

BEHAVIOR IN CULTURE AT OPRİȘOR, VINE VARIETIES, FOR BLACK GRAPES, FROM WESTERN EUROPEAN VINEYARDS

Florin-Cătălin Croitoru ^{1*}

¹ University of Craiova, A.I.Cuza Street, No 13, Craiova, Romania

Abstract

In this paper I analyzed the behavior in the Oprisor culture of varieties of grape varieties (Syrah) of French origin, (Primitivo and Dornfelder), the realization of the German researchers. All the results, observations and determinations made on these varieties were compared with those found at the same time in the varieties that were much soared in the area, Cabernet Sauvignon and Merlot. In the vineyard of Oprisor, data were collected and collected on: the evolution of the grape growth and maturation process, the physico-mechanical composition of the grapes, the recording of the grape production and the analytical and sensory characteristics of the wines. The chemical and sensory analysis of wines highlights the fact that in Oprisor the Cabernet Sauvignon, Merlot, Syrah and Dornfelder varieties give us the possibility to obtain the highest quality red wines, high alcohol, keeping enough acidity, but also by large contents of the non-reducing extract of anthocyanins. The wines are intensely colored and with a beautiful shade of color, they are balanced, authentic wines with great aging in order to get very nice characters, difficult to overlook.

Keywords: Black grapes, Oprisor areal, red wines, vineyards, winemaking.

1.INTRODUCTION

The Oprisor area is part of the famous Mehidentian vineyards, which for a long time have been known for their top quality red wines. These wines are easy to recognize because of their fullness due to the abundance of the extract, the robustness of the high alcohol content, the color intensity with high values and the shade of shimmering color (Căpruciu, 2012). The statistical data recorded over time, as well as some publications (Giugea., 2000; Popa, 2012), shows that the vineyards in Oltenia represented most of the time, about 20-30% of the national vineyard patrimony, and in terms of the share of wine-growing areas occupied by black varieties for red wine, amounts to 30-40% of the total wine-growing area of the whole country. The area has, as we have seen, a gentle climate of Mediterranean currents. It is natural that in such places we cultivate mainly varieties of black and aromatic grapes. They were taken in the new varieties culture: Syrah of French origin, Primitivo and Dornfelder realization of German research (Gheorghiu, 2011).

The purpose of this paper is to track the behavior of new cultivars, Syrah of French origin, Primitivo and Dornfelder of German origin, in the Podgoria of the Oprisor (2015-2017). All the results, observations and determinations made on these varieties were compared with those found at the same time in the varieties that were much soared in the area, Cabernet Sauvignon and Merlot. The objectives of this work during the research period were: the evolution of the grape growth and maturation process, the physico-mechanical composition of the grapes, the recording of the grape production and the analytical and sensory characteristics of the wines. Wine is beneficial to health

when it is natural and healthy. Since antiquity, the hygienic qualities of wine have been appreciated. The researches that have been carried out confirm the positive link between wine and health (Mihalca, 2010; Popa, 2016).

2. MATERIALS AND METHODS

For the wine-growing area at Oprisor, observations and research have been made on Syrah Dornfelder and Primitivo varieties. All observations and research have been made taking into account the black grape varieties for red wine already sourced (Cabernet Sauvignon and Merlot), which until now has been found to be irreplaceable. The Syrah variety is well known and appreciated in: Australia, California, South Africa, Argentina, Italy, Greece and Brazil.

Among all the criteria for evaluating the vocation of an area for a quality viticulture, we have chosen to use the one that captures the oenoclimatic aptitude of an area called Iaoe (Oenoclimatic Skills) established in 1977 by Ștefan Teodorescu. The oenoclimatic index means correlating the average anthocyanin content of the same variety with the climatic conditions of the wine regions where it is cultivated, as the level of anthocyanin content of the black grapes decreases as the climate resources in the wine centers decrease (Teodorescu Ștefan, 1977). The author left out of the idea that by combining the factors favoring the synthesis of anthocyanins in the grape grains, by summing the actual (I) and the temperature (T) and correcting the sum by reducing the excess rain (P) always unfavorable qualities can express the Oenoclimatic Aptitude (A) of the wine-growing area for the production of quality red wines by the formula:

$$A = T + I - (P-250).$$

Observations and determinations on the quantitative and qualitative characteristics of the grapes concerned: the evolution of the grape growth and maturation process, the physico-mechanical analysis of the grapes and the production of grapes on the hub and on the surface unit.

In order to capture the way sugar accumulates, how the acidity increases and how the grain weight increases occur, in the end to determine the moment of full maturity and the optimum time for harvesting the grapes from the beginning of the spring to the next the harvesting of the sugar content, the total acidity and the weight of the grains was determined using the method developed by (Teodorescu, 1952), which justifies the necessity of following the weight of the biological unit of the grapes to better capture the evolution of the relative sugar and absolutely and as a result the stages of growth and maturation of gr The mechanical and technological characterization of the grapes was done at the time of grapes harvesting, with data on the proportion of one gram of grapes of bunches, healthy and injured grains, must, pulp, seeds and marc. 100 grains were determined: total weight, weight and percentage of skin, weight and weight.

At the time of grapes harvesting, the grape production and the surface unit were also established (Teodorescu and Negreanu, 1956).

The technology used for vinification of black grapes was the classic one: harvested 15-20 days after the moment of full maturation, crushing, decryption, maceration-fermentation in relative metal tanks, separation of wine-must when its density reached at 1020, the completion of the alcoholic fermentation and the other malolactic, the drawing of the wine from the dojo.

For both alcoholic and malolactic fermentation, we have limited ourselves to local flora, which in all cases has produced satisfaction.

3. RESULTS AND DISCUSSIONS

The results obtained with regard to the evolution of the grape growth and maturation process are presented in the following tables:

Table 1. Evolution of the process of grape grape varieties for red wines, cultivated at Oprisor-Mehedinți 2015-2017 (average data)

Quality parameters	Varieties	Calendar dates								
		01.08	10.08	20.08	30.08	05.09	10.09	15.09	20.09	25.09
Mass of 100 grains (g)	Cabernet-Sauvignon	87.54	94.44	116.4	122.4	127.4	130.7	135.2	140.5	145.3
	Merlot	98.56	11.3	128.3	130.2	137	149.4	156.7	151.6	148.6
	Syrah	132.22	157.87	171.43	184.12	208.67	220.45	232.82	229.30	225.23
	Primitivo	118.2	12.7	138.7	152.5	165.3	178.8	191.3	205.4	217.5
	Domfelder	131.34	156.34	175.67	194.32	210.45	23.66	224.56	224	223
Acidity (g/H ₂ SO ₄)	Cabernet-Sauvignon	13.0	12.8	11.4	11.0	8.4	7.1	6.5	6.0	5.0
	Merlot	12.5	10.8	7.8	6.4	6.4	6.4	5.9	5.7	4.4
	Syrah	11.2	10.3	9.5	8	7	6.8	6.5	6	5.3
	Primitivo	10.6	10	9.7	9.1	9	8.6	8.1	8	8
	Domfelder	7.2	6.6	6.1	5.7	4.5	3.9	4.2	4.00	4.00
Sugars (g/l)	Cabernet-Sauvignon	115	140	164	189	207	215	218	220	225
	Merlot	130	156	207	225	260	270	271	268	265
	Syrah	128	136	155	180	209	217	225	234	236
	Primitivo	86	97	112	140	163	187	190	194	198
	Domfelder	105	128	144	181	199	215	235	238	239

Frequently, at Oprisor, the leaven period begins with black grape varieties around August 1, when each of the varieties studied already accumulates large amounts of sugars. Most sugars, at the beginning of the broth, recorded the varieties: Merlot (130 g/l), Syrah (128 g/l), Cabernet Sauvignon (115 g). The smallest quantities of sugars are made on the same date by varieties from Germany, Dornfelder (105 g/l) and Primitivo (80 g/l).

The full maturity moment is reached around September 25, except for Cabernet Sauvignon when its grapes reach this moment 5 days later, frequently September 30. At the full maturity of the grapes, the varieties record large quantities of sugars: Merlot (265 g/l), Dornfelder (239 g/l), Syrah (236 g/l), Cabernet Sauvignon (225 g/l); only Primitivo grapes, at that time, have only 198g/l of sugars.

If we look at organic combustion data from the beginning of the springtime and until full maturity, we find that initially the grapes of the 4 varieties have different amounts of these acids. The highest acidity at this time is the Cabernet Sauvignon (13g / l H₂SO₄) grapes, and the lowest is found in Dornfelder grapes (7.2g/l H₂SO₄). Primitivo has 10.6 g/l organic acids. Intermediate quantities are grown on grapes of Merlot varieties (12.5g/l) and Syrah (11.2 g/l).

The average daily average sugar accumulation rate is found in the Merlot variety (2.45 g/l/day) and Dornfelder (2.43 g/l/day). At Cabernet Sauvignon, Syrah and Primitivo, the average daily sugar storage rate does not exceed 2 g/day. It is highlighted that the average daily sugar accumulation rate for all varieties is recorded when full maturity is 11-15 days.

Until full maturity there is slow combustion of organic acids, but their amount at this time is different and the hierarchy found at the beginning of the spring period is not kept. The highest content of 8 g/l organic acids (full grain is recorded by Primitivo grapes, followed by Cabernet Sauvignon with 6.50 g/l but not full maturity), Syrah with 5.3 g/l, Merlot with 4.4 g/l and Dornfelder with 4g/l. On the basis of the data obtained by us, we can assume that in the given situation the results of the previous researches confirm that in Oprisor there are ecopedological conditions among the most favorable for the growth and maturation of black grapes for red wines.

Of course, each variety is manifested by its genetic dowry. This latter aspect is also justified by the results obtained by us when Primitivo, although under the same ecoclimatic conditions as the others, fails to accumulate in the grapes those components that determine the quality of a wine (sugars, acids, coloring and aromatic substances). Numerous and systematic researches made in all major wine countries of the world, including Romania, have identified the means and methods by which the vocation of a vine variety is recognized in order to offer, under certain conditions, grape harvests useful for a certain direction of production. It is known, for example, that grapes with small berries, so large areas of contact with the environment, use more economical solar energy to achieve a rich, complex but balanced composition.

For black and aromatic grapes, the high proportion of skin versus the rest of the structural elements of the grain is a premise that it will synthesize large amounts of coloring and flavoring substances, respectively. The smaller number of seeds in a grain indicates that more sugars will accumulate in this biological unit than in the grain of many seeds. The elasticity and thickness of the grain skin are properties that guarantee greater resistance to climatic accidents or diseases and pests. The yield in the wort, when processing the grapes, is sought to be large enough, especially if we refer to the fractions of must obtained without pressing.

Table 2. Mechanical and technological characterization of the red varieties cultivated at Oprișor-Mehedinți (average data 2015-2017)

The researched item		Cultivated varieties				
		Dedicated		New, taken in culture		
		Cabernet Sauvignon	Merlot	Syrah	Dornfelder	Primitivo
1kg of grapes contains:						
Clusters	G	26.1	15.83	22.5	33.72	34.5
	%	2.61	1.58	2.25	3.37	3.45
Healty grains	no	886	624	621	460	521
	g	902.31	698.5	757.9	899.7	775.38
Damage grains	no	14	69.85	23	5	12
	g	20.3	23	16.56	10.6	17.85
Must	ml	390	24.46	410	450	432.4
	g	427.44	2.46	451	491	148.86
Rest skin and core (pulp)	g	146.28	380	172.14	160	14.64
	%	14.62	318	17.21	16.01	14.86
Seed	g	62.68	134.8	41.61	46.46	39.35
	%	6.26	13.48	4.16	4.64	3.93
Total marc	g	235.06	38.3	236.25	242.0	236.25
	%	23.5	3.83	23.62	24.2	23.62
100 beans:						
Total weight	g	126.67	145.06	165.89	232.35	204.6
Peel	g	20.71	16.51	19.21	30.28	24.64
	%	16.34	11.38	11.57	13.03	12.04
Rest skin and core (pulp)	g	109.35	103.97	148	203.24	181
	%	86.32	71.67	89.2	87.47	88.46
Seed	no	205	183	257	170	217
	g	7.64	7.16	7.12	10.81	8
	%	6.03	4.93	4.29	4.65	3.91
The weight of 100 seed	g	3.61	3.74	2.93	6.31	3.61
Marc	g	28.35	23.67	28.89	41.09	32.64

In one gram of grape, the weight of the bunches oscillates to 15.83g (Merlot) to 34.5g (Primitivo). For 1 kg of Cabernet Sauvignon grapes we find 26.1 bunches, Syrah 22.5 g, and Dornfelder 33.72. The newly introduced varieties have larger sizes and represent a larger share in the grape structure, compared to the two varieties cultivated at Oprișor. Instead, the number of grains per gram of grapes is higher for Cabernet Sauvignon and Merlot, so their size is smaller. If we take into account the number of damaged grains in one gram of grapes, we find that the lowest number is found on Dornfelder (5), Primitivo (12), Cabernet Sauvignon (14) grapes. Most grains damaged in one gram of grapes are found at Merlot (69) and Syrah (23). From where we can infer that newly introduced varieties have greater resistance to some climatic conditions or to diseases and pests.

In the newly introduced varieties we also find a higher wort yield (450ml / kg of Dornfelder grapes, 410ml / kg at Syrah and 400ml / kg at Primitivo), compared to 390ml / kg in Cabernet Sauvignon and 246ml / kg in Merlot. In fact, the proportion of seeds is also smaller in the newly introduced varieties (3.935 Primitivo, 4.16% Syrah, 4.64% Dornfelder), compared to the previously grown varieties (6.26 Cabernet Sauvignon, 13.48% Merlot).

From the data on the structure and size of the 100 parts of beans, it is highlighted that the largest proportion of pears is found in Cabernet Sauvignon (16.34%), the other varieties have relatively close proportions (11.57% at Syrah, 11.38% at Merlot, 12.04% at Primitivo and 13.03% at Dornfelder and the value of the color intensity and color of the wines obtained. The proportion of seeds in 100 grains is 6.03% for Cabernet Sauvignon and 3.91% for Primitivo). These proportions are determined by the genetic gravity of the grain damaged by the degree of use of solar energy in the photosynthesis process and its characterization in the proportion that the chemical compounds of the grape berry (sugars, anthocyanins, aromatic substances, organic acids and so on).

Judging this data on the mechanical composition of the grapes, according to the technological requirements of a black grape variety for red wine, we find that the Dornfelder and Syrah varieties meet these requirements, and can not, however, exceed the offer of the Cabernet Sauvignon variety. Each time, researchers are looking for varieties of vines, whether for fresh consumption or to obtain wines or other grape must or wine products, in addition to quality production, be profitable, that is, as productive as possible.

Table 3. Grape crops produced by vine varieties for red wines at Oprișor-Mehedinți (average data 2015-2017)

Variety	Grape production (kg/ha)	Grape production (kg/hub)
Cabernet Sauvignon	7321	1.61
Merlot	7930	1.74
Syrah	7340	1.61
Dornfelder	5676	1.24
Primitivo	4250	0.99

From a productive point of view, the Syrah variety produces quantities similar to those of the sown varieties (Cabernet Sauvignon and Merlot). Grape production on the plant (hub) is 1.61 kg similar to that of Cabernet Sauvignon and somewhat less than that of Merlot) 1.7 kg/plant). The Dornfelder grape variety has a production of 1.24 kg and the Primitivo variety is barely achieving 0.99 kg/hump.

The admission to cultivation of a vine variety is primarily conditioned by the quality of grape production and, last but not least, by the quality of the grape production it is able to produce in the area where it is to be grown.

Finally, the decision to admit into culture is based only on the fact that the wine obtained from grape processing has a rich, complex chemical composition but also balanced, which makes it to the sensory analysis to be in the quality category desired by the viticulturist.

As a consequence, after the harvest we processed the grapes, using the classic technology for obtaining red wines. After finalizing the operations of grape picking, maceration-fermentation, the brief conditioning of new wines, their laboratory and sensory analysis was carried out.

Table 4. Analytical characteristics and organoleptic characteristics of red wines obtained at Oprisor-Mehedinți (average data 2015-2017)

The type of wine	Alcohol (vol%)	Total acidity (g/l H ₂ SO ₄)	Fixed acidity (g/l H ₂ SO ₄)	Tartaric acid (g/l)	Non reducing extract (g/l)	Ash (g/l)	Anthocyanins (mg/l)	Glycerol (g/l)	Color intensity (IC)	Tone (N.C.)	Sensory analysis (1-20 puncte)
Cabernet-Sauvignon	12.8	5.5	5.4	4.04	34	2.99	790	9.5	12.141	0.300	20
Merlot	14.6	5.6	5.3	3.45	34	3.24	682	9.0	12.537	0.340	19.50
Syrah	13.2	5.4	5.1	4.20	34	3.62	788	9.2	12.995	0.380	19.50
Dornfelder	13.8	5.0	4.5	3.20	35	3.47	790	9.5	15.805	0.450	19.00
Primitiva	12.8	6.8	6.4	3.6	28	3.00	406	9.4	6.711	0.820	17.50

Depending on the degree of sugar accumulation by the grapes, following the maceration-fermentation process, wines with a high alcohol content, which oscillated from 12.8 vol.% (Primitivo variety) to 14.6 vol. % (Merlot variety). In fact, Dornfelder and Syrah wines also have enough alcohol (13.8 vol.% and 13.2 vol.% Respectively). Although with a high alcoholic strength, wines also have a comfortable content of organic acids. Total acidity varies between 5 g/l H₂SO₄ in Dornfelder and 6.8 g/l H₂SO₄ in Primitivo wines.

It is very important that the fixed acidity has the weight (over 90-95%), and over 75-80% is tartaric acid, which oscillates from 3.6g / l (Primitivo) to 4.20g/l at Syrah. Red wines from Oprisor also excel in the high content of the non-reducing extract, which varies from 28g/l (Primitivo) to 35g/l (Dornfelder). Cabernet Sauvignon, Merlot and Syrah wines each have 34g/l of non-reducing extract. The ratio of non-reducing extraneous to ash is for all 1/10 wines. What impresses with the red wines of Oprisor is the high content of anthocyanins, except Primitivo wines with only 406 mg/l anthocyanins. The other wines have: 682 mg/l Merlot), 788 mg/l (Syrah), 790 mg/l (Cabernet Sauvignon and Dornfelder). Glycerol oscillates from 9g/l (Merlot) to 9.5g/l (Cabernet Sauvignon and Dornfelder). The value of color intensity is great especially at Dornfelder (15.8) and Syrah (12.99). Primitivo wines have the smallest intensity of color (6.7). Lightly impresses and recognize the red wine from Oprisor and the pleasant color shade that shines more often on Dornfelder, Syrah, Cabernet Sauvignon and Merlot wines.

4. CONCLUSIONS

1. The Oprisor vineyard is characterized by a great vocation for obtaining the highest quality red wines, as evidenced by the numerous awards and medals among the most brilliant wines produced by Cabernet Sauvignon and Merlot in national and international competitions, but and to the appreciation of consumers in the country and the world.

2. In this wine-growing area, the two new varieties (Syrah and Dornfelder), accumulate the largest quantities of sugar (239g/l Dornfelder, 236g/l Syrah) by Cabernet Sauvignon and Merlot. The Primitivo variety, and it's newly introduced, does not accumulate until it picks up more than 198g/l of sugars.
3. By their physico-mechanical composition, especially if we refer to the proportion of bunches, the number and weight of grains in one gram of grapes, the Dornfelder and Syrah varieties are among those in which the photosynthesis process assures the accumulation of grain components of high value (sugars, organic acids, anthocyanins, aromatic substances, etc.).
4. Grapes of Syrah and Dornfelder varieties also achieve a good yield in must.
5. We produce the highest grape yields on the varieties: Merlot (1.74 kg), Cabernet Sauvignon and Syrah (1.61 kg) and Dornfelder (1.24 kg). The smallest grape production per vine is made by the Primitivo variety (0.99 kg).
6. The chemical and sensory analysis of wines highlights the fact that at Oprisor the Cabernet Sauvignon, Merlot, Syrah and Dornfelder varieties give us the possibility to obtain the best quality red wines, highlighting the high alcoholic strength, maintaining a sufficient acidity, but also by large contents of the non-reducing extract of anthocyanins. The wines are intensely colored and with a beautiful shade of color, they are balanced, authentic wines with great aging in order to get very nice characters that are hard to overlook.
7. Grapes of the Primitivo variety can not obtain quality red wines, which is why, given the vocation for the quality of the area, it must not be taken in culture, at most it can be sheltered in collections and can be used in the improvement processes.

5. REFERENCES

- Căpruciu, D. (2012). Potențialul oenologic al unor soiuri de viță de vie de proveniență mediteraneană, cultivate la Segarcea. [The oenological potential of varieties of vine of Mediterranean origin, cultivated in Segarcea']. Teză de doctorat, Univ din Craiova.
- Gheorghiu, V. (2011). Studiul potențialului oenologic al unor soiuri de struguri de origine mediteraneană, cultivate la Opișor-Mehedinți. [Study of the oenological potential of certain grape varieties of Mediterranean origin, cultivated at Opișor-Mehedinți]. Teză de doctorat. Universitatea din Craiova.
- Giugea, N. (2000). Cercetări privind modul în care unii factori biopedologici influențează compoziția chimică a strugurilor. [Research on how some biopedological factors influence the chemical composition of grapes]. Teză de doctorat. Univ. Din Craiova.
- Mihalca, Al. (2010). Vinuri și Sănătate. [Wines and Health]. Ed. Ramura, Arad
- Popa, A. (2012). Viticultura din Oltenia între reconstrucție și dezvoltare. [Viticulture in Oltenia between reconstruction and development]. Ed. Alma. Craiova.
- Popa, A. (2016). Secretul vinului bun. [The Secret of Good Wine. Second Edition]. Ediția a-II-a. Ed. Alma. Craiova.
- Teodorescu, Ș. (1952). Contribuții la stabilirea momentului optim pentru recoltarea strugurilor. [Contributions to the optimal moment for harvesting grapes]. *Analele I.C.A.R.*, Seria nouă, Nr. 3. Vol. XXII, București.
- Teodorescu, Ș., Negreanu, El. (1956). Îmbunătățirea metodicii pentru urmărirea procesului de maturare la struguri. [Improvement of methodology for the grape ripening process]. *Bul. Șt. Secția Biologie-Șt. Agricole*. Vol VIII, Nr. 1. Academia Română.