ABSTRACT

The main objective of the present study was obtaining data on the optimisation of the production technology of Băbească neagră wines in the Moldova area. The proposed objectives aim for obtaining Băbească neagră wines through different maceration procedures, the characterization and comparison of the wines obtained by the applied technologies in order to establish the optimal technological variant to use to the maximum the oenological potential of the grape variety and on the other side, to establish the influences of the technology, vineyard and climatic conditions on the compositional characteristics of the wines.

For the research, black grapes of Băbească neagră were harvested, during 2009 and 2010 from Iaşi, Dealu-Bujorului, Nicoreşti, Odobeşti and Panciu vineyards. The harvesting was done manually, in wooden containers. The grapes were then transported to the oenology Laboratory of the Horticultural Faculty Iasi. The obtained technological variants are presented below.

CONTROL SAMPLE (M) – classical maceration-fermentation: after crushing and destemming, Fermol® Rouge yeast was added to the must, 30 g/100 kg must. For a better extraction and color stabilization, pectolytical enzymes Endozym® Rouge were added (1,5 g/100 kg must). Maceration–fermentation was done in stainless steel tanks for 120 hours with must pumping over the cap 4 times a day, for 30 minutes. After the end of the maceration-fermentation process, the must and skins were pressed with a hydraulic press and the obtained must was put into stainless steel tanks where the alcoholic and malolactic fermentation took place as well. After the end of the malolactic fermentation, the wine was racked and conditioned according to his quality category. Bottling was done after a previous filtering.

VARIANT 1 (V1) – maceration-fermentation in rotative-tanks: the must and skins, with Fermol® Rouge yeast (30 g/100 kg must) and pectolytical enzymes Endozym® Rouge (1,5 g/100 kg must),were kept in alimentary stainless steel tanks for 72 hours, the homogenization being made by a three times a day, three minutes turn, in order to avoid the forming of the cap. The formed carbonic gas of the fermentation process was eliminated through an overpressure trap, that was opened only when the recipient was in stand-by. The must-wine was set in stainless steel tanks to finish its alcoholic and malolactic fermentation. The following conditioning activities were done in the same way as those from the classical

maceration-fermentation.

VARIANT 2 (V2) – thermomaceration: was done by heating part of the must and skins at 70 °C, for 30 minutes, followed by adding this part to the unheated, previously separated must. After cooling at 20 °C, Fermol® Rouge yeast (30 g/100 kg must) and pectolytical enzymes Endozym® Rouge (1,5 g/100 kg must) were added; the following technological process being identical to that of the control sample. The experiences and the practical activities confirmed that heating of the must and skins at 70 °C, for 15–30 minutes, leads to a better anthocyans extraction and the inactivation of oxidases.

VARIANT 3 (V3) – carbonic maceration: was done without crushing and destemming of the grapes. The healthy and whole grapes were placed in a closed vessel, with a grill situated at 20 cm from the bottom. Under it, must of Băbească neagră with Fermol® Rouge yeast and in full alcoholic fermentation was placed in order to insure the CO_2 atmosphere, necessary for the carbonic maceration. This process ended when the used grapes had a brownish hue and the berries' skins were partially or totally discolored, while the berries were easily crushed. The obtained marc was pressed with a hydraulic press as in the other variants and the obtained wine was conditioned as described above. The working temperature was of 28–30 °C, for 12 days, fact worth mentioning.

VARIANT 4 (V4) – concentrating the color intensity: the grapes were processed as follows: they were crushed and destemmed, then Fermol® Rouge yeast (30 g/100 kg must) were added, and the skins and must were kept in contact for 8 hours, in the presence of pectolytic enzymes Endozym® Rouge (1,5 g/100 kg must), at 12 °C in order to obtain a short maceration; after, 10% of free fall muss was extracted. This quantity was used for the production of a rosé wine. The remained must was used for the technology of concentrating the color intensity (V4) of red Băbească neagră wines, as by extracting 10% of the muss mass, the same quantity of solids remained in contact with a smaller quantity of must. Only in the case of the grapes harvested from Nicoreşti vineyard, which was consider the control vineyard, in order to increase the color intensity, a quantity of 20% of the free fall must was extracted, resulting 2 technologies, noted with V4 a (10% of the must) and V4 b (20% of the must). Later, the technological processes were identical to those of the classical maceration-fermentation.

VARIANT 5 (V5) – ultrasounds maceration: the marc was introduced in an ultrasonic cavity with 2000 W power and an oscillations frequency of 35 kHz for 15 minutes. Only for the wines from Nicoreşti vineyard, a period of 22 minutes for the ultrasound treatment was used, resulting thus two more variants (V5 a = 15 minutes and V5 b = 22

minutes). After the Fermol® Rouge yeast (30 g/100 kg must) and pectolytical enzymes Endozym® Rouge (1,5 g/100 kg must) were added, the same technological process as the ones from the classical maceration-fermentation variants were used.

VARIANT (V6) – microwave maceration: the marc was irradiated at 750 W for 15 minutes. After 30 minutes, the marc reached 20 °C, with the help of a third of unheated marc. After the Fermol® Rouge yeast (30 g/100 kg must) and pectolytical enzymes Endozym® Rouge (1,5 g/100 kg must) were added, the same technological process as the ones from the classical maceration-fermentation variants were used. Also, different irradiation powers and times were used in the case of the marcs from Nicoreşti vineyard, thus resulting the following variants: V6 a = 650 W 10 minutes, V6 b = 650 W 45 minutes , V6 c = 750 W 15 minutes and V6 d = 750 W 30 minutes.

VARIANT (V7) – rosé wine: in order to obtain rosé wine the must extracted from V4 variant was used. Fermol® Primeurs yeasts were added (20 g/100 kg must) and kept in stainless steel tanks for the alcoholic fermentation. After that, the wine was racked, filtered and bottled.

VARIANT (V8) – blanc de noir wines: were obtained by pressing whole grapes with a hydraulic press, work pressure 2 atm, so as the wine does not become full of phenolic compounds. Fermactive® AP yeasts 30 g/100 kg must (without pectolytical enzymes) were added, as to avoid the transfer of tannins and poliphenoloxidases to the must. The alcoholic fermentation was done in stainless steel tanks. During the alcoholic fermentation, the fermentation temperature did not overpass 20 °C. The malolactic fermentation process did not take place, as these wines must have the sensorial characteristics of white wines. The obtained wines were racked and bottled.

The following parameters were analyzed from the obtained wine samples: alcoholic concentration, density, reductive sugars, total dry extract, non reductive extract, volatile acidity, total acidity, pH, phenolic compounds. The color of the wines using the CIE Lab 76 method was also determined, with the help of the chromatic parameters obtained by determining the absorption spectra for each sample. By HPLC, the anthologist' profile was obtained, for each chromatogram identifying and calculating the relative proportions of the following anthocyans: delfinidine-3-monoglicoside (Dp), cyanidine-3-monoglicoside (Cy), petunidine-3-monoglicoside (Pt), peonidine-3-monoglicoside (Po), malvidine-3-monoglicoside (Mv), peonidine-3-monoglicoside acetilate (Po-a), malvidine-3-monoglicoside acetilate (Mv-a), peonidine-3-monoglicoside cumarilate (Po-cm), malvidine-3-monoglicoside cumarilate (Mv-cm). The phenolic acids from the wine samples were quantitatively analyzed

with the HPLC technique (gallic, syringic, p-cumaric acids and resveratrol). Besides all these analyses, a sensorial determination was also done. After a statistical interpretation of the wine-tasting forms, the dominant aroma of Băbească neagră wines is that of cherries.

Analyzing, as a whole, the influence of the technologies on the main physical-chemical parameters, it can be noted that, in decreasing order, the thermomaceration, microwaves maceration, color concentration, rotative-tanks maceration and ultrasounds maceration have a positive effect on the wine's parameters, mainly leading to an increase of the non-reductive extract, anthocyans' content, phenolic compounds content. On a second level, they also lead to higher values of the alcoholic concentration, as well as an equilibration of the sensorial characteristics of the wine, compared to the control sample. The carbonic maceration sample had negative values compared to the control sample, obtained wines with a low alcoholic concentration, low extractivity and a low acidity. The red wines of Băbească neagră have higher values of the extract, anthocyans, total phenolic compounds, phenolic acids compared to the obtained rosé and blanc de noir wines from the same grape variety.

Meritorious results were also found in the maceration in rotative-tanks variants and concentration of color intensity samples, that had values very close to the analysed parameters, with a plus in the case of variant of color concentration concerning the fact that, through extracting 10% of the must, another technology can be done from the same raw matter – rosé wines, diversifying at the same time the wine assortment. The wines obtained by color concentration also had the highest amount of resveratrol. The same technology had a positive influence on the sensorial profile of the wines.

Among the non-conventional technologies used – maceration with microwaves and ultrasounds – the microwave maceration was best, mostly by the color import bought to the wines obtained through this technology.

The obtained results for chromatic parameters of the wines have underlined the influence of the technolgy used on the colour of the wines, fact also seen in the computerised simulation of colour of each wine. Moreover, after calculating the colour differences with the ΔE 2000 formula, a few situations were found where the wines are not different from a sensorial point of view. Therefore, by evaluating these similitudes, the practical side of the technology is noticed, which is the insurance of a consistency in wine colour by choosing the optimal technological variant.

Concerning the possibility of diversifying the wine sort by valorising the oenological potential of Băbească neagră grapes in the direction of creating rosé wines, the physical-chemical parameters of the obtained wines prove the pretability of Băbească neagră variety

for these types of wines.

The production of blanc de noir wines (V8) of Băbească neagră black grapes is applied when the diversification of the wine sorts is wanted, with the following practical aspects: when the grapes have a relatively high quantity in sugars and an acidity that is good for creating quality white wines, fresh and fruity, or, during the years when the grapes do not accumulate a sufficient quantity of color substances.

Comparing the wines from the different vineyards, the classical maceration-fermentation variants are as follows, regarding the global aspect of the main analyzed parameters: the wines from Iaşi, Panciu, Dealu-Bujorului, Odobeşti and Nicoreşti vineyards.

The annual climatic conditions have influenced the analyzed parameters of the wines. The wines produced in 2009 had higher values of the alcoholic concentration, non-reductive extract, phenolic acids, fact due to the superior sugar quantity in grape berries in 2009, compared to the one accumulated in 2010, because of a rainier and chillier year. The aromatic and taste pallet of the wine was much better expressed in the conditions of the year 2009 that 2010.

In order to statistically prove the influence of the technology, of the vineyard and of the production year, the statistic procedure ANOVA was used, mainly the F test (Fisher).

To sum it up regarding anthocyans' profile, one can say that the value of the participation percentage of each anthocyan is a relatively stable parameter that did not vary significantly according to technology and production year, with only one exception in the case of the peonidine-3-monoglicoside anthocyan.

After applying the statistical test ANOVA regarding the influences of technology and production year on the wines' concentration in resveratrol and in phenolic acids, the influence was proved to be significant.

The quantitative evaluation of phenolic acids reflects the influence of the technology applied to Băbească neagră grapes. Therefore, the samples of thermomaceration, microwaves maceration, color concentration, led to an enriching of the wines in phenolic acids, compared to the control sample.