SUMMARY

The PhD. thesis with the title **"A study into the production technology of Sauvignon Blanc wine in Blaj Viticultural Centre, Târnave Vineyard"** has been elaborated during 2007-2010 within the Wine Research Facility in Blaj and S.C. Promotion Blaj where I work.

The grapes came from vineyards of Sauvignon blanc located on the "Câmpul Libertăţii" vineyard area which is owned by the Wine Research Facility, Blaj. The technological experiments were originaly organized within this facility, and then they were continued at S.C. Promotion Blaj. Current measurements and chemical analyses were carried out in laboratories in the Wine Research Facility, Blaj and S.C. Jidvei.

For determining the varietal flavours of a pyrazinic nature and the thiol aromatic compounds (specific analysis) which give their own typicity to Sauvignon blanc wines, I have collaborated with the Department of Chemistry, University of Auckland, New Zealand, which has the necessary equipment and personnel.

Structure of the thesis. The thesis is structured into two parts, the general part and the experimental part and it has 8 distinct chapters.

The general part includes the first three chapters where I have presented the Wine Research Facility in Blaj and its position within the frame of Tarnave vineyard; the evolution of research on wines in this vineyard; the technological schemes that are used to produce white quality wines.

The experimental part, which is also the most consistent contains 5 chapters. I have presented the aim of the research ant the biological material that I have used; observations and determinations to establish the quality of the grapes; the technological experimented factors; determinations of the varietal flavors which are specific to the variety and to the Savignon blanc wines; the physical-chemical characteristics and the sensorial profile of the obtained Savignon blanc wines.

The paper ends with the general conclusions and the bibliography.

Chapter 1 — presentation of Blaj vineyard Center. Blaj vineyard Center belogs to the Tarnave vineyard and it is situated at the confluence of Târnava Mare and Târnava Mică. The vineyards are located around Blaj and the surrounding villages – Sâncel, Crăciunelul de Jos, Valea Lungă, Cergău and Cenade where there are climatic conditions that are favorable to the development of vine. The area has 490 ha from which Savignon blanc approximately 31 ha.

The environment is represented by a hilly terrain, crossed by the wide valley of the river Târnava Mare. The peaks are extended by gentle slopes and heights of 400-450 m. The vineyards are stationed on the southern slopes, from an altitude of 250-270 m to 400-450 m where there are sufficient light and heat resources for vineyard. The soils for vine that are predominant are the following: entiantroposoil, eutricambosoil and regosoil.

Ecological factors. The average yearly temperature (between 1989-2010) is 10^0C, the duration of real sunburn / vegetation period 1427,4 hour/year and 601,8 mm the rainfall volume. Ecological indicators with synthetic data record values that show favorability for vines: real heliothermal index (RHI) 2,05; hydrothermal coefficient (HC) 1,27, bioclimatic index wine (BIW) 6,82, index of oenoclimatic competency (IOC) 4287,7; index during biological organic wine (IBOW) 10-15.

The ecological vocation of Blaj vineyard Center is represented by production of quality white wines, aromatic wines and sparkling wines.

Chapter 2 — Research on Târnave vineyard wines. The first research started once the Experimental Vineyard for Research and Development was founded in 1946 in Crăciunelul de Jos, the current Wine Research and Development Facility in Blaj. They focused on the study of ripening of the grapes and optimal timing harvesting for obtaining quality wines (Matran C., Popa Ecaterina). Then there came the research on physical-chemical and organoleptic characteristics of wines that reveal the possibility of the vineyard Târnave quality white wines and sparkling wines (Bellu O., Ana Ileana Popa, Buia I).

A milestone was represented by technological research that began with Wine Complex in Jidvei and Wine Complex in Blaj, when there was a switch to the production of Târnave industrial type wines (Paveleanu N., Şuteu C., Buia I.). After 1990 there began research for the production of sparkling wine (Dănoaie Fl., Babeş S., Popa Ana Ileana). In recent years, there have been studies on technological scheme for producing quality white wines (Buia I., Horşia Claudia).

Chapter III — Technological schemes for producing quality white wines. To produce quality white wines, two technological schemes are used in the wine center Blaj: that one from the Research Facility in Blaj which is equipped with equipment manufactured in the years 1975-1985 and the SC Promotion one, which meets the requirements of modern wine-making by

providing the latest equipment. Thus are obtained wines that in addition to wine fermentation aromas also reveal varietal grape flavors, extracted from the prefermentative skin maceration process.

Chapter IV — research objectives and the biological material used. To optimize the technology of Sauvignon Blanc wines was necessary research on:

1. Determination of the optimal timing of raw material and harvesting grapes of Sauvignon blanc from the center of wine Blaj;

2. Streamlining the system of sulfitation of the raw material/processing grapes in order to limit the oxidation processes;

3. Prefermentative skin maceration process optimization of the musting process, to determine the duration needed to improve the aromatic character of the wine;

4. Fermentation of yeast flora of musts with yeast strains selected spontaneously and appropriate to reveal the primary varietal flavors;

5. Determination of aromatic compositions compounds varieties of Sauvignon blanc wines features (vegetal aromas and flavors of pirazinic thiolic nature);

6. Determination of the quality of wines produced by physical and chemical laboratory analysis and organoleptic analysis.

7. Optimization of technological scheme for production of Sauvignon wines in the Wine Center Blaj.

Biological material was represented by Sauvignon Blanc grapes, from existing plantations on Câmpul Libertăţii vineyard, owned by Blaj Wine research Facility.

Chapter V — Studying the quality of the raw materials. The ripening process of the grapes was monitored during the years 2007-2010. There were determined the sugars,the total acidity and weight of grains and the best time to harvest grapes was also set.

The process of maturation of the grapes begins at 14-20 VIII and lasts to 20-30 IX (a total of 35-41 days). There are accumulated amounts of sugars in the grapes between 196 and 210 g/L and total acidity is 4,8 to 5,8 values g/L sulfuric acid. Glucose-acidimetric index to full maturation of the grapes is between 34,7 and 43,7.

Chapter VI — Experienced technological factors. The following technological operations were experimented: antioxidant protection of grapes and musting, prefermantative skin maceration, clarification and wort deburbing before fermentation, enzymatic preparations for clarification and extraction of grape varietal aromas, fermenting wort and yeast strains in spontaneous yeast flora appropriately selected.

The antioxidant protection of grapes and musting, made by applying aqueous solutions of sulfur dioxide concentration of 6% on grapes or must doses used 5-10 g/hl of must. These doses do not affect varietal grape flavors.

Prefermentative skin maceration took place in stainless steel containers over 16-24 hours in 2007-2008, and autovinification thermostat, over 16-32 hours, 2009-2010. Enzyme preparations were used (Lafazym extract) to extract the grain husks and a variety of compounds aromatic compositions specific aroma precursors to Sauvignon Blanc variety.

Managing the process was done by: temperature monitoring and cooling to 14 to 17^0C the must, whenever it imposed, periodic homogenization to facilitate diffusion of compounds flavoring; recirculation of the must to optimize the extraction process.

Clarification and deburbation of the must, comprised four different experimental control variant V 1. Without enzyme preparations and variants V2-V4 with enzyme preparations.

Wine was kept in tanks for 24 hours and deburbed separatedly when 70-80% of burbes were settled. Coarse tailings of the burbing process took place over 10-24 hours. The best results (10-12 hours), have been recorded for versions V2 and V4 for speed Novoclaire enzyme products (doses of 0,5-1 g / hL) and Lallzyme C-Max (doses of 1 g/hL).

Fermenting wort with yeast from spontaneous flora and selected yeast. During 2007-2008, this process took place in stainless steel tanks with temperature control possibility and in 2009-2010 in containers with a capacity of 300 hl, fitted with automatic process monitoring fermentation (cooling jacket, temperature sensors, automatic valves for heating, control panel). We pursued advanced metabolism of sugars to obtain high yield alcohol and the limitation of volatile acidity in wines and achieving a high glycerol content, optimizing the content of volatile thiol compounds responsible for wine aroma typical of the variety Sauvignon Blanc.

In establishing the experimental variants we have used the following selected yeast: Fermactive SB, Fermactive AP, Zymaflore X5 and Vulcaferm aroma. The witness variants have been achieved with yeast from the spontaneous flora.

The process of fermentation was 10 to 14 days depending on the sugar content of wort and strain/strain of yeast used.

Chapter VII — Research on compound varieties specific to Sauvignon blanc aromatic compositions. Sauvignon blanc wine's specific aroma is due to volatile aromatic pirazinic and thiol compounds. The pirazines give the aromas of pepper and green pepper and the thiol compounds are responsible for notes of grapefruit, passion fruit and exotic fruits. The concentration of compound flavor of wine varieties depend on the degree of maturation of the grapes, the ecoclimatic conditions specific to each year and the technological operations applied

to primary vinification. The volatile thiol level decreased significantly in the first period of storage of the young wines. Yeast glutathione released by antioxidant has limited the process.

The Sauvignon varietal aroma compounds determinations were made at the Department of Chemistry, University of Auckland, New Zealand, which has the necessary equipment and methods of analysis. This international collaboration was made in order to deepen research and to bring new contributions.

The pirazinic flavored compounds have been determined from the wines that we obtained in 2007 and 2008 – experimental years. There were 12 variants: V1.1, V1.3, V1.5, V2.1, V2.3, şi V2.5 with yeast from the spontaneous flora, without adding fermenting activators; V1.2, V1.4, V1.6, V2.2, V2.4, V2.6 variants with selected yeast and fermenting activators. The prefermentative skin maceration period varied between 0-24 hours. The analytical methods have been based on a new metoxipirazines automatic extraction technique through HS-SPME (Head Space Solid-Phase Micro-Extraction) and the quantitative determination through gas chromatography associated with mass spectrometry (GC-MS).

We have recorded the following average values: 3-izobutil-2-metoxipirazina (IBMP) 22,9 ng/L şi 3-izopropil-2-metoxipirazina (IPMP) 16,9 ng/L.

The variety of volatile thiols were determined from wines produced in 2007 and 2010, a total of 11 variants. The method is based on the reversible combination with thiol (hidromercurium) sodium benzoate. The complex obtained is attached to an anionic exchange column and then elution is performed with cysteine and extraction with dichloromethane.

The average content of thiol compounds has been the following: 4-mercapto-4-metilpentan-2-one (4MMP) 8,48 ng/L, 3-mercaptohexan-1-ol (3MH) 851,2 ng/L and 3-mercaptohexil acetat (3MHA) 0,35 ng/L.

To optimize the concentrations of volatile aromatic compositions varieties (pirazine and volatile thiols) of wine, we recommend the following:

- 20-24 hours prefermentative skin maceration ;

- usage of Zymaflore X5 and Fermactiv AP yeast to ferment the must;

- maintaining young wine yeastin contact with the initial deposit for preserving flavor, because of the glutathione released from yeast cells.

Optimization technology of Sauvignon blanc wines. Based on investigations we have arrived to the optimization of the technology: harvesting grapes in the index values of glucose-acidimetric 34,7 – 43,7; sulfitation grapes or musting dose of 5-10 g/hL, which does not affect varietal aromas, prefermentative maceration of skin, autovinification machines compulsory for 20-24 hours and use of enzyme preparations Lafazyme type extract, which facilitates extraction of varietal aromas; deburbing wort before fermentation in tanks, thermostats, and separation of

deposit formed when 70-80% of coarse and the burbs were made with the must burbs keep in fine, rich in nitrogenous materials necessary for fermentation yeasts, fermenting wort with yeast strains suitable selected (Zymaflore X5 and Fermactiv AP) keeping young wines for the extraction of glutathione in cell death yeasts, which protects the wine volatile thiols.

Chapter VIII — Physical-chemical characteristics and sensory profile of Sauvignon Blanc wines. The wines we have obtained have been analyzed from a physical-chemical perspective and their sensory profile has been established:

- 2007, 11,8% alcoholic volume, total acidity 5,02 g/L sulfuric acid, volatile acidity 0,25 g/L acetic acid, pH 2,99, reducing sugars 2,0 g /l, 22,4 g/L dry non-reducing extract;

- 2008, 11,4% alcoholic volume, total acidity 4,52 g/L sulfuric acid, volatile acidity 0,33 g/L acetic acid, pH 3,24, reducing sugars 3,5 g/L, 20,1 g/L dry non-reducing extract;

- 2009, 12,6% alcoholic volume, total acidity 3,99 g/L sulfuric acid, volatile acidity 0,29 g/L acetic acid, pH 3,4, reducing sugars 1,9 g/L, 229 g/L dry non-reducing extract;

- 2010, 11,6% alcoholic volume, total acidity 5,16 g/L sulfuric acid, volatile acidity 0,31 g/L acetic acid, pH 3,09, reducing sugars 1,3 g/L , 20,01 g/L dry non-reducing extract.

The sensory profile of the wine is complex, its varietal aromas such as pyrazine and thiol are highlighted. The wines show the typical characteristics of this variety, and are tastefully balanced due to the chemical composition parameters.

The thesis ends with the general conclusions and the bibliography