Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 21, Issue 1, 2021
PRINT ISSN 2284-7995, E-ISSN 2285-3952

DYNAMICS OF RED WINES QUALITY OBTAINED WITHIN THE COMPANY S.C. MURFATLAR ROMANIA S.A. IN THE PERIOD 2017-2019

Cecilia NEAGU, Radu Andrei IOVA, Daniela CREȚU

University of Agronomic Sciences and Veterinary Medicine of Bucharest, Călăraşi Faculty Branch, 1 Nicolae Titulescu, Călăraşi, Romania. Emails: cecilianeagu2005@yahoo.com, andrei_anglia@yahoo.com, danielacretu5@yahoo.com

Corresponding author: cecilianeagu2005@yahoo.com

Abstract

In order to determine the dynamics of the red wines quality produced within S.C. Murfatlar Romania SA, we performed an analysis of the main physical chemical parameters with an essential role in the quality of wines, namely: alcohol concentration %, free sugar g/l, total acidity g/l $C_4H_6O_6$, non-reducing dry extract g/l, total sulphur dioxide g/l. The analysis regarding the main physical, chemical and organoleptic parameters (colour, smell, taste, texture, balance) responsible for the quality of the wine was performed during the last 3 years (2017-2019) for 12 samples of red wine obtained within the company. The main physical chemical parameters responsible for the quality of the wines, respectively the alcoholic strength, and the total acidity recorded a positive evolution for the analyzed red wines. In terms of organoleptic analysis, all four wines proved to be particularly extractive, with a strong bouquet, balanced and with special flavours. All the analyzed parameters were within the limits imposed by the International Organization of Vine and Wine (OIV) during the studied period.

Key words: *alcoholic strength, physical-chemical parameters, quality, red wines, total acidity*

INTRODUCTION

The wine quality is a subjective term, with different meanings, depending on the context in which it is used. The perceived quality is a reflection of the chemical composition of the wine, when it is consumed [1, 5, 11].

The qualitative diversity of wines, determined mainly by the areas where the vines are grown as well as the diversity of varieties, led each wine-growing country to adopt its own wine classification systems. High quality wines are obtained from wine varieties with superior technological properties, cultivated in delimited wine-growing areas [4]. In Romania, the classification criteria are: alcohol content, quality characteristics determined by the physical chemical composition and the obtaining technology, all provided in the Law on Vine and Wine [9]. The highest quality category of wines is that of wines with a controlled origin name and quality steps (DOC) [6].

Specialists in the field unanimously agree that a high quality wine is the wine that best expresses the terroir of which it is part [4]. Terroir is a concept that concentrates all the peculiarities of a wine area, such as soil, climate, environment, geographical position, but also the traditions of that area. Thus, the terroir plays an important role in obtaining a high quality wine, as the wine takes from it unique elements that cannot be duplicated anywhere in the world [12].

MATERIALS AND METHODS

Terroir of Murfatlar vineyard is characterized by arid soils with visibly calcareous sub-layers, by an excessive continental climate, with hot summers and long, sunny autumns, with rich heliothermal resources. The rain regime is deficient (less than 400 l/m2), distributed mainly in spring and autumn, this ensuring a uniform ripening of the grapes, sometimes even their maturation with the help of pathogenic fungi (Botrytis cinerea var-nobilis) which causes an over-concentration of sugar in grapes, essential for obtaining high quality wines [2].

Consequently, the imprint of the rich, generous and unique terroir of Murfatlar vineyard is transmitted to the wines obtained within the company, resulting in the case of

red wines - particularly extractive wines, with intense aromas and colors, by aging developing a strong bouquet.

The assortment structure of the company currently includes about 200 varieties, in proportion of 30% red varieties (Feteasc Neagr, Cabernet Sauvignon, Merlot, Pinot Noir, etc.), 65% white wines (Chardonnay, Sauvignon Blanc, Muscat Ottonel, Riesling Italian, etc.), and 5% pink varieties.

The present study aims to analyze the dynamics of the qualitative parameters of red wines obtained within the company Murfatlar Romania S.A. during the last 3 years.

We performed an analysis of their physical chemical and organoleptic characteristics, during the last 3 years, the analysis being performed based on the data collected from the analysis bulletins provided by the company S.C. Murfatlar S.A. Romania. The 12 samples were: 3 samples of Feteasc Neagr wine from Arezan collection, 3 samples of Merlot wine from Leat 6500 The Origin collection, 3 samples of Cabernet Saugvinon wine from Zestrea Murfatlar collection, 3 samples of Pinot Noir wine ennobled with Merlot from Zestrea Murfatlar collection.

The physical chemical characteristics analyzed for each wine were: alcoholic concentration%, free sugar g/l, total acidity g/l $C_4H_6O_6$, non-reducing extract g/l, total SO_2 mg/l.

The organoleptic characteristics that formed the basis of this analysis were: the color, smell, taste, texture and balance of the wines, based on which we also achieved the olfactory and gustatory profile of the analyzed red wines.

We looked if the qualitative parameters of this type of wine were within the limits imposed by the International Organization of Vine and Wine (OIV) during the studied period.

RESULTS AND DISCUSSIONS

The values of physical-chemical parameters responsible for the quality of red wines showed in the period 2017-2019 the following values [10]:

Table 1. Physical-chemical parameters of red wines produced within S.C. Murfatlar Romania S.A. in the period 2017-2019

No. sample	Year	Physical-chemical parameters				
		Free sugar (g/l)	Alcohol vol (%)	Total acidity (g/l $C_4H_6O_6$)	SO2 total mg/l	Non reducing dry extract (g/l)
Red wine Feteasc Neagr – Collection Leat 6500 The Origin						
1	2017	23.9	12.00	5.48	115	23.50
2	2018	26.2	12.70	6.60	156	30.20
3	2019	22.4	12.50	5.90	179	33.20
Red wine Cabernet Sauvignon –Collection Leat 6500 The Origin						
4	2017	9.70	12.20	5.32	149	26.00
5	2018	9.00	12.50	5.89	151	25.60
6	2019	8.90	12.70	5.32	169	27.30
Red wine Merlot – Collection Zestrea Murfatlar						
7	2017	9.30	12.20	5.39	159	26.00
8	2018	9.00	12.60	5.53	165	25.80
9	2019	11.0	12.40	5.80	158	25.20
Red wine Pinot Noir ennobled with Merlot – Collection Premiat						
10	2017	29.0	11.80	6.10	172	27.10
11	2018	27.2	12.20	6.43	174	28.90
12	2019	29.5	12.20	6.50	136	26.90

Source: The analysis bulletins of S.C. Murfatlar Romania S.A. [10].

From Table 1, we find out that in the period 2017-2019, most physical-chemical parameters of red wines have changed.

The dynamics of sugar free of the 4 red wines is presented in Fig.1.

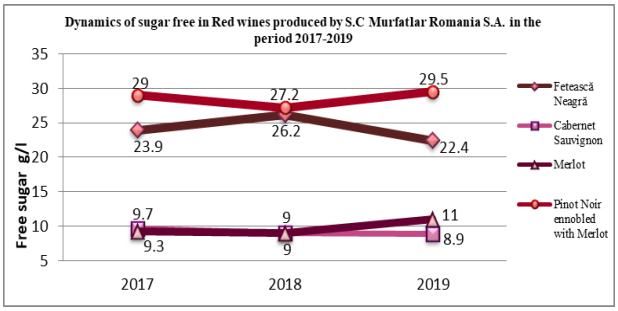

Fig. 1. Dynamics of sugar free in Red wines produced by S.C. Murfatlar Romnia S.A. in the period 2017-2019 [10]

Source: own design [10].

As we can see from Figure 1, the free sugar content varied for each red wine analyzed, as follows: Merlot and Pinot Noir wines ennobled with Merlot recorded in 2019 compared to the first year studied increases by up to 18.27%, respectively 1, 72%, while Cabernet Saugvinon and Feteasc wines had a negative evolution, decreasing by 8.24% and 6.27% respectively.

The increase of the free sugar content in Merlot and Pinot Noir wines ennobled with Merlot is motivated by the use of a modern

vinification technique, opting for the fermentation of wines in egg-shape cement amphorae, these giving the 2 wines superior quality characteristics, compared to Cabernet Saugvinon and Fetească Neagră wines, in which the fermentation took place in steel tanks. Amphorae are made of cement, having an egg shape, among the famous wine producers that use this model of amphorae are Pontet Canet, Chateau Lafite and Chapoutier [1].

Depending on the accumulated free sugar content, the 4 wines analyzed are classified as follows: Cabernet Saugvinon wines, Merlot-semi-dry wines, Fetească Neagră wines, Pinot Noir ennobled with Merlot-semi-sweet wines.

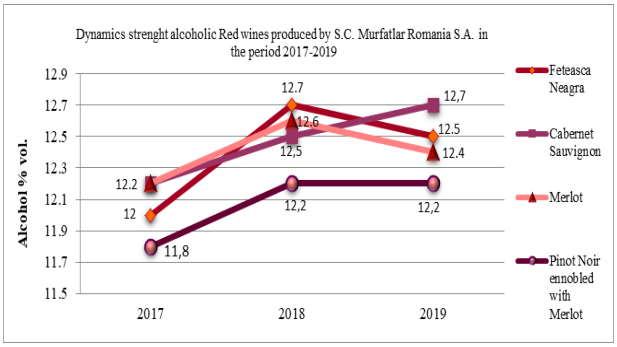

Fig. 2.Dynamics of alcohol strength of red wines produced by S.C. Murfatlar Romania S.A. in the period 2017-2019
Source: own design [10].

We note that in 2019 comparatively to the first year studied, all four analyzed wines recorded a slight increase of alcohol strength, at least over 4%.

The content of sugar and alcohol strength moderates the wines acidity, offering them a balance [7].

As we can see from Figure 3, the total acidity of Merlot and Pinot Noir wines ennobled with Merlot recorded a positive evolution throughout the studied period, with an average annual increase of over 5.9%. The factors that contributed to these increases are the treatment of cement amphorae in which the wines were vinified, with tartaric acid solutions before use, as well as the particularities of Merlot grapes from which both wines were made, which have a higher content of annual tartaric acid.

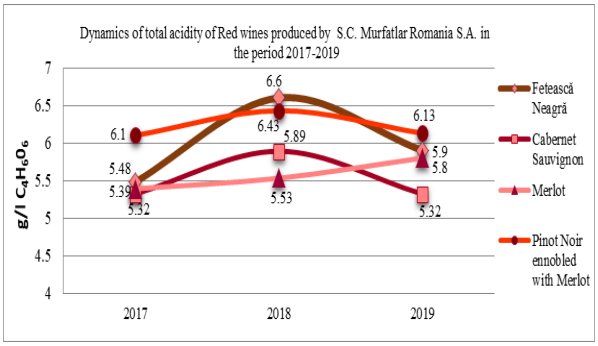

Fig. 3. Dynamics of total acidity of red wined produced by S.C. Murfatlar Romania S.A. in the period 2017-2019
Source: own design [10].

In contrast, in 2019, Cabernet Saugvinon and Fetească Neagră wines recorded a decrease in the value of total acidity by up to 9.68% and 10.6% compared to the values of total acidity in the previous year, as acidity corrections were made by refrigerating the wine, adding K_2HPO_4 solutions as well as SO_2.

Sulphur dioxide prevents the disease of the wine and improves the quality of the wines, keeping their freshness of aromas and color, participating in the formation of the wine bouquet [8].

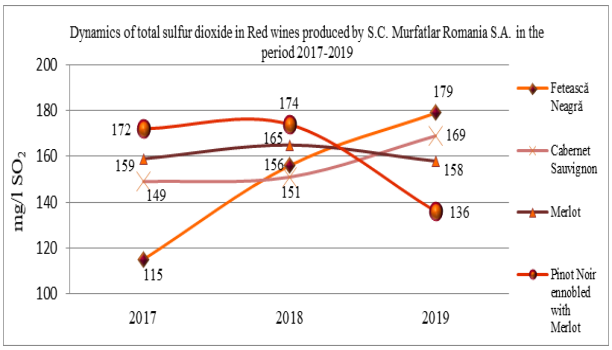

Fig. 4. Dynamics of sulphur dioxide of red wines produced by S.C. Murfatlar Romania S.A. in the period 2017-2019
Source: own design [10].

Regarding the evolution of sulphur dioxide of the 4 wines analyzed, we find that in 2019, compared to the first year studied in the case of Fetească Neagră and Cabernet Saugvinon wines, there were increases of 55.65% and 13.42%, respectively, these increases have as main causes the addition of SO2 in order to correct the acidity of the 2 wines, in the clarification operations but also to prevent possible defects. In the case of Merlot wine, the amount of sulphurous anhydride decreased

slightly by 0.63%, while Pinot Noir wine ennobled with Merlot decreased by up to 20.9% during the same period. These decreases are explained by maintaining the 2 wines at an adequate temperature of 18^0C for both maceration and alcoholic fermentation, by triggering malolactic fermentation with the sowing of selected lactic acid bacteria, and by the use of cement amphorae, as they were made without chemical additives, from washed sand from Loire Valley, gravel, non-chlorinated water and cement, unfinished inside for better antimicrobial and bacteriological control, thus reducing the need for SO_2, in order to treat any defects of the 2 wines.

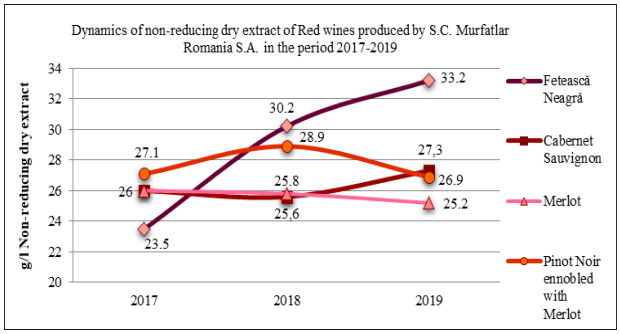

Fig. 5. Dynamics of non-reducing dry extract of red wines produced by S.C. Murfatlar Romania S.A. in the period 2017-2019
Source: own design [10].

The non-reducing dry extract of the 4 red wines showed a positive evolution in 2019 compared to the first year studied for Fetească Neagră and Cabernet Saugvinon wines, which increased by 41.2% and 5%, respectively, due to a long maceration at a temperature of 10^0C, while Merlot and Pinot Noir wines ennobled with Merlot recorded slight decreases, of 0.8%, finding that the use of a modern vinification technology can sometimes have as a side effect a slight decrease of the non-reducing dry extract.
The most extractive of the 4 wines studied were the wines Fetească Neagră and Pinot Noir ennobled with Merlot.
Based on the data provided by the analysis bulletins, we made the taste and olfactory profile for each wine.
The organoleptic characteristics of *Fetească Neagră wine* are presented in Fig.6.

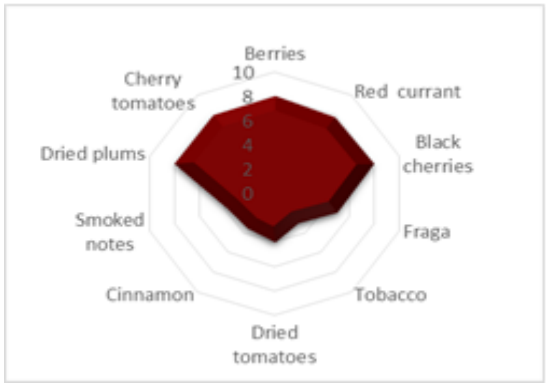

Fig. 6. Olfactory profile of Feteascã Neagrã wine in Arezan collection - S.C. Murfatlar Romania S.A.
Source: own design [10].

Feteasca Neagră wine, with a deep ruby red color, is a wine as expressive as it is soft. Scented with intense and compact aromas, it evolves gently in clean and refined notes represented by a symphony of sensations of red berries, dried plums, black cherries, red and strawberry currants, tobacco, sun-dried tomatoes, cinnamon and smoky notes. Initially shy and tense, it then looks complex and with a remarkable personality, resulting in perfect concordance with the olfactory picture.

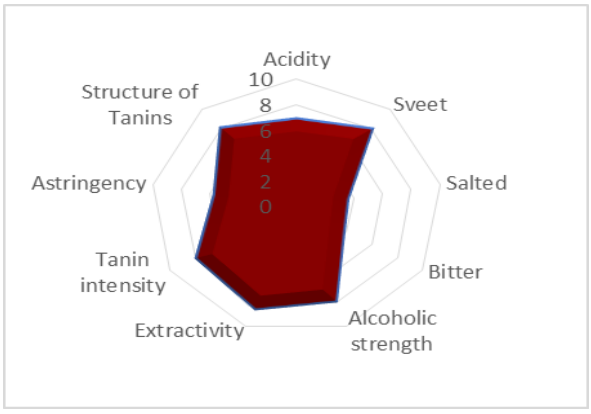

Fig.7. Taste profile of Fetească Neagră wine in Arezan collection - S.C. Murfatlar Romania S.A.
Source: own design [10].

Tasteful, it arouses a true admiration of elegance to its tannins, extremely fine and well defined, along with the generous extraction of fruit and an acidity in perfect harmony with the structure of this wine, woven as if by hand, with a velvety and balanced body accompanied by lively notes of spice and characterized by an optimal

persistence, robbing us for a long time of the thought dedicated to its taste [3].
The organoleptic characteristics *of Cabernet Saugvinon wine* are presented in Fig. 8.

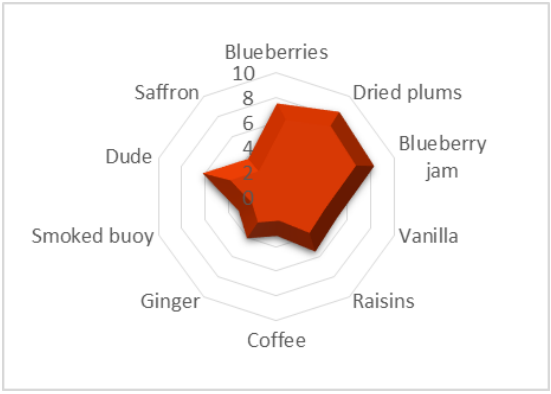

Fig. 8. Olfactory profile of Cabernet Saugvinon wine of Zestrea Murfatlar collection - S.C. Murfatlar Romania S.A.
Source: own design [10].

Saugvinon Cabernet, with an intense, clear and crystalline ruby red color, delights the olives with shades of dried plums, currants, blueberry jam, dudes, vanilla and coffee, ending with spicy notes such as ginger, saffron and smoked paprika.

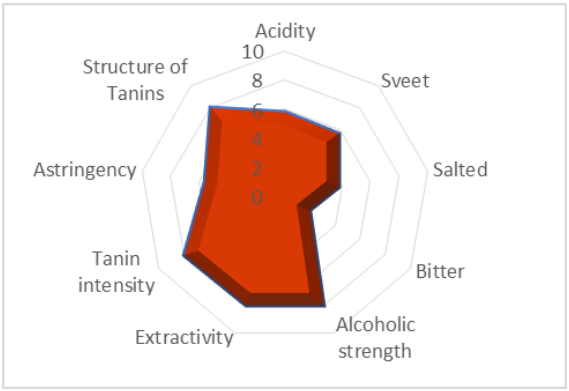

Fig. 9. Taste profile of Cabernet Saugvinon wine of Zestrea Murfatlar collection - S.C. Murfatlar Romania S.A.
Source: own design [10].

Taste, the wine greets us with a feeling of freshness of red fruits, with a wide structure and intensity of tannins and a perfect balance between acidity and alcoholic strength [8].
For *Merlot wine*, the organoleptic characteristics are shown in Fig.10.
Merlot wine is a ruby red wine with violet reflections, olfactory delights with an explosion of aromas of red fruit, bitter chocolate, vanilla, blueberry jam, licorice and burnt wood, following an intense attack of spicy notes such as pepper, green peppers and eucalyptus.

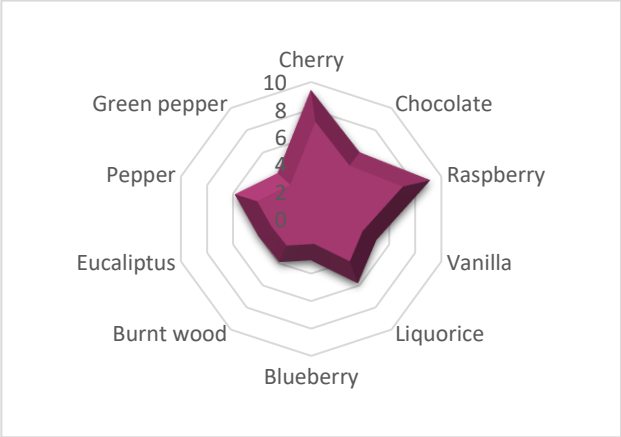

Fig. 10. Olfactory profile of Merlot wine of Leat 6500 collection The Origin - S.C. Murfatlar Romania S.A.
Source: own design [10].

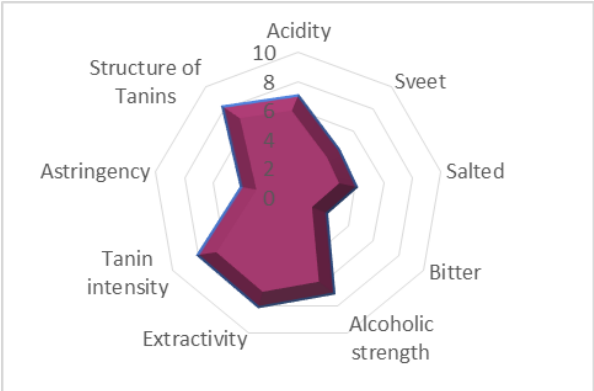

Fig. 11. Taste profile of Merlot wine of Leat 6500 collection The Origin - S.C. Murfatlar Romania S.A.
Source: own design [10].

Tasteful, it is strong, intense, balanced with round tannins, with a noticeable astringency, a medium body with a lasting aftertaste.
For *Pinot Noir wine ennobled with Merlot*, the organoleptic characteristics are illustrated in Fig.12.
Pinot Noir wine ennobled with Merlot is a wine with an expressive red glow and nuances of maturity, clear and crystalline.
Olfactory, it is characterized by a wealth of aromas of red fruit such as raspberries, cherries, currants, cherries and blackberries, in perfect synchrony with notes of cinnamon, truffles, sage, paprika and tobacco.

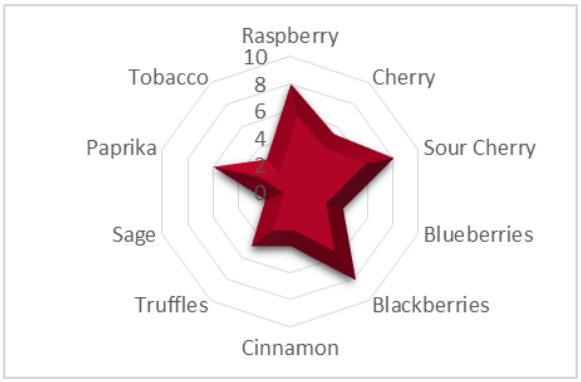

Fig. 12. Olfactory profile of Pinot Noir & Merlot wine of Zestrea Murfatlar collection - S.C. Murfatlar Romania S.A
Source: own design [10].

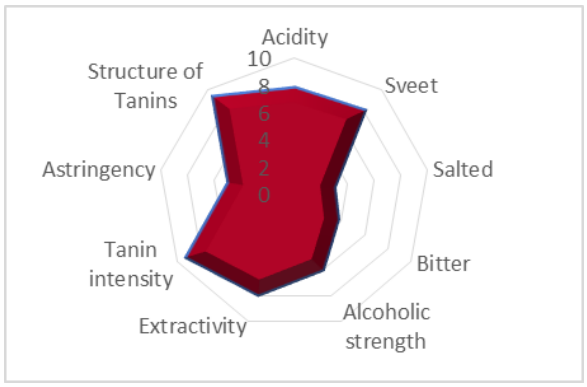

Fig. 13. Taste profile of Pinot Noir & Merlot wine of Zestrea Murfatlar collection - S.C. Murfatlar Romania S.A.
Source: own design [10].

Tasteful, it is strong, balanced, with velvety tannins, having a medium body.

CONCLUSIONS

Based on the study, we can conclude the following:
Feteasca Neagră red wine in terms of physical chemical composition and organoleptic characteristics, throughout the period 2017-2019, corresponded to the quality category DOC CT and the type of wine depending on the sugar content – semi - sweet.
Cabernet Saugvinon red wine corresponded in terms of physical chemical composition and organoleptic characteristics, throughout the period 2017-2019, the quality category DOC CMD and the type of wine depending on the sugar content - semi-dry.
Merlot red wine corresponded in terms of physical chemical composition and organoleptic characteristics, throughout the period 2017-2019, the quality category DOC CT and the type of wine depending on the sugar content - semi-dry.
Pinot Noir red wine ennobled with Merlot corresponded in terms of physical chemical composition and organoleptic characteristics, throughout the period 2017-2019, the DOC CT quality category and the type of wine depending on the sugar content - semi-sweet.
In the category of red wines, in the case of Merlot and Pinot Noir wines ennobled with Merlot, there was a tendency to increase the main physical chemical parameters responsible for wine quality, namely alcoholic strength, free sugar and total acidity.
The qualitative parameters of all wine categories were within the limits imposed by the International Organization of Vine and Wine (OIV).
In the future, we propose a better promotion on the international markets of wines made from Romanian varieties, such as Feteasca Neagră, which enjoys an increased appreciation in international wine competitions.

REFERENCES

[1]Ardelean, M., 2015, Book of Romanian wines, Rao Publishing House, Bucharest, p.35.
[2]Association of producers and traders of wines with designation of origin "Murfatlar", Specifications for the production and marketing of wine with controlled designation of origin "Murfatlar" (Asociația producătorilor și comercianților de vinuri cu denumire de origine ”Murfatlar”, Caiet de Sarcini pentru producerea şi comercializarea vinului cu denumire de origine controlată ”Murfatlar”), https://www.onvpv.ro/sites/default/files/caiet_de_sarcini_doc_murfatlar_152ro.pdf, Accessed on Dec.10, 2020.
[3]Boerescu, D., 2008, 101 Romanian superior wines, Trei Publishing House, Timișoara, p. 23.
[4]Chira, A., Nicolae, D., 2007, Quality of agricultural and food products, Ceres Publishing House, București, p.83.
[5]Jens, P., 2015, Wine from grape to glass, Casa Publishing House, p.37.
[6]Manole, V., Boboc, D., 2005, Wine marketing in România, ASE Publishing, Bucharest, p.28.
[7]Marchionni, S., Braschi, E., Tommasini, S., Bollati, A., Cifelli, F., Mulinacci, N., Matei, M., Conticelli, S., 2013, High-Precision $^{87}Sr/^{86}Sr$ Analyses in Wines and Their Use as a Geological Fingerprint for Tracing Geographic Provenance, Journal of Agricultural and Food Chemistry, 61, 28, 6822–6831.

[8]Pomohaci, N., Namoloșanu, I., Stoian, V., Cotea, V., Sîrghi, C., Gheorghiță, M., 2000, Oenology vol. I, Ceres Publishing House, p.48.
[9]Romania's Parliament, 2015, Law on Vineyard and Wine 164 of 24 June 2015 in the Common Organisation of the Market in Wine, Art. 32, published in Official Gazette no.472 from June 30, 2015.
[10]S.C. Murfatlar România SA, Analysis bulletins of red wines obtained within the company S.C. Murfatlar România SA – in the period 2017-2019.
[11]Stoian, V., 2001, The great book of wine tasting. Tasting for everyone to undestand. Artprint Publishing House, Bucharest, p.32.
[12]Voinea, L., 2013, Food quality and safety, ASE Publishing House, Bucharest, p.120.