SUMMARY

of the doctoral thesis entitled

ASPECTS ABOUT CORRELATION OF THE WINES QUALITY WITH A SERIES OF PHYSICO-CHEMICAL PROPERTIES

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This study started from the idea that a remarkable trio of Romanian wines could be the wine varieties of Fetească Neagă, Fetească Albă and Busuioacă de Bohotin (Mândru V., 2018) and that the perception of the common consumerof wine can be subjectived.

These three varieties of local wine, having three different colours (red, white and rosé) and same 2018 year of harvest, were collected from specialty stores. 21 bottled wine samples (8 Fetească Neagră samples, 8 Fetească Albă samples and 5 Busuioacă de Bohotin samples), produced in 6 vineyards (from 4 wine-growing regions) in Romania, were analyzed in laboratory and then evaluated by a panel of 26 tasters.

The purpose of this research was to establish to what extent the microbiological and physico-chemical parameters of wine are important for the common consumer.

The present work is structured in seven chapters, which make up two parts, **Part I** meaning the bibliographic study and **Part II** meaning the own research.

The first part of the doctoral thesis is structured in two chapters and presents the current state of research, as a result of the documentation and study of a series of scientific works from the specialized literature.

The second part is structured in five chapters, presenting the own research carried out, the results obtained following the fulfillment of the objectives of the work and the conclusions of the study.

Thus, chapter I and chapter II are an integral part of the Part I of the doctoral thesis and chapters III-VII are parte of the Part II.

Chapter I, named "*Microbiological, physical and chemical parameters of wine*" presents the current state of knowledge regarding the quality parameters of wine

defined in national and European legislation. It presents the specific analytical determinations of each parameter, the purpose of this determining and how each of them influences the wine quality.

The parameters studied were total germ counting (TGC), yeasts and molds, total sulphite, total acidity, volatile acidity, pH value, tannins, anthocyanins, alcohol concentration, residual sugar and total polyphenols.

Chapter II, named "*Sensory properties of wine*", is a bibliographic research about the common consumer's perception of the specific attributes of each sensorial characteristic regarding wines. Thus, three general sensorial characteristics were identified in the wine tasting process, like visual appearance, olfactory appearance and taste. Two specific attributes have been defined for visual appearance: color intensity and color hue. Three specific attributes were defined for the olfactory aspect: overall aroma, aroma intensity, and aroma quality. And six specific attributes were defined for the taste: acidity, astringency, alcoholic content, smoothness, sourness and harmony. Finally, overall quality was also defined as a global attribute.

Chapter III is the one that opens Part II of the study and is named "*Microbiological and physico-chemical characterization of some wines obtained from three varieties of Romanian grapes*". This chapter presents the 21 local wine samples chosen for this study, the experimental protocol and the analytical methods applied. It was necessary to be organized according to a protocol for the analyzes, that took into account that the microbiological analyzes were carried out first, in order not to accidentally contaminate the samples, and then the physico-chemical analyzes were carried out, which had also an other specific prioritization. For example, the first chemical analysis carried out was the determination of sulphite, in order to be able to determine the entire amount of sulphite and avoid its partial loss immediately after opening the bottle, if other chemical analyzes had been carried out before it. Finally, the obtained results were statistically interpreted for each wine variety.

In the **IV-th chapter**, named "*Adaptation of modern methods for highlighting the presence of sweetening and coloring compounds*" the development and validation of two liquid-chromatographic analysis methods for the identification and quantification of three synthetic sweeteners (aspartame, acesulfame K, saccharin and its salts of Na, K and Ca) and four synthetic colorants (tartrazine, sunset yellow, amaranth and erythrosin) that could be identified in wines. Although useing of these additives in production process of wines is prohibited, the presence of one of the sweeteners was identified in two wine samples.

The **V-th chapter** named "*Sensory analysis of wines*" presents the organoleptic analysis technique through which wine samples were tasted by a panel of 26 tasters who graduated an introductory course of wine tasting techniques. The protocol of wine tasting by colour was applied, for not interfering the aromas and thus the white wines were tasted first, then the rosé wines and finally the red wines (these being generally stronger in aromas). The specific attributes of the sensorial characteristics (previously

presented in chapter II) were evaluated (with grades from 1 to 5) for all wine samples. At the end, the quality overall of each wine sample was evaluated by applying the BLIC technique, representing the sum of four specific wine characteristics: Balance, Length, Intensity and Complexity. The registered results were statistically processed for each variety of wine. The smell was the most appreciated, followed by the visual appearance and then the taste. Also, the Fetească Neagră samples were the most appreciated.

In the **chapter VI**, named "*Correlation of physico-chemical parameters with the sensory properties of wines*", the previously obtained results were statistically processed through three new statistical methods: the Anova-Excel function, principal component analysis (PCA) and partial least squares regression (PLS-DA). Thus it was concluded that the analytical parameters that most influence the consumer's perception are the content in phenolic compounds, the pH and the total content of polyphenols. Also, sulfites and total acidity showed almost no correlation with most of the sensory attributes. These statistical methods are useful in classifying and differentiating wine varieties based on their chemical profiles, which can be useful in quality control and wine marketing.

Chapter VII is named "*General conclusions and recommendations*" and states that the purpose of the research has been achieved.

The wine samples were analyzed in the laboratory by specific methods of wines. In addition, two novel methods based on the liquid-chromatographic technique were developed and validated. It is about the method of identification and quantification of synthetic sweeteners and the method of identification and quantification of synthetic colorants. Both methods have proven specific performance of parameters and can be used to identify possible fraud in the food and wine industry. Also, the sensorial analyses were also carried out through a new method, the EPIC method by which the tasters evaluated the sensory attributes of the wines. Finally, the analytical parameters were correlated with the sensorial attributes at a statistical level, by three methods, two of them beeing new techniques (PCA and PLS-DA).

Recommendations are to develop a study in a single color of wine, choosing a larger number of samples, from more varieties of wine but all of the same colour. First, could be red wines because they have proven to be more apreciated. A second recommendation is to organize the wine tasting with a panel that has a larger number of tasters and more varied in occupational criteria, educational training and cultural origin, in order to be able to provide a study with more relevant results.