STUDY ON MATURATION DYNAMICS AND POTENTIAL OF THE PHENOLIC COMPOUNDS IN THE LOCAL VARIETIES OF RED GRAPES

STUDIU PRIVIND DINAMICA MATURĂRII ŞI POTENŢIALUL COMPUŞILOR FENOLICI ÎN SOIURILE AUTOHTONE ROŞII

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Abstract: *The aim of researches is the study of the dynamics and the evaluation of the phenolic compounds potential of the grain black grapes of local varieties namely: Rară neagră, Bătută neagră, Breazăă, Ciorcuţă neagră, Fetească neagră, Kopceac, Negru de Akkerman, Negru de Căuşeni, Seină and Tămâioasă de Bohotin the harvest of 2011 grown in the Central region of the Republic of Moldova. The Codrinschi variety grown in the central region (the land Stăuceni) and South (the land Causeni) has also been studied. The variety Merlot served as a control. Carbohydrates, organic acids and phenolic complex potential at different stages of maturation process were determined. It was determined that after the phenolic complex potential and compared with control variety Merlot the investigated varieties may be classified as follows: varieties with high content in phenolic compounds varieties with medium content and varieties whith low content in phenolic compounds.*
Key words: local varieties, maturation dynamics, carbohydrates, titratable acids, phenolic substances.

Rezumat *Scopul cercetărilor îl constituie studiul dinamicii maturării şi evaluarea potenţialului compuşilor fenolici la strugurii cu bob negru aparţinând soiurile autohtone: Rară neagră, Bătută neagră, Breazăă, Ciorcuţă neagră, Fetească neagră, Kopceac, Negru de Akkerman, Negru de Căuşeni, Seină şi Tămâioasă de Bohotin din recolta anului 2011, cultivaţi în regiunea Centru a Republicii Moldova. De asemenea, a fost studiat şi soiul Codrinschi cultivat în regiunea Centru (plaiul Stăuceni) şi regiunea Sud (plaiul Pleşeni). Ca martor s-a folosit soiul Merlot. Au fost determinate glucidele, acizii organici şi potenţialul complexului fenolic la diferite etape ale procesului de maturare. S-a constatat că, după potenţialul complexului fenolic şi în raport cu soiul martor Merlot, soiurile investigate pot fi grupate în felul următor: cu conţinut ridicat de compuşi fenolici, cu conţinut mediu şi cu conţinut scăzut în compuşi fenolici.*
Cuvinte cheie: soiuri autohtone,dinamica maturării, glucide, acizi titrabili, substanţe fenolice.

INTRODUCTION

Lately several countries highlights from the base assortment of varieties, some so called "national".

Currently Moldovan range of grape varieties with black bean consists mainly of French classics, as well as from clones of these varieties like Cabernet

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Sauvignon, Merlot, Pinot Noir. It is difficult to create a national symbol of the existing assortment of wine.

In the current tough competition from several countries worldwide wine market with great diligence promotes wines from indigenous varieties. An example may serve Georgia and Saperavi, Rkaţiteli varieties, Bulgaria - Mavrud, Rubin and Melnic, România – Tamâioasă, Fetească Neagră, Azerbaijan - Şirvanşah, Baian publication. (Rusu et al., 2008, Crăciun, 2008). Many local varieties like Rară neagra, Fetească neagră Tamâioasă de Bohotin etc., had a mark on history of the country and created typicity of wine vineyards.

Currently we have some local red varieties, which are invaluable, but unfortunately they have not undergone thorough research on the potential of phenolic substances and colorants.

The purposes of these investigations is the study of aging dynamics and assess, the potential of phenolic compounds of grapes with black bean of local varieties in the climatic conditions of 2011, which would enable optimization of their processing technology to obtain red wines.

MATERIAL AND METHOD

Researches were performed at the Scientifical-Practical Institute of Horticultural and Food Technologys (SPIHFT) Republic of Moldova in 2011 on Rară neagră grapes varieties (Babească neagra), Batută neagră, Breaza, Ciorcuţă neagră, Fetească neagră, Kopceak, Negru of Akkerman, Negru of Căuşeni, Seină and the Tamâioasă of Bohotin grown ampelographic collection of SPIHFT, Central region, where they were provided the same culture conditions. When it was affiliated Codrinschi local variety grown in the central region (Stauceni) and South (Pleseni). Served as a witness Merlot, grown on plantations SPIHFT (central region).

As research objects grapes served with black bean named local varieties harvested and analyzed at different stages of maturation - the first fruits before the technological maturation.The grapes were made the following determinations: carbohydrate content, titratable acids, phenolic substances and anthocyans. Sugars and titratable acids content was determined according to standard methods, phenolic substances - according to colorimetric method with Folin-Ciocalteu reagent, anthocyanins - colorimetric method. Research has been conducted in laboratory Oenology and Wine with Designation of Origin in collaboration with the laboratory genetic fund and improvement of the SPIHFT.

RESULTS AND DISCUSSIONS

Evolution of carbohydrate content and titratable acidity expressed as tartaric acid during ripening grape varieties indigenous black beans is presented in table 1.

The data presented can be seen that local varieties under investigation differ in different capacities carbohydrate accumulation and reduced titratable acidity. Thus, on September 7, 2011 with the highest carbohydrate content outlined Codrinschi varieties(South region) - 194 g/L, the Tamâioasă of Bohotin, Negru of Căuşeni, Kopceak - 183-187g /L.

Table 1

Carbohydrate content and titratable acidity during ripening grape varieties local black grain under 2011

Variety name	7 September		15 September		20 September		26 September		29 September	
	Titratable acidity (g/L tartaric acid)	sugar (g/L)	Titratable acidity (g/L tartaric acid)	sugar (g/L)	Titratable acidity (g/L tartaric acid)	sugar (g/L)	Titratable acidity (g/L tartaric acid)	sugar (g/L)	Titratable acidity (g/L tartaric acid)	sugar (g/L)
Rară neagră	11,5	173	10,2	207	9,8	212	9,2	217	8,4	228
Breazăă	8,0	155	7,5	165	7,1	177	6,4	188	6,0	192
Kopceak	9,0	183	8,1	200	7,5	203	7,0	213	-	-
Bătută neagră	7,4	130	7,1	135	5,8	140	5,6	155	5,5	160
Seină	7,4	153	7,3	160	7,2	180	7,0	200	6,5	205
Fetească neagră	9,3	175	7,6	194	7,5	210	7,3	227	7,2	250
Ciorcuță neagră	7,4	177	7,3	187	7,0	195	6,5	197	-	-
Tămâioasă of Bohotin	8,9	187	8,6	205	8,3	247	-	-	-	-
Negru of Akkerman	6,8	128	6,5	145	6,0	153	5,5	164	-	-
Negru of Căuşani	10,2	185	9,0	200	8,9	208	8,8	215	-	-
Codrinschi (Pleşeni) South region	7,9	194	7,6	202	7,6	212	6,5	230	6,3	240
Codrinschi (Stăuceni) Central region	14,9	170	10,7	190	8,8	202	8,3	213	8,2	215
Merlot (control)	9,0	167	8,8	192	8,4	212	8,2	218	-	-

The varieties Negru of Akkerman and Bătută neagră carbohydrates have the lowest level,130 g/L, and varieties Brează, Seină, Merlot (control), Codrinschi (Central region), Rară neagră, Ciorcuță neagră stand with an average carbohydrate. On titratable acidity may be mentioned that at that time the highest value is observed in varieties Codrinschi (Central region), Rară neagră, and Neagru of Căușani. The other varieties, including witness Merlot variety, this index is included within the 7.4 to 9.3 g/L.

On September 15, 2011 there is an increased accumulation of carbohydrates in Rară neagră varieties, Merlot and Codrinschi (Stăuceni) - 35, 25 and 20 g/L respectively. Varieties Bătută neagră, Seină, Brează, Ciorcuță neagră is characterized by a weak capacity to increase carbohydrates during this period - with only 5-10 g/L.

In the titratable acidity can be seen that a more significant decrease in the proportion of1.2 to 4.7 g/L is observed in the varieties with the highest value of this index: Negru de Căușani, Rară neagră, Fetească neagră, Codrinschi (Stăuceni) (table 1). To the other varieties titratable acidity decreased more slowly, and some varieties: Seină, Ciorcuță neagră, Negru of Akkerman remained basically the same.

On September 20, 2011 Tâmâoioasă of Bohotin variety of incense recorded the highest carbohydrate content from all investigated varieties 247 g/L, representing titratable acidity 8.3 g/L. Rară neagră varieties, Fetească neagră, Negru of Căușani, Codrinschi (Pleşeni) and Merlot (control) have a carbohydrate content of between 208 and 212 g/L, and titratable acidity varies between 7.5 and 8.9 g/L except by Rară neagră variety, characterized by the highest value of this index (9.8 g/L) on nomination.

It should be noted that, just as in the previous period, the lowest carbohydrate content is observed in varieties Bătută neagră (140 g/L), Negru of Akkerman (153 g/L) and Brează (177 g/L). They also have the lowest values of titratable acidity accordingly 5.8 - 6.0 and 7.1 g/L. In other varieties under investigation carbohydrates varies within the 180-203 g/L, and titratable acids between 7.0 and 8.8 g/L.

At the end of September (the technological maturation) in local varieties Fetească neagră, Codrinschi (Pleşeni), Rară neagră carbohydrate content reached values of 250, 240 and 228 g/L respectively, and titratable acidity decreased to 6.3 - 7.2 g/L, except Rară neagră variety, which has the highest index value of the varieties under study - 8.4 g/L.

It should be noted that the varieties under investigation, is characterized by a low potential for accumulation of carbohydrate varieties Bătută neagră (160 g/L), Negru of Akkerman (164 g/L) and Brează (192 g/L), with and lowest titratable acidity, which varies between 5.5 and 6.3 g/L.

Carbohydrate content in the witness Merlot variety (218 g/L) was recorded in varieties Codrinschi (Stăuceni), Negru of Căușani and Kopceak.

In figures 1 and 2 are presented data on the evolution of phenolic substances and anthocyans in varieties subject investigations.

Fig. 1 - Evolution of phenolic substances during ripening grapevine varieties in the local climatic conditions of 2011

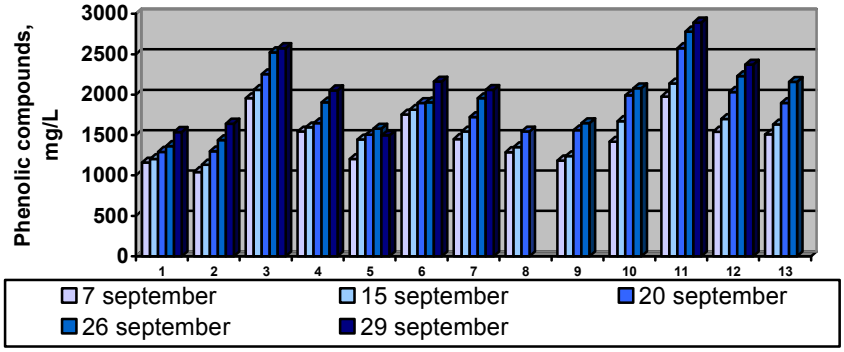
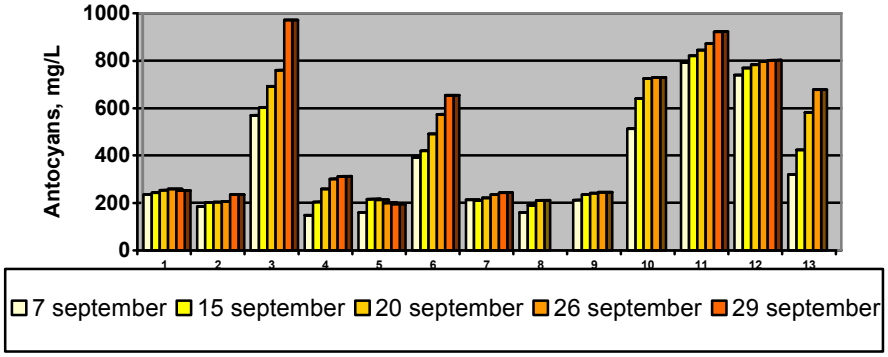


Fig. 2 - Evolution anthocyans during ripening grapevinevarieties in the local climatic conditions of 2011



Research shows that local varieties are characterized by very different potential of phenolic complex. At the beginning of maturation in varieties Codrinschi (Pleşeni) and Kopceak is registered the highest values of phenolic substances and anthocyans content - 1978 and 793 mg/L, 1957 and 571 mg/L, appropriate, and varieties Breaza, Rară neagră, Negru of Akkerman, Seină and Tămâioasă of Bohotin have the lowest values of these indices, which range between 1042 and 1284 mg/L for phenolic substances and 159-235 mg/L for anthocyanins. In the variety Codrinschi (Stauceni) may be mentioned that compared with the same variety grown in South phenolic substances and anthocyan content is lower and consists1573 and 740mg / L.

Fetească neagră variety show with an average content in phenolic compounds – 1754 mg/L phenolic substances and 392 mg/L anthocyanins, are placed closer to reference variety Merlot - 1505 mg/L and 320 mg/L respectively. With an average content of phenolic substances (1416 mg/L) and advanced in anthocyanins (514 mg/L) is distinguished variety of Negru of Causeni.

It should be noted that Ciorcuță neagra and Bătută neagră varieties have a medium level of phenolic substances - 1545 and 1448 mg/L and relatively low anthocyans – 148 and 213 mg/L corresponding.

From fig. 2 may find that more intense accumulation of phenolic compounds in the climatic conditions of 2011 are recorded in the second half of September. It should be noted that throughout the ripening grape varieties investigated had different storage capacities and phenolic substances and anthocyans. Research shows that close to the reference variety Merlot as phenolic and anthocyans content of the substances are Fetească neagră, Negru of Căuşani and Bătută Neagră. Codrinschi varieties (Pleşeni) and Kopceak are characterized by the highest potential of phenolic compound. In Rară neagră and Tămâioasă of Bohotin varieties content of phenolic and coloring substances is less than the Merlot.

After phenolic compound potential (phenolic substances / anthocyanins, mg/L) varieties are placed subject to investigations as follows:

- With a high content (more than 600 coloring mg/L and phenol - more than 2000 mg/L): Codrinschi (Pleseni) – 2891/923; Kopceak - 2524/761; Codrinschi (Stauceni) - 2371/803; Fetească neagră – 2163/655; Merlot – 2158/678; Negru of Căuşeni – 2078/730;
- Average (coloring 300-600 mg/L and phenol - 1600 to 2000 mg/L: Bătută neagră – 2054/312;
- Small containing (coloring below 300 mg/L and phenol – below 1960 mg/L): Ciorcuță neagră – 1957/235; Negru of Akkerman – 1648/245; Rară neagră (Center region) – 1540/252; Tămâioasă de Bohotin – 1545/211; Brează – 1436/206; Seină – 1582/200.

CONCLUSIONS

1. Investigated local red varieties are distinguished by the carbohydrate content, titratable acidity and potential of phenolic compounds. Codrinschi varieties (Stăuceni) Rară neagră and Negru de Căuşeni are outlined with higher value of titratable acidity - 8.2 to 8.8 g/L.

2. After potential phenolic compound and compared with reference variety Merlot varieties studied can be grouped as follows:

a) varieties with a high content in phenolic compounds - Codrinschi, Kopceak, Fetească neagră, Negru of Causeni; b) varieties with medium contain of phenolic compounds (the witness) – Bătută neagră; c) varieties with low content of phenolic compounds – Tămâioasă de Bohotin, Brează, Ciorcuțăă neagră, Seină, Negru of Akkerman, Rară neagră (center wine region).

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