ABSTRACT

The doctoral thesis mainly aims to characterize the wines obtained from grapes of Busuioacă de Bohotin from Pietroasa wine center, Dealu Mare, using various methods of classical and innovative technologies, with emphasis on the fermentation maceration process.

The PhD thesis contains 165 pages, 21 tables, 62 figures and color photographs, the bibliography contains 150 titles and four annex documents.

The paper is structured in two parts. The first part of the book contains the introduction, four chapters that describes the present state of knowledge on the issues addressed, and the second part represents the author's own research, presented in four chapters, including conclusions.

Chapter I - current state of knowledge on culture and oenological potential spread of Busuioacă de Bohotin grape variety, mentioning a few general information about the grape variety and especially about wines produced from it, reviewing the ampelographic characteristics of the variety.

Chapter II – eco-climatic characterization of Pietroasa wine center, in Dealu Mare vineyard, focusing on the climate vocation of Pietroasa wine center for the production of aromatic wines, but also on land suitability and potential of the vineyard where the grapes were harvested . Also in this section the climatic conditions of the viticultural year 2008-2009 are described.

Chapter III – The technologies for the production of rosé and aromatic wines are described briefly: the methods of obtaining a rosé wine, the process of maceration and the factors influencing it, classic technological processes for producing rosé wines (skin maceration and fermentation for various time periods, short skin maceration, carbonic maceration, direct pressing of black grapes) general technological flow of obtaining a rosé wine, fermentation maceration modern techniques used in wine production (cryo-maceration, microwave maceration, ultrasound maceration) general information on the quality of aromatic wines and chromatic characteristics of rosé wines .

Chapter IV - The current state of knowledge regarding phenolic and aromatic compounds in wine summarizing the two chemical classes of specific interest to Busuioacă de Bohotin wines.

In Chapter V are presented the aim an objectives of the study, as follows:

1. Choosing optimal technology for producing rosé wines from the variety of Busuioacă de Bohotin using various methods of wine making and fermentation maceration, taking into consideration the main physical and chemical parameters of wine in the context of Pietroasa wine center, Dealu Mare;

2. Determining the influence of technology on color compounds in wines made from grapes of Busuioacă de Bohotin;

3. Comparative assessment of action of adjuvants on the process of extraction of phenolic compounds forming complex phenolic;

4. Computerized color simulation of relevant studied wines ;

5. Determination of the influence of technology on aroma compounds of wines made from grapes of Busuioacă de Bohotin;

6. Comparative Assessment action aids the process of extracting aromatic aroma compounds forming complex;

7. Evaluation of the loss of flavor of the wine Busuioacă de Bohotin, when the alcoholic fermentation by transferring them to the outside by means of carbon dioxide;

8. Comparison of aroma compounds and color of commercial Busuioacă de Bohotin wines from wine shops, wines from various regions of the country;

9. Comparison of wine aroma compounds studied with the Busuioacă de Bohotin wine, which passed through the operation of maturation in oak barrels;

10. Determination of the optimal technological options for wines made in terms of quality;

Chapter VI presents the material and method. The research covered two stages: first Busuioacă de Bohotin grapes were harvested and were processed, using classical methods at Basilescu Wine Cellar, and some through innovative winemaking methods in the Laboratory Oenology, USAMV IASI. In the second stage, the wines obtained were subjected to analysis in Oenology Laboratory of the Faculty of Horticulture of U.Ş.AMV Iaşi.

As biological material were harvested Busuioacă de Bohotin grapes from vineyards owned by the company La Vie SRL in Pietroasa wine center during autumn 2009 at the technological maturity. Harvest was done manually in boxes of 15 kg carefully in order to preserve the integrity of grapes mainly their typical aromatic substances; the proportion of raisined berries did not exceeded 30% of the grape. The grapes were sorted by hand as to not alter the specific chemical composition of the final wine. In physicochemical analyzes, it was found that wine has a sugar content of 240 g / L and a total acidity of 6 g / L tartaric acid.

Next, the grapes of Busuioacă de Bohotin variety harvested at technological maturity, were processed according to specific steps of producing rosé aromatic wines. The focus was on maceration phase, carried out both by the classical method –skin maceration - and by applying modern methods described below. In relation to the control sample (V0 version - classic maceration), seven experimental versions were established as follows:

- Variant V1 - maceration on the skin with different time durations.
- Variant V2 - classic maceration using different enzyme and yeast .
- Variant V3 - classic maceration and barrel storage.
- Variant V4 - fermentation maceration in rotating tanks
- Version V5 - maceration using microwaves.
- V6 - ultrasound maceration.
- Version V7 - cryomaceration.

To determine the influence of technological processes for maceration of the Busuioacă de Bohotin wine specific analyzes were performed:

• chemical analysis: density, determining alcohol concentration, free and total SO2, volatile acidity, total acidity, reducing sugar concentration and non-reducing dry extract;

• analysis of phenolic compounds: polyphenols index, total anthocyanin content and color determination;

• Analysis of aroma compounds: terpenes, higher alcohols, fatty acids and esters.

Chapter VII presents results from analyzes and discussions on them. Thus, analyzing the physico-chemical characteristics of experimental wines obtained, we can say: total acidity varies between 3,58 g/L $C_4H_6O_6$ in BB MAC. 72 h and 6,03 g/L $C_4H_6O_6$ in BB MAC. 12 h and BB 15 min U samples, while volatile acidity has low values characteristic of healthy wines, the highest being in the cryomacerated sample(0,42 g/L CH_3COOH), decreasing in the control sample(0,21 g/L CH_3COOH) while others register 0,27 g/L CH_3COOH in BB MAC 18h, 0,37 g/L CH_3COOH in BB MAC 72h and 0,39 g/L CH_3COOH in BB MAC 7 days. A longer maceration period influences positively the formation of volatile acids. Analysed samples have an alcoholic content between 12,18% vol. and 16,3% vol. Non-reductive extract is between 19,29 g/L in BB CISTERNE ROTO 24 h and 24,24 g/L in the cryomacerated variant. The innovative technological values have an average of the non-reductive extract of 23,52 g/L, higher by 3,54 g/L than the average of the classical macerated samples (19,96 g/L).

Knowing the anthocyanin profile of wines can establish the grape variety from which the wine was obtained, as to confirm their authenticity and naturalness. There is a limit for authentication based on fingerprint anthocyanins wines; This is because, after 1-2 years of

storage, there are only traces of free anthocyanins, only separated from the wine, which can be determined by HPLC (Ţârdea C., 2007).

By profiling anthocyanins, once can determine the authenticity of rosé wines. During maceration, malvidin (oenidin) diffuses first from the berry skin, followed by other anthocyanins. As a result, it can differentiate rosé wines produced on short maceration way in which oenin dominates from those obtained by blending white wine with the red, requiring a prolonged maceration, allowing diffusion of anthocyanins from skins. (Cotea V. D. ş. a., 2009).

Anthocyanin profile of the wine expresses the percentage of participation of the acylated and free anthocyanins that build up the color. Because during skin maceration and during wine storage, acylated anthocyanins are more stable and resistant to condensation, for profiling anthocyanins the acetylated + coumaryl anthocyanin content as well as the ratio between acetylated/ coumaryl anthocyanins were analyzed. Acylated forms are found in very small quantities and are a characteristic of each species; their values are differentiated according to technology applied. The acetylated and coumaryl forms of peonidin and malvidin were analysed.

The results show that the variety of Busuioacă de Bohotin is characterized by an increased amount of coumaryl anthocyanins , which makes the report acetylated / coumaryl to be below par. This is very important because the ratio of acetylated and coumaryl anthocyanins is considered as an indicator of the typical variety. Moreover, these values are consistent with values recorded in Romanian black grape varieties.

Taking into question phenolic compounds the following were revealed :

- All the wines analyzed, malvidin was found in the highest percentage (40-80%), followed by peonidin, petunidin and delphinidin; regardless of the maceration, cyanidin is found in the lowest proportions (0.2 to 3%);

- The relationship between acetylated and the coumaryl anthocyanins is below par value Busuioacă de Bohotin variety experimental variants;

- The intensely colored sample is obtained by applying rotating maceration in tanks for 24 hours;

- The less intensely colored sample is obtained by applying cryomaceration, which has been shown in other studies in the area (C. Zamfir, 2009 and Sandu Tudose-Ville-S., 2012);

- In terms of the analysis of phenolic compounds in experimental and commercial versions can show that wines made from the variety of Busuioacă de Bohotin in Dealu Mare presents similar values of delphinidin and petunidin, which shows that terroir has the same influence on these color parameters.

The used gas chromatographic method coupled with mass spectrometry identified an average of 28 volatile compounds of commercial Busuioacă de Bohotin wine grouped as follows: nine esters, higher alcohols 8 5 acids, terpenic compounds or derivatives 6. Also butyrolactone was identified, natural compound that is found in correctly processed wines that have not been forged.

Analysis of aroma compounds revealed that:

- Aromatic compounds identified in the Busuioacă de Bohotin wines of experimental variations are influenced both by applying various technologies maceration and oenological substances used;

- maceration period has a positive influence on some of the terpene compounds (Linalool), whereas esters, higher alcohols and acids reach a peak within a certain time after which they decrease;

- Cryomaceration process leads to an increase in the concentration of all the compounds analyzed, which also occurs in the microwave maceration;

- Higher alcohols and fatty acids decrease in samples where ultrasound maceration was performed while the concentration of terpene compounds and esters increases;

- For the maturation of wines in oak casks, esters are subject to major changes qualitative in the sense that most of them are found in 10-fold higher in the sample to be considered a control. Terpene compounds have an inverse dynamic, some of them being 5 times lower in concentration in the sample matured in barrel compared to control;

- In terms of flavor profile, commercial variants of Busuioacă de Bohotin are strongly influenced by the area of origin;

- Losses of 3-methyl-1-butanol and hexanoate were found during fermentation, specific compounds found in general in wines with fruity flavor and, and specific compounds of Busuioacă de Bohotin wine, as ethyl citronellyl, compound that contributes to the scent of rose, classical for this variety.