

Optimization of blend components for improving red sparkling wines production

E. Soldatenco, N. Taran, B. Morari, O. Soldatenco, S. Stoleicova

Scientific and Practical Institute of Horticulture and Food Technologies, Republic of Moldova, Chisinau, city Codru,
Str. Vierul, 59, MD-2070, Phone: +37322285035, +37322285018 Fax: +373 22285025

Received: 23 May 2014; Accepted: 27 June 2014

Abstract

Red sparkling wines produced in Moldova occupy a special place on the wine market, but to improve the quality of the finished product it is necessary to improve the technological regimes for manufacturing base wines for this category of wines.

From these reasons, study was conducted on different raw red wines, from classical European varieties Cabernet Sauvignon, Merlot and Pinot Franc, comparing the influence of different composition of red wines blends on the organoleptic indices and establishing their physic-chemical parameters. As a result composition of blends from raw red wines and optimal content of phenolic substances including anthocyanins, for red sparkling wine production was established.

Keywords: red sparkling wine, blend, coupage, red classical varieties, phenolic substances, anthocyanins.

1. Introduction

Moldova is a country that tends to assert increasingly active on the global market of wines, but to compete with developed countries (France, Italy, Spain and so on) that have developed winemaking traditions we must adapt winemaking technologies according to current requirements for ensuring quality of local wines. Therefore main objectives are improving production technologies, scientific argumentation of the used technological processes for reaching stable quality of wines also diversification of production technologies and wine assortment. [1]

One of this kind of product are red sparkling wines, which are produced for decades in our country but till now there is no certain criteria's of quality for this category of wines, and often in production of this wines are used basically quality parameters as for white sparkling wines only lower titrate acidity, and are negated some basic

compounds which are characteristic only for red wines.

Due to these requirements, appears necessity of development and scientifically improvement of existing technology process as: grape processing, fermentation processes, primary and secondary factors that determine the quality, color and chemical composition of red sparkling wine [1]. Also an important indicator of quality of red sparkling wines is the content of phenolic substances, which extraction occurs in grape skins during fermentation-maceration process. Content and composition of this group of components significantly affect the nutritional value and sensory quality of the wine. In particularly important are anthocyanins, pigments specific for red wines. [2].

Currently assortment of red sparkling wine is vast, and every producer uses different blending components of raw red wines. However, due to stringent market requirements there appeared the

need of scientific research of improvement and argumentation of optimal blending components of raw red wines produced from European classic red grape varieties grown in the central region of the Republic of Moldova, in order to improve the quality of the obtained red sparkling wines.

In this context, the purpose of the study is the optimal composition of raw red wines from classical European varieties for production of red sparkling wines and establishing optimal content of phenolic substances in coupage before secondary fermentation.

2. Materials and methods

The research was conducted in the laboratory of "Biotechnology and Microbiology of wine" and "Micro-winemaking" section from Scientific-Practical Institute of Horticulture and Food Technology (SPIHFT) in 2012-2013 years. As objects of research were used dry red wines produced from Merlot, Cabernet Sauvignon and Pinot Franc varieties. As technological treating adjuvant materials were used bentonite. In this research work were applied physicochemical methods of analysis recommended by the International Organization of Vine and Wine and those elaborated or modified at the SPIHFT [3].

3. Results and discussions

In order to establish optimal quality parameters of red sparkling wines were occurred study among red sparkling wines produced in Republic of Moldova and one sample from Ukraine (Crimea).

Wines were subjected to physico-chemical and organoleptic properties. The results on the quality parameters are shown in Table 1.

Analyzing the obtained results, we can see that their different quality parameters of red sparkling wines commercialized on Moldavian retail market. And for establishing which of these parameters are most optimal for red sparkling wine were cured organoleptic analysis. Commission have decided that all red sparkling wines where qualitative without defects but the most appreciated was *classic red sparkling wine (2006) Cricova* and *Classic red sparkling wine (2008) "Crimsoe Igristoe"*, it being understood that these wines have a comparatively high content of phenolic substances and alcohol concentration from 11.5 to

12 % Vol, being notified with rich aroma of dried fruit and an optimal degree of maturation.

Therefore it was determined that optimal concentration of phenolic substances in the finished product is 1300-1500 mg/dm³ and anthocyanins 70-81 mg / dm³.

For determination of the influence of blending components on organoleptic parameters were selected raw red wines produced from European varieties Merlot, Cabernet Sauvignon and Pinot Franc. Physico-chemical parameters are represented in Table 2.

Using raw red wines were formed experimental micro-coupages and tested organoleptic, according to obtained results were selected four coupages with different content of phenolic substances for red sparkling wines production.

Coupage 1: Pinot-Franc 60% Merlot + 40% (content of phenolic substances - 1193 mg/dm³);

Coupage 2: Pinot Franc Merlot 33% + 33% + 34% Cabernet Sauvignon (content of phenolic substances - 1398 mg/dm³);

Coupage 3: 70% Merlot + 30% Cabernet Sauvignon (content of phenolic substances-1584 mg/dm³);

Coupage 4: 20% Merlot + Cabernet Sauvignon 80% (content of phenolic substances - 1860 mg/dm³).

After the secondary fermentation and maturation in the bottle for 9 months sparkling wines were subjected to physico-chemical and organoleptic analysis, the results are shown in Table 3.

Analyzing results from table 3, we can distinguish that all of the samples have accumulated in the bottle required pressure of CO₂, and the concentration of alcohol ranges from 12.2 to 12.8 % vol.. Concentration of titratable acidity varies between 5.1 - 6, 6 g/dm³. The volatile acidity is within acceptable limits for this category of wines. Therefore all coupages occurred secondary fermentation quality basic parameters correspond to all requirements.

Analyzing the data from figure 1 had been noticed that after secondary fermentation and aging for 9 months at the process of red sparkling wines production, had decreases content of phenolic substance in all samples in average with 340 mg/dm³. This diminution is caused by the activity of the yeast during secondary fermentation, action of bentonite and phenol degradation during aging in the bottle.

Table 1. Organoleptic and Physico-chemical parameters of red sparkling wines from Moldavian retail market.

Name	Alcohol concentration, % vol.	Concentration of			Organoleptic note, proms
		the titrable acidity, g/dm ³	Phenolic compounds, mg/dm ³	Anthocyanins, mg/dm ³	
Original Semisweet red sparkling wine (2010) Vismos	11.62	5.2	1194	57	9,2
Original Semisweet red sparkling wine (2012) Cricova	12.37	5.2	1166	62	9.0
Classic red Sparkling wine (2006) Cricova	11.97	5.3	1394	70	9,4
Original Semisweet red sparkling wine (2010) Milesti Mici	10.96	5.3	950	55	8.8
Classic red sparkling wine (2008) Crimscoe Igristoe	11,50	5,4	1459	81	9,5

Table 2. Physicochemical indices of raw red wines from classical european verities (vintage year 2012)

Name	Alcohol concentration, % vol.	Mass concentration of				OR, mV	Organoleptic note, proms
		titratable acidity, g/dm ³	volatile acidity, g/dm ³	phenolic compounds, mg/dm ³	anthocyanins, mg/dm ³		
Cabernet-Sauvignon	11.9	6.9	0.30	1962	231	210	7.85
Merlot	12.0	5.3	0.56	1389	180	201	7.9
Pinot Franc	13.3	5.7	0.33	823	97	194	7.8

Table 3. Physico-chemical and organoleptic indices of red sparkling wines after 9 months of maturation with different concentrations of phenolic substances

Name	Pressure, kPa	Alcohol concentration, % vol.	Mass concentration of		pH	OR, mV	Organoleptic note, proms
			titratable acidity, g/dm ³	volatile acidity, g/dm ³			
Coupage 1	420	12,8	5,1	0,42	3,3	193	8,8
Coupage 2	380	12,7	5,3	0,36	3,3	196	8,8
Coupage 3	490	12,8	6,6	0,42	3,2	204	8,9
Coupage 4	450	12,2	5,6	0,49	3,3	210	8,7

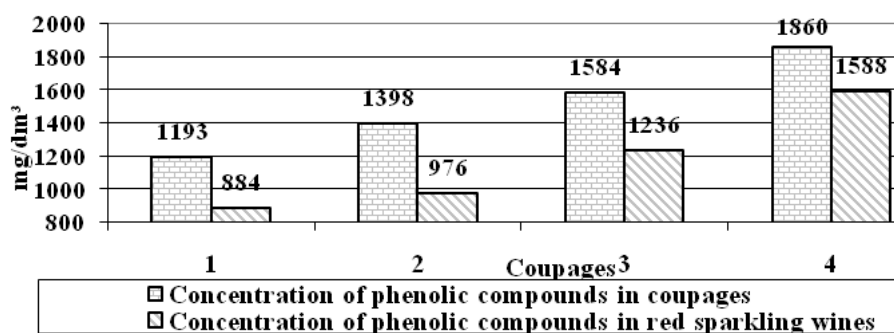


Figure 1. Comparative analysis of phenolic substances concentration in red sparkling wines after 9 months maturation.

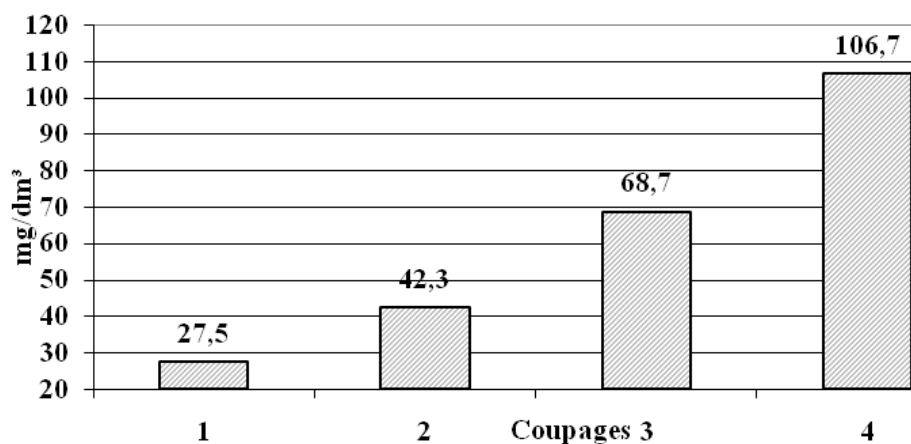


Figure 2. Concentration of anthocyanins in red sparkling wines after 9 months maturation

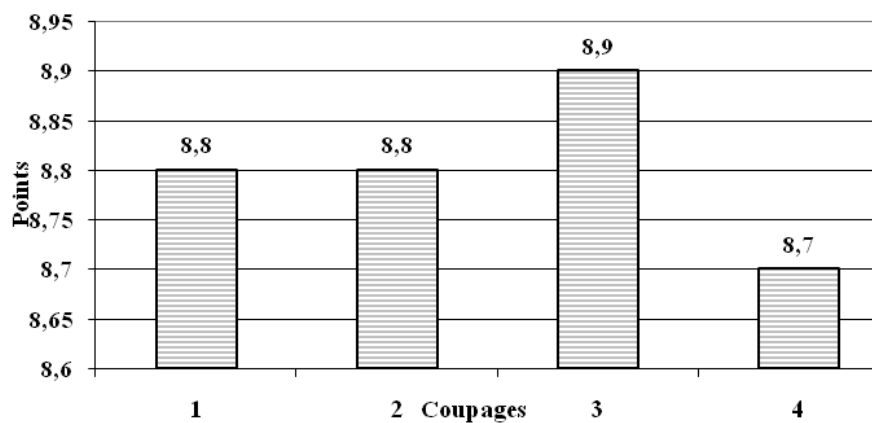


Figure 3. Organoleptic analysis in red sparkling wine after 9 months of maturation obtained from coupages with different content of phenolic substances

According to the results shown in Figure 2 the concentration of anthocyanins in red sparkling wines obtained from coupages 1 and 2 are 27.5 and 42.3 mg/dm³, at this level of anthocyanins intensity of the color is too low which is considered insufficient for red sparkling wines. Coupages 3 and 4 had sufficient level of anthocyanins reserve to ensure intense ruby red color after the secondary fermentation and maturation for 9 months.

Organoleptic analysis allowed to highlight red sparkling wine produced from coupage of Merlot (70%) and Cabernet Sauvignon (30%), being considered with complex aroma, balanced taste, intense ruby color, stable pearling and foaming. This formula of blending is recommended for red sparkling wine production.

Red sparkling wines produced with using as blending partner red wines from Pinot Franc variety had obtained lower organoleptic assessment having lower tones of color, oxidation flavors and flat taste. Red sparkling wines produced with raw red wines from Cabernet Sauvignon variety, as basic blending partner in proportions of 80%.

Have been appreciated with lowest organoleptic score, characterized by unbalanced taste due to excessive tanning substances, aromatic character are lower comparative to red sparkling wine obtained from 3 coupage with using of basic blending partner red wines from Merlot varieties.

4. Conclusion

It was determined the optimal reserve of phenolic substances in raw red wines material for the production of red sparkling wines, being between 1500-1700 mg/dm³. These content of phenolic complex allows to obtain wines with sufficient concentration of tannins for equilibrate taste of producing red sparkling wines with advanced quality parameters.

As a result of laboratory experiments have been studied different blending schemes using raw red wines produced from classical European varieties Pinot Franc, Merlot and Cabernet Sauvignon, grown in the central winemaking region of the Republic of Moldova. Following the organoleptic assessment was highlighted blending with the use of 70% Merlot and 30% Cabernet Sauvignon. Red sparkling wines produced under this coupage have stable pearling and foaming parameters, rich flavor and balanced taste.

Compliance with Ethics Requirements: Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human and/or animal subjects (if exists) respect the specific regulations and standards.

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