwaves maceration 750 W 30 minutes. One can remark that, the influence of the technological variants on this parameter is very clearly observed; also, the data shows the influence of the maceration-fermentation techniques on the wine's color, especially the influence of exposure time to marc for extraction of color compounds in the same technology.

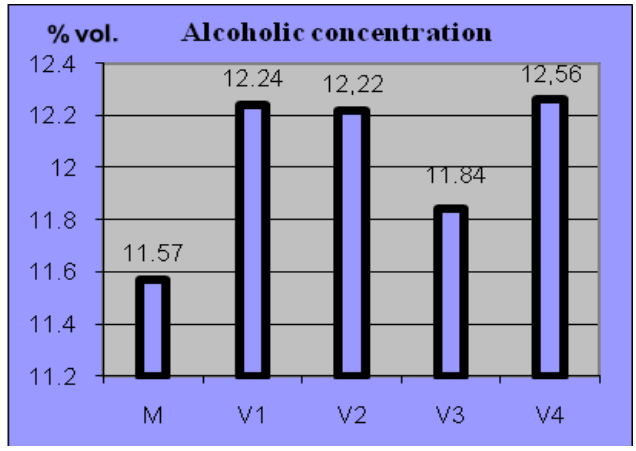

Fig. 1. Alcoholic concentration of Băbească neagră wines

Table 2

Compositional characteristics of red wines from Băbească neagră grapes harvested from Nicorești vineyard

No.	Technological variant	Relative density at 20ºC	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)	Non reductive extract(g/L)	Total dry extract (g/L)
1	M	0,9932	5,84	0,43	3,61	20,18	74,55	21,04	22,2
2	V1	0,9931	6,28	0,38	3,67	15,33	58,19	20,92	24,00
3	V2	0,9932	6,14	0,36	3,64	12,92	48,87	21,26	24,50
4	V3	0,9934	6,47	0,32	3,63	18,51	61,42	21,06	23,50
5	V4	0,9934	6,34	0,32	3,63	16,74	54,76	21,89	24,8

Table 3

Chromatic parameters of wines obtained from Băbească neagră grape variety from Nicorești vineyard

No.	Technological variant	Clarity L	Color coordinates		Saturation C	Tonality H	Luminosity	Hue	Δ E	Δ H
			a red(+) - green(-)	b yellow(+) - blue(-)						
1	M	64,5475	43,9773	20,5060	48,5232	24,9990	1,6944	0,7131		
2	V1	48,9912	58,6284	13,7052	60,2090	13,1574	2,5708	0,5783	22,4255	11,1512
3	V2	58,2106	49,8458	12,2043	51,3182	13,7577	1,9010	0,6498	11,9797	9,7748
4	V3	39,9875	59,1963	19,5428	62,3388	18,2699	3,4035	0,5951	28,9091	6,4556
5	V4	28,6080	58,1903	27,1049	64,1934	24,9759	4,9739	0,6002	39,2072	0,0224

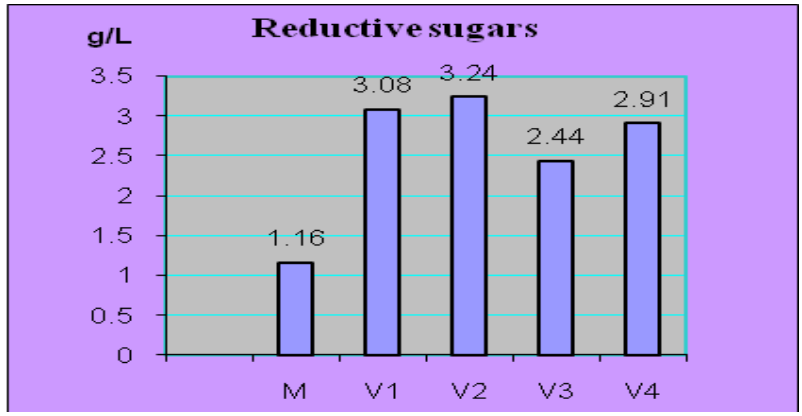

Fig. 2. Reductive sugars content of Băbească neagră wines

In table 3, the chromatic parameter values for the different wines obtained are presented.

Clarity „L" characterizes the more or less „bright" visual aspect of the wine's color and can have values between zero for an opaque black sample to 100 for transparent colorless samples. Therefore, the values of clarity „L" varies between 58,21 in V2 to 28,6 in V4 compared with the control sample(M) 64,5. These values prove the efficacy of microwave maceration, that leads to a better extraction and diffusion of anthocyanic pigments and other compounds found in the skin, avoiding unwanted changes in the taste and odor that can appear in the case of excessive heating specific to thermo-maceration.

The <<a>> component red-green (Tab. 3) of color represents the coordinate of complimentary colors red-green. This parameter frequently has negative values in white wines where green tonalities prevail on red hues and positive values in red wines; it varies from 49,84 in V2 to 59,19 in V3, compared with the control sample(M) 43,97.

The <<b>> component yellow-blue of color represents the coordinate of complimentary colors yellow – blue. This parameter frequently has positives values, with minimum value at V2 12,20.

CONCLUSIONS

The obtained wine samples can be qualified as D O C - CMD, execpt the ROTO-tank maceration sample.

The V4 maceration method (750 W for 30 minutes) has the best chromatic parameters and physical-chemical compositional characteristics in the conditions of 2009 harvest.

The use of a certain maceration-fermentation technology greatly influence the wines'color.

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