SUMMARY

This PhD thesis focuses on the topic: “Contributions to the Conditioning Technologies of Cotnari Wines for the Improvement of Stability”.

The paper is structured in two parts: a general presentation and an experimental part of the research.

The general part of the research contains three chapters, which present data and information regarding the general technology to obtain quality white wines, the history and ecosystem of Cotnari winery, as well as some wine conditioning technologies.

The experimental part is made up of five chapters, which present the purpose and objectives of the research, the institutional framework of the research and experiments, the research material and method, the results obtained and their interpretation, as well as the general conclusions.

The first chapter presents the origin, the ampelographic characteristics and the agrobiological and technological value of the four native grape varieties analyzed in this research. Furthermore this chapter also presents the general technology to obtain quality white wines with its specific technological steps, as well as the features of Cotnari wines (Frâncuşă, Fetească albă, Grasă de Cotnari and Tămâioasă românească).

The second chapter presents information regarding the history and natural environment of the winery from Cotnari. Placed at the Northern border of the wine culture, this winery benefits nonetheless from a valuable climate, the native varieties (Frâncuşă, Fetească albă, Grasă de Cotnari and Tămâioasă românească) having perfect conditions so as to determine high productions not only from a quantitative, but also from a qualitative point of view.

The third chapter emphasizes the fact that wines need to be adequately taken care of, so as to be stored for a longer time and have a good evolution in recipients and bottles. It is also in this chapter that the analyzed conditioning technologies are presented, namely: potassium sorbate clearing, tangential flow filtration, gum arabic clearing and cellulose gum clearing.

The fourth chapter presents the purpose and objectives of the research.

The fifth chapter presents the institutional and organizational framework, in which the research and experiments specific to the topic of this paper were conducted.

The sixth chapter presents the main research methods and means, which are among the most modern ones accepted by OIV and which guarantee a safe result. Moreover, the chapter presents the experimental types, which are analyzed in this research.

The seventh chapter presents the results obtained in what regards the main physical and chemical features of wines, as well as very important original data concerning the influence of oenological treatments analyzed in this research upon the flavors of the Cotnari wines.

In the end the general conclusions are presented (eighth chapter), in which the contributions to the conditioning technology of Cotnari wines for the improvement of the stability are summarized.

The main purpose of this research was to emphasize the importance of treatments to condition and stabilize wines and mainly their influence upon the physical and chemical content and the flavor of wines obtained from four native grape varieties: Frâncuşă, Fetească albă, Grasă de Cotnari and Tămâioasă românească (Busuioacă de Moldova) all belonging to the Cotnari winery.

The main objectives of this research were:

- obtaining experimental samples by means of the treatments with potassium sorbate, tangential filtration, gum arabic and cellulose gum on certain wine types taken directly from the industrial flow of the company S.C. Cotnari S.A;

- the physical – chemical analysis (alcohol content, volatile and total acidity, pH, density, reductive sugars, quantity of free and total sulfur dioxide, total dry and non-reductive extract) of the samples obtained as a result of the use of certain treatments during the conditioning stage of wines;

- the quantitative gas – chromatographic analysis of some flavor compounds from the wine varieties Frâncuşă, Fetească albă, Grasă de Cotnari and Tămâioasă românească after conditioning treatments;

- establishing the degree to which certain oenological treatments influence the dynamics of flavor compounds in the wine varieties Frâncuşă, Fetească albă, Grasă de Cotnari and Tămâioasă românească.

The experimental samples were the following:

The variety Frâncuşă

Fr M – new crude wine, before clearing;

Fr V_1- after the treatment with potassium sorbate;

Fr V_2 – after tangential filtration;

Fr V_3- after the treatment with gum arabic;

Fr V_4- after the treatment with cellulose gum CELSTAB® ;

The variety Fetească albă

FA M – new crude wine, before clearing;

FA V_1- after treatment with potassium sorbate;

FA V_2- after tangential filtration;

FA V_3- after treatment with gum arabic;

FA V_4- after treatment with cellulose gum CELSTAB®.

The variety Grasă de Cotnari

Gr M – new crude wine, before clearing;

Gr V_1- after treatment with potassium sorbate;

Gr V_2 – after tangential filtration;

Gr V_3- after treatment with gum arabic;

Gr V_4- after treatment with cellulose gum CELSTAB® ;

The variety Tămâioasă românească

TR M – new crude wine, before clearing;

TR V_1- after treatment with potassium sorbate;

TR V_2- after tangential filtration;

TR V_3- after treatment with gum arabic;

TR V_4 – after treatment with cellulose gum CELSTAB®;

The analysis of the composition features of the wines obtained was conducted throughout the year 2011 at the Oenology Laboratory of the "Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine from Iasi. The physical and chemical analyses were based on the methods presented in the national and international standards, as well as in the specialty literature.

The wine samples thus obtained were subjected to the following physical and chemical analyses:

- alcohol content;
- reductive sugars;
- volatile acidity;
- total acidity;
- pH;
- relative density;
- non-reductive extract;

Beside these general analyses one also determined the volatile compounds by gas – chromatography.

From the analysis of the influence that certain conditioning treatments (potassium sorbate, tangential filtration, gum arabic, cellulose gum) exert upon the main physical and chemical features and upon the concentration of some volatile compounds in the wines obtained from the varieties Frâncușă, Fetească albă, Tămâioasă românească and Grasă de Cotnari, the following variations may be mentioned:

- The alcohol content in wine varieties from the year 2011 has values that range between 11% vol. for the wine obtained from the Frâncușă variety, type Fr V_2, treated using tangential filtration, and 12,0% vol. for the wine obtained from the Tămâioasă românească variety, type TR V_3 treated with gum arabic;
- From the point of view of the residual sugar, following the analysis one obtained values ranging between 1.88 g/L for the wine made of the Frâncușă variety, type FR V1, treated with potassium sorbate, and 3.60 g/L for the wine made of the varieties Frâncușă and Grasă, types FrV_3 and GrV_3 treated with gum arabic;
- The value of the total acidity ranges between 6.90 g/L $C_4H_6O_6$ for the wine obtained from the Fetească albă variety, type FA M and 8.12 g/L $C_4H_6O_6$ for the wine obtained from the Frâncușă variety, type FrV_3, treated with gum arabic; all these values are normal not only considering the varieties analyzed, but also the specific features of the region;
- The pH values range between 3.21 for wines obtained from the Frâncușă variety, types Fr V_3 and Fr V_4, treated with gum arabic and cellulose gum, respectively, and 3.60 for the wine obtained from the Grasă variety, type Gr V_1, following the potassium sorbate treatment;

- The relative density ranges between 0.9936 in wines obtained from the Tămâioasă Românească variety, types TRV_3 and TRV_4 and 0.9950 in the wine obtained from the Frâncușă variety, type FrV_2, after filtration;
- The values of the total dry extract range between 23.7 g/L for Fr M and FA M and 26.3 g/L for Gr V_3, while the non-reductive extract has values ranging between 21.22 g/L for Fr V_1 and 23,10 g/L for Fr V_3.

Wine conditioning treatments determine the modification of the concentrations of aroma compounds, by their absorption of by catalyzing some reactions of forming bigger molecule compounds with a different sensorial mark:

- In case of the wine samples obtained from the Frâncușă variety, the ester with the largest quantity is the diethyl ester of the butanediodic acid, with a slightly fruity aroma of apples and ylang, in the highest concentration in the sample obtained after the gum arabic clearing. (FrV_3 – 1.42 mg);
- The terpenes quantified in the Frâncușă wines were the linalool, with the highest quantity in the FrV_2 sample obtained by tangential flow filtration, i.e. 18.26 µg and the beta-ionone, with the highest concentration in the same sample, i.e. 47.57 µg. The filtration clearing method is indicated when one wants to obtain wines with a strong terpenic touch;
- In case of the wine samples obtained from the Fetească albă variety, the isoamyl acetate, with a strong aroma of bananas and pears, can be found in the highest concentration in the sample obtained by gum arabic treatment, i.e. FAV_3 – 3 mg;
- The results of the quantification of the terpene β-Ionone in case of the wine samples obtained from the Fetească albă variety draw the attention upon the use of conditioning clearing methods, since apart from the control sample, which had no clearing additives, the concentration is below the detection limit of the machine;
- In case of the wine samples obtained from the Grasă de Cotnari variety, the ester ethyl of the hexanoic acid, with a sweet fruity flavor, with hints of apples and bananas, is found in the greatest quantity in the control sample, i.e. 0.2 mg, this variation being present for all quantified esters;
- The fat acids, among which the hexanoic acid was quantified (GC 1 – 1237.649 µg, GC 2 – 775.9732 µg, GC 3 – 621.5503 µg, GC 4 – 935.8955 µg and GC 5-1094.928 µg) do not have a nice smell in concentrations higher than 20 mg/L, the conditioning clearing methods applied determining their decrease in all wine samples analyzed;

- In case of the wine samples obtained from the Tămâioasă românească variety, the ester hexyl of the acetic acid is to be found in the highest concentration in the control sample and the following two samples obtained by potassium sorbate clearing and filtration, decreasing afterwards in the samples with gum arabic additives and cellulose gum additives;
- The conditioning and stabilization treatments obviously influence the quantities of isoamyl acetate: the highest quantity of isoamyl acetate is found in the Grasă de Cotnari sample, cleared with the cellulose gum CELSTAB®, i.e. 4.57 mg/L. The lowest quantity is found in the control sample of the Frâncușă variety, in which no clearing or stabilization method was applied, i.e. 149.35 µg/L.

The lowest quantity of phenethyl alcohol (9.3 mg/L) is found in the Grasa de Cotnari sample cleared with gum arabic, whereas the highest value (24.23 mg/ L) is found in the type Fr 2. The clearing and stabilization methods that maintained a high quantity of phenethyl alcohol are those from type 2, i.e. those after the potassium sorbate clearing.

Following this research one may conclude that it is absolutely necessary for wine to undergo various stabilization treatments so as to maintain the content and sensorial qualities or to eliminate certain flaws.