

"LUCIAN BLAGA" UNIVERSITY, FROM SIBIU
FACULTY OF AGRICULTURE, FOOD INDUSTRY AND THE
ENVIRONMENT

PHD THESIS
SUMMARY OF THESIS

Scientific Advisor

PhD

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"LUCIAN BLAGA" UNIVERSITY FROM SIBIU
FACULTY OF AGRICULTURE, FOOD INDUSTRY AND THE
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RESEARCH ON THE
TECHNOLOGICAL POTENTIAL OF
PRODUCING QUALITY RED WINE IN
TÂRNAVE VINEYARD

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INTRODUCTION

Preparation of wine and vine cultivation is known from ancient times and is a craft, an art that was practiced by a particular group of people and transmitted from one generation to another, with all its secrets. Wine is produced by alcoholic fermentation of grape must, differing not only more wine aroma, taste and density, especially by chemical composition. It must bear the personality variety of origin and applied technology must preserve the character of naturalness as basic attribute quality characteristics of a wine. Wine is a complex physicochemical, balanced crank, which change over time. In the training phase, the wine can be characterized by physico-chemical analysis, which determine the quality of the wines and their classification. The wine industry in our country, the main task is to define the most rational technologies for producing high quality wines in large blends, homogeneous and stable physical, chemical and microbiological, able to satisfy increasingly consumer demands. To certify the quality of a wine using a complex of different items such as specification of the place of origin, variety, agricultural technique and maximum yield per hectare, its technology and adherence to limits of composition and harmony relationships between components. Outlining criteria for quality wine organoleptic characteristics and compositional concern, physico-chemical and biological stability, naturalness and igienity, origin and authenticity, presentation and submission of consumer sale (Stoian V., 2001, 2007). Equally important are the gusto-olfactory qualities of the wine, its physico-chemical analyzes and other complex analyzes (polyphenol content). Knowledge of the processes taking place in the wine, along with analytical data on physico-chemical composition of a wine, underlying the development of modern winemaking technologies, to obtain wines of different categories and types, especially quality wines with designation of origin. Series of experiments were located on plots of each grape variety in the study, which are relatively close to each other, with the same environmental conditions. Producing wines to satisfy consumer tastes can not be obtained but without rigorous control over the process technology, from raw materials and ending with the finished product - wine.

This thesis is divided into nine chapters, including 208 pages , 12 tables, 131 figures and 92 national and international references.

Thesis title "Research on the technological potential of producing quality red wines in Târnave vineyard" was developed under the leadership of highly competent professional scientific leader Univ. Prof. Dr. Eng. Ovidiu Tița, who became my mentor since faculty and masters, for then to become the scientific coordinator of doctoral studies in the field of Industrial Engineering. The objectives of the paper refers to the study of certain types of red grapes grown in Târnave vineyard, factors influencing their production and the production technology of the finished product – red wine.

I want to thanks all the committee members to assess and support the thesis, for the honor you do me by analyzing the work, and to consent to participate in committee work, thanks to my husband, my parents and my sister for moral support, understanding and peace that I have granted during the three years of study. Also, Ithanks to the management of Jidvei Wine

Complex, for material provided to achieve this thesis and for the opportunity to perform a variety of analyzes, very useful for study completion. I can not conclude without sincerely thanks all those who directly or indirectly supported me in carrying out and completion of the doctoral study.

Keywords – grapes, wine, Jidvei, Sirah, Cabernet Sauvignon, Merlot, Pinot noir.

SCIENTIFIC OBJECTIVES OF THE THESIS

Red wines have a structure more complex than white wines, because of phenolic compounds, which gives them a ruby -red color, softness, astringent taste, extractivity (corpulence), physico-chemical stability and long storage. The study was conducted in 2010-2012, on the red grape varieties Cabernet Sauvignon, Merlot, Pinot noir and Sirah grown in the Târnave vineyard, which is known for white wines they produce, but of 2300 ha of vines vineyard, 53 ha are planted with vineyards producing red grapes (21 ha are planted with Pinot Noir, Cabernet Sauvignon 20 ha, 8,5 ha with Merlot and 3,5 ha with Sirah) . The decision to remove red wine market has been impacted by rising temperatures in Târnave, which resulted in removal of plantation white varieties at higher altitudes, in place of being planted red grape varieties.

Objectives which aimed to achieve its purpose were: paying attention to every red grape variety in the study, analysis of the transformation of the wine and then wine organoleptic analysis and composition of the final product obtained by removing wine market, how it is appreciated by consumers and presenting red/rose wine obtained in national and international competitions, find out the opinion of some experts. The scientific approaches of this paper I intend to develop several variants of red grape processing technology, using different oenological materials and several methods of achieving grape maceration, a process required for achieving quality red wines. This process occurs extraction of color and flavor compounds in grapes feedstock.

In the context of current research, thesis proposes the following scientific objectives:

1. Study of culture frame for red grape varieties in the Târnave vineyard;
2. Study of climate conditions for experimental years 2010-2012, with interpretation of evolution climatic factors that influence the quality of the red grapes;
3. Establishing quality raw material and optimal timing of harvest for red grapes;
4. Study of physico-chemical evolution grapes (Cabernet Sauvignon, Merlot, Pinot noir and Sirah) from Târnave vineyard, in 2010-2012;
5. Study of methods for the maceration-fermentation and factors which affecting the process;
6. Achieving sensory analysis, physico-chemical and microbiological characteristics of red wines obtained;
7. Promotion of new types of quality red wines.

CHAPTER 4

PRACTICAL APPLICATIONS FOR GRAPES HARVESTING, MACERATION OF GRAPE AND PREPARING OF THE MUST FOR FERMENTATION

4.1. Harvesting of red grapes

To establish the optimal timing of commencement of harvest is necessary to follow the dynamics of cooking, which is done by analyzing the phase of the first fruits of grapes at the beginning of May in 5 days, 3 in 3 days, then daily. It is observed mass of 100 grains (g), sugar content (g/l), total acidity (g/l H₂SO₄) and changes the color of grape anthocyanin content (mg/l). Analyses were performed according to the methodology approved OIV under existing regulations in our country.

4.2. The maceration of the must

It is the process through which the extraction of color compounds and their diffusion in the solid phase must. The keeping in contact with the liquid phase of the pulp variety facilitates the diffusion of aroma compounds in wine (Moldovan D., 2009). The operation was carried out in concrete tanks with stainless steel interior and in automatic stainless steel tanks.

4.3. Preparing of the must for fermentation process

Before carrying out the fermentation, red musts be subject to the following:

- must separation without pressing the grapes
- pomace pressing
- grape assembly
- composition corrections
- must clarification.

For the four types of red musts, Sirah, Cabernet Sauvignon, Pinot Noir and Merlot, studied in 2010, 2011 and 2012, the operation of clearing was done in three variants with Enovin color, Enozym Vintage enzyme and without enzyme. Rinse time was determined when 70-80% of rough yeast were made, 20-30% is the remaining fine yeast, which contain suspended substances, rich in nitrogen for yeast in fermentation. The best option turned out was Enovin color enzyme, then Vintage Enozym enzyme, when clarification is achieved in 11 to 13 hours, during fining the must with the dual enzyme (23-24 hours).

4.4. Conclusions

In the three years studied, 2010-2011-2012, although the accumulation of sugars and weight of 100 grains had higher values in 2012, total acidity was the lowest. Year 2012 was an atypical year, with a high content of sugars and low acidity. Year 2010 and 2011 were years very close in terms of quality and quantity. There is made such a great accumulation of sugars and acidity was appropriate, with a good sugar content. Regarding the anthocyanin content of red grapes, the study shows that the highest content of anthocyanins was achieved in 2012, at all four red grape varieties studied. Anthocyanin content showed an upward trend, starting with the first fruits, and during subsequent to technological maturity, anthocyanin content decreased slightly. Picking anthocyanin content ranged from 970-1060 mg/l at Sirah grapes, 1130-1170 mg/l at Cabernet Sauvignon, between 1010-1100 mg/l at Pinot Noir and 1100-1180 mg/l at Merlot variety, the highest value recorded for the 2012 harvest to all varieties. Rich thermal resources and duration of sunshine, resulting in a good biosynthesis of anthocyanins in the grape varieties studied.

Regarding the maceration-fermentation of the must, it can be achieved by several methods, variants used in fermentation- maceration for red wine at S.C. Jidvei S.R.L. in the three years studied are those that include the use of in concrete tanks with stainless steel interior and in automatic stainless steel tanks and steel. The results were good in both cases, red wines obtained are typical corresponding color and pleasing to consumers.

In the three years studied, red grapes were vinified in three different ways, two variants have included the use of tannin, enzyme for extraction, clarification and yeast selected and a variant without exogenous additions. All three variants were found to be good, with the distinction that the musts which have not been added had a long maceration-fermentation and decantation.

CHAPTER 5

PRACTICAL APPLICATIONS ON FERMENTATIVE PROCESSES LEAD TO QUALITY RED WINES IN THE TÂRNAVE VINEYARD

5.1. Alcoholic fermentation of the grape must

For fermenting musts were used two types of yeast selected: Viniform TTA, a spanish yeast with enzyme for maceration and clarification Enovin color and Fermactive Rouge Expression, a yeast from France with Enozym Vintage enzyme. It was also made without yeast and fermented without enzymes for each must, in order to make a comparison. As a general conclusion, it appears that red grapes harvested in 2012 had a higher content of sugars. The musts which fermented with Viniform TTA yeast fermented faster than those containing yeast Fermactive Rouge Expression, a difference of one day. In musts that have made without yeast

fermentation, the process went more difficult, the difference is even 3-4 days and we obtain semi-dry wines.

5.2. Malolactic fermentation of red wine

In Cabernet Sauvignon 2012 wine produced in stainless steel winemaking, malolactic fermentation operation was performed by seeding oak barrels and barique sites has been retained resulting wine with malolactic bacteria *Viniflora Oenos* (*Oenococcus oeni*) from Chr. Hansen. This process was not done before warm wine barrels and barique to 24°C. These bacteria were stored at -18°C. With these malolactic bacteria in red wine was introduced the Actipasa Fast (www.agrovin.com) activator (nutrient) at a dose of 20 g at barique (225 l) and 52 g at barrel (600 l). This nutrient serves facilitate cell proliferation and increase the alcohol yield. After about a month, malolactic fermentation is completed. The same was done with the other red wine produced in the three years studied, respectively Pinot Noir and Merlot. As the Sirah wine malolactic fermentation is not required, it is preferred by consumers fresh. The moment for a malolactic fermentation completed depending on the type of wine and the grape variety from which the wine was produced. This time is influenced by temperature and physico-chemical characteristics of wines (pH, total acidity, high alcohol, free and total SO₂ content). Also, the closing of malolactic fermentation depends on the version of fermentation is spontaneous or directed (with selected lactic bacteria). After malolactic fermentation, the wine from barrels and barique was separated on yeast and was sulphited with 35 mg/l liquid SO₂.

The malolactic fermentation control is carried out by chromatography or thin paper, which is separated, tartaric acid, malic acid and lactic acid from wine. The absence of malic acid in the chromatogram attesting conducting malolactic fermentation in wine.

5.3. The role of yeasts and enzymes in red wines

For red wines studied were used yeast Viniferm TTA (www.agrovin.com) and Fermactive Rouge Expression (www.sodinal.com), but I make a fermentation without selected yeast, also.

The enzymes used in this study are Enovin Color (www.agrovin.com) and Enozym Vintage (www.agrovin.com). Was achieved in this case come solution without enzymes. The ability of enzymes to increase up to 10¹⁴ times the speed of reaction conditions mild action, specificity and the ability to adjust the activity is an advantage.

5.4. Conclusions

For red wine obtaining, we don't ferment the must. We must ferment crushed grapes, including skin, pulp, seeds, because the pigments are contained in grapes and are released by the action resulting alcohol from maceration-fermentation operation. The fermentation can take up to

several weeks, and during this process are released flavors, tannins and dyes, polyphenols and other valuable substances for color and bouquet of the wine. Fermentation at a controlled temperature, usually between 20-28°C is essential for defining the quality of the wine. Only after maceration-fermentation, red wine undergoes pressing operation. Malolactic fermentation is essential for red wine, because when this process is completed, the wines are full, complex and with a complete aroma. The presence of malic acid gives them unpleasant feeling cruel, prints them taste bitter and green nature (Popa A., Tuțulescu F., 2011).

The yeasts and enzymes can significantly influence the flavor of the wine, releasing or altering aromatics of the grape. The enzymes can accelerate biochemical processes, can improve production processes, it can improve the quality of finished products and can increase the degree of diversification. The enzymes give to wine various characteristics, such as fruitiness, freshness and balance. The enzyme studied, Enovin color, achieved the fastest rinsing process must.

CHAPTER 6

DIRECTIONS AND TRENDS IN THE QUALITY RED WINES PRODUCTION, RESULTING IN PRACTICAL ANALYSIS OF RESEARCH

6.1. Expanding plantations which producing red grapes

In the last years, vineyards have enriched clones vine Pinot Noir, raw material for sparkling wine, and the clone for red-ruby wines (Sirah, Merlot, Cabernet Sauvignon, Fetească neagră) with purplish reflexes in youth, wearing grape flavor and a special delicacy, which gives the wine greatness. Thus, at Jidvei, the area covered with vineyards producing red grapes is growing, in part because consumer preferences for red and rosé wines have skyrocketed lately. The climatic conditions, also, allow us to expand plantations producing grape vine tomatoes.

6.2. Planting new varieties of red grapes

Due to climate change that occurred recently at Jidvei, Târnavă vineyard try expanding areas planted with vines producing red grapes, this time, in addition to Pinot Noir, Merlot, Cabernet Sauvignon and Sirah and Fetească neagră. For vine plantations will be used only vines of the varieties recommended and authorized (Popa. A., Dicu C., 2010).

6.3. Promotion of new varieties of red wines

From 2010 harvest were put on the market two types of red wines with geographical indication, Merlot and Pinot noir Negru Vodă, but they were limited edition, because the vineyards producing the grapes were in the early years to fruition. At Jidvei we obtain red wine Crăița Transilvaniei sweet and semi-dry and Perla Transilvaniei.

From Sirah and Cabernet Sauvignon wines, 2011 harvest, was obtained, bottled and put on the market a rose blend, which is called *Mysterium Sirah+Cabernet Sauvignon (50-50%)*. This is the first rose wine made by Jidvei company.

All of these two wines, Sirah and Cabernet Sauvignon, but the 2012 harvest was obtained Sirah and Cabernet Sauvignon NEC range, which was launched a new range of wines, Rose NEC, Sauvignon Blanc NEC and Chardonnay NEC.

In May 2012 it launched a fourth assortment of red wine with geographical indication, type bag in box, at 5 liters and 10 liters.

6.4. Achieving better red wines quality

To diversify the analyzes performed on red grapes from Târnave vineyard and to observe the accumulation of anthocyanins and flavanols better in these grapes, Jidvei company was purchased in 2013 a portable fluorimeter, Multiplex 3, which has an optical sensor and can be used both in vine plantations and in the interior (winery and laboratory). The device can also be used to determine the chlorophyll and the nitrogen from the leaves of the vine, you can prevent some diseases like chlorosis vine, which is manifested by the gradual disappearance of chlorophyll, leaf green becoming yellowish or whitish-yellow. Much of chlorotic leaves dry and fall. Flowers, in such stocks fall as well, and production decreases significantly and vines begin to dry.

6.5. Conclusions

The decision to remove red wine market has been influenced by rising temperatures in Târnave region, which resulted in removal of plantation white varieties at higher altitudes, in place of being planted red grape varieties. Main quality rose wines obtained revolve around the notion of freshness. First, the freshness of flavor: red fruit such as blueberries, raspberries, then freshness temperature: be cooled in ice bucket, to be served at a temperature of 7-8 degrees Celsius. At this temperature, fruity character dominates alcohol warmth. Red grape varieties culture has special features, which are different from white grape varieties. This feature should be taken into account, since portaloiiului choice, in order to grafting and continuing then with the other technological sequence to be applied differently, depending on the cultivar grown and cultured.

In the future, we want a more complex analysis, both producing grape vine tomatoes and their evolution to produce red and rose wines of superior quality. It also provides an expansion of plantations so alive, to have higher production of red grapes and in order to obtain a wider range of quality red wines and rose wine. We computing and collaboration with foreign winemakers, specializing in the production of high quality red wines.

CHAPTER 7

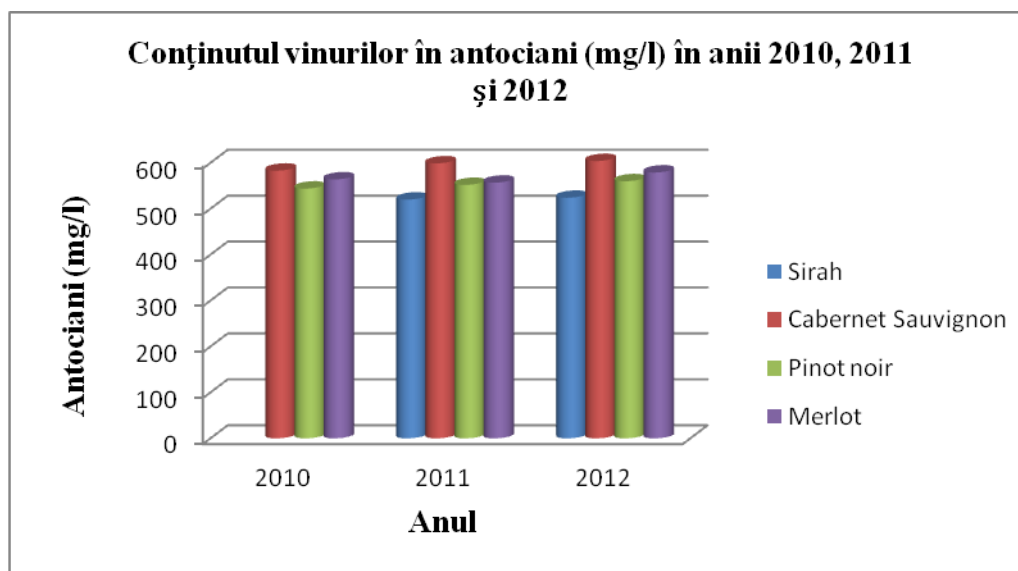
RESULTS OBTAINED IN PRACTICAL ACTIVATION BY IMPLEMENTING FEATURES ON QUALITY RED WINES FROM TÂRNAVE VINEYARD

7.1. The chemical composition of red wines obtained

7.1.1. The determination of phenol compounds

The phenolic compounds participate in the formation of color, taste and aroma of red wines. The amount of phenolic compounds depends on the variety, the annual climatic conditions, soil and agrotechnical factors. The phenolic compounds which accumulate in red grapes are phenolic acids, flavones, flavonols, tannins, anthocyanins and microphenols. The chemical analysis is providing a range of information on the composition, health or strength alterations wine.

Following the survey observed that Cabernet Sauvignon has the highest content of anthocyanins (604 mg/l in 2012).



Regarding the amount of phenolic compounds I can say that red grape varieties studied recovered well enough climatic conditions from Târnavă vineyard, in particular temperature and insolation.

7.1.2. Determination of wine color density

In 2012 the red wines had a more intense color compared to the years 2010 and 2011, because the temperature was higher this year, color compounds being able to accumulate better in raw grapes. The maximum was recorded at Cabernet Sauvignon 2012 harvest (7.21).

7.1.3. Determination of glycerol from the wine

Cabernet Sauvignon wine garnered the highest content of glycerol in all three years studied, the maximum being recorded in 2012 harvest (7.93 g/l), followed by Merlot (7.59 g/l), Sirah (7.35 g/l) and Pinot Noir (7.33 g/l).

7.1.4. The physico-chemical properties of the wine

The physico-chemical properties also contribute to assessing the quality of wines. Their values provide clear information about certain characteristics of a wine, which are essential for quality and authenticity. Wine obtained in experimental period were analyzed physico-chemically by official methods (Țârdea, 1971). Analysis of wines is regularly refers to determining the following parameters: alcoholic strength, total acidity, volatile acidity, extract, sugar content, free and total sulfur dioxide and pH. The equipment used must be calibrated metrological determinations. The results of measurements on the physico-chemical composition and organoleptic characteristics of wine products to be shipped commercially enroll in the analysis (www.onvpv.ro).

7.2. Methods of analysis and control for red wines

7.2.1. Sensory analysis of red wines

Sensory attributes (organoleptic) of a wine is assessed on a visual examination, olfactory and gustatory conducted by a person trained in such assessment. Visual examination involves assessing the color of wine, clarification, general issues of gases (CO₂) and viscosity. By examining olfactory underline wine's bouquet and flavor and any defects smell. Examination of taste is the most complex, but perhaps the most subjective. By the taste buds, but also tactile sensation, are considerations of acidity, sweetness, astringency, extractivity (body wine) and gustatory harmony. The results of this analysis are part of a tasting sheet and a report that can be individually or can be made to a panel of more members. Tasting sheet and report are made as effective HACCP (Hazard Analysis and Critical Control Points). Sensory profile of wine is very complex, highlighting varietal aromas. Red wines obtained revealed specific variety and typicality were balanced harmony of taste due to quality parameters. The following figures are the organoleptic characteristics of the wine profiles for variants analyzed according to the type of yeast used in fermentation. As a general conclusion, it appears that all four red wine, which was made with yeast fermentation Viniferm TTA, fared better and more complex sensory profile. More acidic wines are typical and unctuous. In second place are as quality wines yeast used in fermentation Fermactive Rouge Expression and wines fermented with yeast have a pronounced vegetal character and a little bitterness. Also, fruiting are the same as the other two variants. Specificity varieties was observed in all experimental variants.

7.2.2. Microbiological analysis of red wines

During the development of wine may occur microbiological certain disorders which are caused by yeast, bacteria or fungi. These disorders can alter the composition of wine and compromise its organoleptic quality. Some microorganisms that thrive in wine can cause so-called diseases of wine. Wines can be attacked by some chemical and biochemical factors. Changes caused by them are called faults.

7.3. Study of maturation evolution for red wine from Târnave vineyard

For experiments I using Cabernet Sauvignon grapes of the 2010 harvest. Malolactic fermentation wine was perfect and was briefly conditioning (decanting, filtration). Prior to bottling of the wine was made with the final conditioning of bentonite, followed by sterile filtration. Wine was followed in June by 6 months over a 2 year aging in vessel and one year in bottle, review the following information:

- Aging to ship: 6 months, 1 year, 1 year and 6 months two years;
- Aging in bottle: 6 months, 1 year;
- Aging in vessel (6 months), followed by aging in bottles (six months).

Were used for aging wooden vessels (barrique) oak, with a capacity of 220 liters at a temperature of 10-15°C and humidity of 75-80 % and bottles by 0.75 liter.

a) Evolution of the aging red wine color intensity

Staining intensity decreases during aging in oak barrels, decreasing by 0.024 after 1 year aging oak vessel and 0.21 after two years aging in oak vessel. The color intensity decreases at least in aging wine glass, decreasing by 0.01 after every 6 months of ripening. By aging for 6 months in oak barrels, followed by bottle aging for six months, the intensity decreases by 0.11.

b) Changes in anthocyanin content (mg/l) in aging red wine

Anthocyanins are another class of compounds with an important role for the quality of the red wine. The study observed that anthocyanin content decreases with aging wine.

c) Evolution unreduced extract (g/l) in aging red wine

During aging red wine in oak barrels, drops and unreduced extract, although losses occur and water and alcohol by evaporation. Unreduced extract decreased slightly by aging, decreasing by 1.04 g/l after 1 year aging in oak vessel and 1.79 g/l after two years aging in oak vessel. After aging for 1 year the bottle, the extract unreduced decreased by 0.58 g/l, and after 2 years decreased by 1.01 g/l The aging time of 6 months at oak vessel, followed by aging for 6 months glass drops unreduced extract 1.1 g/l.

d) Changes in polyphenol content (g/l)

Polyphenols content decreases during aging in oak vessel, decreasing by 0.20 g/l after 1 year aging in oak vessel and 0.32 g/l after two years aging in oak vessel . Although the timber vessel comes to an intake of polyphenols, however, over time, the polyphenols content decreases due to precipitation over time (Rădulescu A., 2011). Polyphenols content decreases far less per bottle aging, decreasing steadily to 0.02 g/l after every 6 months of aging. The aging time of 6 months at oak vessel, followed by aging for 6 months glass polyphenols content decreases to 0.13 g/l.

e) The evolution of color tint

The color tint increased by aging wine with 0,130 after two years of aging in oak vessel with 0,014 after two years bottle aging and 0.0393 after aging for 6 months in oak vessel, followed by aging 6 months in bottle. In vessels of wood and glass bottles creates a reducing environment where connections between anthocyanins and tannins aldehyde unfold, and red-purple color disappears. So the increase is due to increased component tint color yellow color against the red component and blue-violet (Rădulescu A., 2011). The conclusion is that the aging of red wines in bottle and in barells was achieved improved organoleptic and chemical composition. The speed and intensity of evolutionary processes were higher during the first year of aging to ship in the first six months of aging in bottle. By aging for 6 months in oak vessel and 6 months in bottle fine wines were made balanced, smooth and round with a pleasant bouquet. After treatment wine with oak alternative products, sensory profile disrupted notable, often favorable, both in smell and taste (Constantin Croitoru, 2012).

7.4. Statistical analysis of quality raw materials parameters according to climatic conditions from Târnavă vineyard

With a special program was made a correlation between the monitored parameters (content of anthocyanins, sugars and weight of 100 grains), in relation to climatic conditions (temperature and humidity) over the three years of study: 2010-2011-2012. Correlation was achieved for the four red grape varieties studied: Sirah, Cabernet Sauvignon, Merlot and Pinot noir.

For Sirah variety has been observed that high levels of anthocyanins are subject to high temperatures and low humidity, and the weight is higher in years with lower temperatures and higher relative humidity. Values are higher sugars years precipitation levels and low temperatures and high relative humidity. The acidity is high in rainfall years and high relative humidity.

For Cabernet Sauvignon, high levels of anthocyanins are subject to high temperatures and humidity. The weight is greater in the year with lower temperature and relative humidity. The

sugars values are higher in years with lower temperatures and levels of rainfall and high relative humidity. The acidity is high in rainfall years and higher relative humidity and low temperatures.

For Merlot, high levels of anthocyanins are subject to high temperatures and humidity. Weight and sugars are higher in years with lower temperatures and relative humidity. The acidity is high in rainfall years and higher relative humidity and low temperatures.

For Pinot noir, high levels of anthocyanins are subject to high temperatures and humidity. The weight and sugar content are higher in years with reduced temperatures, with the difference that the weight is positively influenced by higher levels of rain and humidity, while the values sugar levels are higher in low humidity and precipitation. The acidity is high in rainfall years and higher relative humidity and low temperatures.

7.5. Red wine sales growth

Over the years, there has been an increase in Jidvei wines sales, produced in the heart of Transylvania (red and rose wine) and rose sparkling wine produced here. Over 50% of company sales Jidvei menus in HoReCa (hotels, restaurants, cafes), the difference going into retail (selling piece by piece).

7.6. Conclusions

The condition that must be met for a wine to be put on the market and more to be appreciated and purchased by consumers is to comply with all quality requirements and also to pass that rigorous control includes the results of physico-chemical and microbiological, results from Jidvei manufacturer, because the values recorded in the three years under study are within the optimal red wines and rose wines. The red wines produced must be appropriate physico-chemical composition and sensory and microbiological analysis to observe (to be free of yeast, bacteria and fungi), have a market as large and as strong graduation. Very important is the participation of red wines obtained at national and international competitions, for find out the opinions of other experts.

Sensory profile of red wines obtained, conducted by specialized persons is more complex wines that alcoholic fermentation was performed using selected yeasts. Red wines produced in Târnavă vineyard lends itself to aging and becoming more rounded, fuller, soft and with a bunch of aging complex.

Regarding selling of red wines, rose wines and sparkling rose over the three years studied, there was a fairly large increase in domestic and foreign market. Jidvei company has a sound financial basis, exports increased steadily and wine consumption remained at high levels (www.wineromania.com).

CHAPTER 8

FINAL CONCLUSIONS AND RECOMENDATIONS

By applying appropriate technologies work can get red wine with a deep red color, fresh flavor, personality and typical variety, extractivity, harmony, taste, hardness and lack of bitterness and rich component effect on the consumer. Choosing the proper wine system, the working parameters and treatments applied can improve the quality of red wines from the Târnave vineyard. However, we must not forget that the aging potential of a wine red color and other contributing factors such as the nature of the soil, vine age, yield, harvest date and method of vinification.

At red wines, a very important role it has color. For red wines studied, the color is quite intense, the higher color intensity has Cabernet Sauvignon 2012, followed by Merlot 2012, Pinot Noir 2012 and Sirah 2012. Moreover, we can say that even in years less favorable, the red wines from Târnave vineyard ensure their needs extract, which allows an appropriate balance and provides expendability. Red wine, in addition to its intense flavor, help and health. Rich in sugars, organic acids, glycerol, phenolic compounds, amino acids, vitamins - A, B1, B2, PP and minerals, provides great nourishment for the human body and mineralizing. Therefore, the wine was recommended even by doctors for its anemic, uplifting, refreshing and energizing. Meanwhile, red wine lowers cholesterol, protect the heart, controls blood sugar levels, improves brain capacity, prevents colds, stops the cancer and help you lose weight, but this only if drank in moderation.

The quality and characteristics of red wines from Târnave vineyard essentially due to growing conditions of the grapes, the geographical environment with its inherent natural and human factors. Cabernet Sauvignon, Merlot, Pinot noir and Sirah from Târnave have found a second home. Regarding the amount of phenolic compounds can say that red grape varieties studied recovered well enough climatic conditions Târnave vineyard, in particular temperature and insolation, thus obtaining red wines rich in phenolic compounds, which gives a characteristic color wines. Also, the analysis of these types of red wines studied, is within normal limits (Mărginean C., 2014).

The study is valuable for fundamental research, the data obtained can be benchmarks for new experiments or to establish efficient processing conditions in the wine industry to achieve quality and stability of finished products in accordance with modern quality standards. Interpretation of results in terms of technology indicated that the Târnave vineyard can produces red wines designation of origin and quality levels. The wines are typical of the variety show typicity balanced taste, because the harmony of chemical composition parameters. Also, wines suitable for aging, which helps their finishing.

Due to competition between countries which producing red wines, Târnave vineyard has focused on sensory typicality and authenticity red wines. The results constitute a starting point

for further research, bringing new solutions to alcoholic fermentation and malolactic fermentation, conditioning, stabilization, bottling and preserving these wines.

Personal contributions

Research on the technological potential of producing red wines in Târnavă vineyard were made during 2010-2011-2012 years. Achieving the goals of this thesis was made possible by a large accumulation of information from the literature, but primarily by a large number of experimental determinations made at Jidvei Wine Complex and at other approved laboratories. In this sense we can define the following individual contributions:

- Study of natural factors from Târnavă vineyard: geographic location, terrain, soil, exhibition
- Study of climatic conditions during research 2010-2011-2012 years
- The physico-chemical analysis and anthocyanin content, during ripening grapes Cabernet Sauvignon, Pinot noir, Merlot and Sirah in the study
- Establish full maturity, phenolic maturity and optimal timing of harvesting grapes to produce red wines
- Study of fermentation- maceration operation, basic operation of the process for obtain red wine
- Study of rinsing operation with and without the addition of enzyme
- Study the fermentation operation with and without the addition of yeast selected
- Study of the evolution of red wine during maturation and aging in bottle and barrique
- Physico-chemical and sensory evaluation of red wines obtained by several methods.

Future research

- Studies in this paper can be extended and other red grape varieties (Fetească neagră) and other types of red wine and rose wines.
- Chemical analyzes can be extended in other directions, especially to identify heavy metals in soil microbiology, etc.
- Participation rose wines and red wines obtained at national and international competitions, for find out the opinion of other specialists.
- Improved export structure, with emphasis on red wines and rose wines.
- The trend is to provide more complete database, which contains as many parameters monitored, as long a period of time.

CHAPTER 9**SCIENTIFIC ACTIVITY**

1. Mărginean Maria Cosmina, Tana Maria Cristina, Tița Ovidiu, Ecaterina Lengyel, "Diseases and defects of wine. Contagion", Jubilee International Conference "Agricultural and Food Sciences, Processes and Technologies" Sibiu, 10 December, 2010
2. Tana Maria Cristina, Mărginean Maria Cosmina, Tița Ovidiu, Ecaterina Lengyel, "Characteristics of the composition of the raw material wine from Jidvei Center -Târnave vineyard ", Jubilee International Conference "Agricultural and Food Sciences, Processes and Technologies" Sibiu, 10 December, 2010
3. Ecaterina Lengyel, Alina Diana Hanc, Petros Carmen, Alina Ramba Mihaela, Mihai Șandru-Dovleac, Maria Cosmina Mărginean, Maria Cristina Tana, Ovidiu Tița, "Wine-natural food", International Conference Agricultural and Food Sciences, Processes and Technologies, ISBN 978-606-12-0068-9, 85-90, 2010
4. Mărginean Maria Cosmina, Tana Maria Cristina, Tița Ovidiu, "Wine maturing in oak barells", The 10th International Symposium Prospects for the 3rd Millennium Agriculture, Cluj Napoca, 29 September – 1 October, 2011
5. Mărginean Maria Cosmina, Tana Maria Cristina, Tița Ovidiu, "Climatic conditions in 2009 and 2010 years", The 2nd International Conference on Food Chemistry, Engineering & Technology, Timișoara 2011
6. Mărginean Maria Cosmina, Tana Maria Cristina, Tița Ovidiu, "Clarification of the must by flotation", The 7th International Conference "Integrated Systems for Agri-food Production" (SIPA '11), Nyíregyháza - Hungary, November 2011
7. Eniko Gaspar, Letiția Oprean, Andreea Ilas, Mihaela Păun, Alina Popa, Roxana Tufeanu, Cristina Maria Tana, Cosmina Maria Mărginean, Ecaterina Lengyel, "The influence of starter cultures of yeast over wine quality ", International Conference Agricultural and Food Sciences, Processes and Technologies, ISBN 978-606-12-0068 - 9, 99-104, 2010
8. Tana Maria Cristina, Mărginean Maria Cosmina, Tița Ovidiu, "Implementation of maceration techniques for Muscat Ottonel", The 10th International Symposium Prospects for the 3rd Millennium Agriculture, Cluj Napoca, 29 September – 1 October, 2011
9. Tana Maria Cristina, Mărginean Maria Cosmina, Tița Ovidiu, "The evolution of wines during maturation, in the wine center Jidvei – Târnave vineyard", The 2nd International Conference on Food Chemistry, Engineering & Technology, Timișoara 2011

10. Tana Maria Cristina, Mărginean Maria Cosmina, Tița Ovidiu, "Assortment of quality wines in Târnave vineyard", The 7th International Conference "Integrated Systems for Agri-food Production" (SIPA '11), Nyíregyháza - Hungary, November 2011
11. Mărginean Maria Cosmina, Tana Maria Cristina, Tița Ovidiu, "Maturation of red grapes (Cabernet Sauvignon and Pinot noir) from Târnave vineyard in 2010 and 2011", The Conference Agri-Food Sciences, Processes and Technologies, Sibiu, 10-12 May, 2012
12. Tana Maria Cristina, Mărginean Maria Cosmina, Tița Ovidiu, "The evolution of composition for aromatic grape varieties and wine from Jidvei center – Târnave vineyard", The Conference Agri-Food Sciences, Processes and Technologies, Sibiu, 10-12 May 2012
13. Mărginean Maria Cosmina, Tana Maria Cristina, Adriana Mihaela Tița, Ovidiu Tita, "Characteristics of the composition of Cabernet Sauvignon and Pinot noir wine, from Târnave vineyard, in 2010-2011 years", IC-ANMBES Brasov Conference, 24-27 May, 2012
14. Mărginean Maria Cosmina, Tana Maria Cristina, Adriana Mihaela Tița, Ovidiu Tita, "Characterization of aromatic wines from Târnave vineyard, in 2010 and 2011years", IC-ANMBES Braşov Conference, 24-27 May, 2012
15. Mărginean Maria Cosmina, Tana Maria Cristina, Tița Ovidiu, "The accumulation of phenolic compounds in red wines and white wines, in 2010-2011 years", International Symposium of Science, Iași, 8 September, 2012
16. Mărginean Maria Cosmina, Tița Ovidiu, "The influence of climatic conditions on grapes, in 2009-2010 years," ULB Sibiu 2012
17. Mărginean Maria Cosmina, Tana Maria Cristina, Tița Ovidiu, "Soil characteristics in Târnave vineyard", 13th International Multidisciplinary Scientific GeoConference SGEM Bulgaria, June 2013
18. Tana Maria Cristina, Mărginean Maria Cosmina, Tița Ovidiu, "The characterization of agrochemical soil from Târnave vineyard", 13th International Multidisciplinary Scientific GeoConference SGEM Bulgaria, June 2013
19. Mărginean Maria Cosmina, Tana Maria Cristina, Tița Ovidiu, Tița Adriana Mihaela, "The phenolic content of red wines from Târnave vineyard, in 2010-2011-2012 years", BIOATLAS Conference Braşov, May 2014
20. Tana Maria Cristina, Mărginean Maria Cosmina, Tița Ovidiu, Tița Adriana Mihaela, "Research on optimizing the production technology of ice-wine at the Târnave vineyard, Jidvei Wine Center", BIOATLAS Braşov Conference, May 2014.

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APPENDIX

List of Appendix

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