BIOLOGICALLY ACTIVE SUBSTANCES IN RED WINES MOLDOVAN

***Skorbanov Elena, Taran Nicolai, Cernei Mariana, Tampei Olga, Rinda Parascovia, Degteari Natalia**

„Practical Scientific Institute of Horticulture and Food Technology" – Chişinău, Moldova

***Skorbanov Elena, oenocontrol@rambler.ru**

Abstract: In red wines from grapes grown in Moldova, polyphenols, which have a pronounced antioxidant activity are represented mainly monomeric anthocyanins and their derivatives (cianidina, delphinidin, peonidina, petunidina), flavonoids (quercetin and rutin) and stilbenes (resveratrol). Using high performance liquid chromatography (HPLC) determines differently principal monomeric polyphenols content, resveratrol, quercetin and routine dry red wine grapes. Separation schemes developed can be successfully used to study phenolic compounds in wine during various investigations.

Were studied stilbene compounds in red wine grape grown in Moldova, the different years of harvest, from different manufacturers. It was found that the content of these compounds in wines analitzate are: quercetin (0.4 to 107) mg/dm^3, routine - (0.7 to 14.6) mg/dm^3, rezveratrol - (1.2 to 9.5) mg/dm^3. Concentrations, these substances contained in red wine Moldovan allow sufficient to assume their biological activity because, according to the statements of many scholars, namely the group of polyphenols act as antioxidants and antimutagenic human body.

Keywords: red wines, polyphenols, biologically active.

Introduction

Red wine contain a significant amount of natural extractives, with special attention deserve polyphenols.

In recent years, in Italy, France, Portugal, China and other countries [1,2] conducted research related to the study of polyphenols with antioxidant properties, in red wines from both the classic red grape varieties of Cabernet, Merlot, Pinot Franc, and from local zoning classes.

Most often for the quantitative determination of antioxidants and bioactive polyphenols used spectrophotometric, electrochemical methods, and techniques of high performance liquid chromatography [5,7].

Most red grapes zoned in Moldova, contain significant amounts of phenolic compounds. A number of them, such as quercetin, rutin, resveratrol, anthocyanins and other exhibit antioxidant properties, scientists. The first publication of the content of resveratrol in the Moldovan wines appeared in 1995 year, then - in 2007 [8]. However, due to the lack of methodology and related equipment in Moldova conducted systematic research of other active compounds of red wines. Therefore, we are interested in the study of their content in red wines produced from both the classical grape varieties and other varieties grown in the country.

The total content of phenolic compounds in red wine, according to some researchers [6,7], does not always correlate with biologically activity. Study of individual phenolic compounds in red wines can indirectly assess the biological activity wine and, therefore, its biological value [3].

Differential determination of phenolic compounds - a complex procedure, for which the necessary modern equipment and highly qualified specialists.

Materials and methods

Determination of monomeric polyphenols were determined by high performance liquid chromatography (HPLC), which allows to separate the phenolic compounds in a special chromatography column, then define them quantitatively. We picked up the optimum conditions for separating a mixture of monomeric polyphenols and used the technique developed for the quantitative determination of the above differentiated compounds in red wines from grapes zoned in Moldova: Cabernet Sauvignon, Feteasca Neagra, Rara Neagra, Kodrinsky.

Mastering mode determination of phenolic compounds by HPLC and further studies are carried out on a liquid chromatograph LC-20A Prominance, Shimadzu column CC 125/4 Nucleosil 100-5c 18 Nautilus. Detector SPD-20AV UV/VIS, which is equipped with this liquid chromatograph includes deuterium and tungsten halogen lamps, as a result of expanded analytical capabilities to the visible range.

Eluted in gradient mode with a feed rate of the mobile phase 0.75 ml / min. Solution A: methanol solution B: bidistilled water

Detection was performed at wavelengths of 305 nm (resveratrol), 363 nm (rutin,quercetin).

This mode is used to determine the routine, quercetin and resveratrol.

For anthocyanins and their derivatives were used the following solutions: Solution A: orthophosphoric acid to 10% solution B: acetone + orthophosphoric acid (1:1).Detection was performed at a wavelength of 520 nm

Results and discussion

Monomers anthocyanin groups creating a characteristic ruby color, found in the dry red grape wines are presented in *Table 1*.

Table 1. *Monomeric anthocyanins and their derivatives in red grape wines in Moldova.*

Anthocyanin	% of the total anthocyanin							
	vintage 2009				vintage 2010			
	Feteasca Neagra	Rara Neagra	Kodrinsky	Cabernet-Sauvignon	Feteasca Neagra	Rara Neagra	Kodrinsky	Cabernet-Sauvignon
Delphindin-3-glucoside	3,7	0,7	2,9	1,4	3,2	2,1	7,6	5,6
Cyanidin-3-glucoside	0,6	-	0,8	1,0	0,4	-	1,0	1,0
Diglucoside malvidol	0,5	0,2	1,0	0,8	0,4	0,3	0,5	0,2
Petunidin-3-glucoside	6,3	3,2	3,6	1,4	6,7	4,7	8,7	6,2
Peonidin-3-glucoside	2,4	2,3	2,2	1,1	3,0	2,9	4,0	3,0
Malvidin3-glucoside	30,1	45,0	23,7	15,6	53,8	45,3	38,3	33,2
Σ associated anthocyanin	56,5	48,6	65,8	79,0	32,4	44,6	40,0	50,7

Analyzing the data, we can say that the red wine produced from local grapes, bringing on the content of anthocyanins in wines from European varieties. This low percentage concentration diglucoside malvidola - 0.2-1.0% of the total amount of anthocyanins and quite high - malvidin-3-glucoside – 15,6-53,8%.

According to the literature, malvidin-3-glucoside is the major anthocyanin coloring in red wines from European grape varieties. Moldovan grape wines examined in this study are highlighted in large content malvidin-3-glucoside, especially Feteasca Neagra (53.8%) and Rara Neagra (45.3%).

Of the other monomeric flavonoids, normally found in the skin of the grape berries, and then in red wine, along with anthocyanins were found quercetin and rutin. Their contents are shown in *Table 2*, and the chromatographic profile - in *Figure 1*.

Table 2. Monomeric flavonoids in red grape wines in Moldova

Red wines	Quercetin, mg/dm^3		Rutin, mg/dm^3	
	vintage 2009	vintage 2010	vintage 2009	vintage 2010
Feteasca Neagra	0,57	0,97	5,45	4,09
RaraNeagra	0,63	0,43	4,09	2,9
Kodrinsky	4,57	3,65	10,46	12,67
Cabernet-Sauvignon	3,08	9,17	9,20	8,92
Merlot	8,90	10,72	13,1	14,6

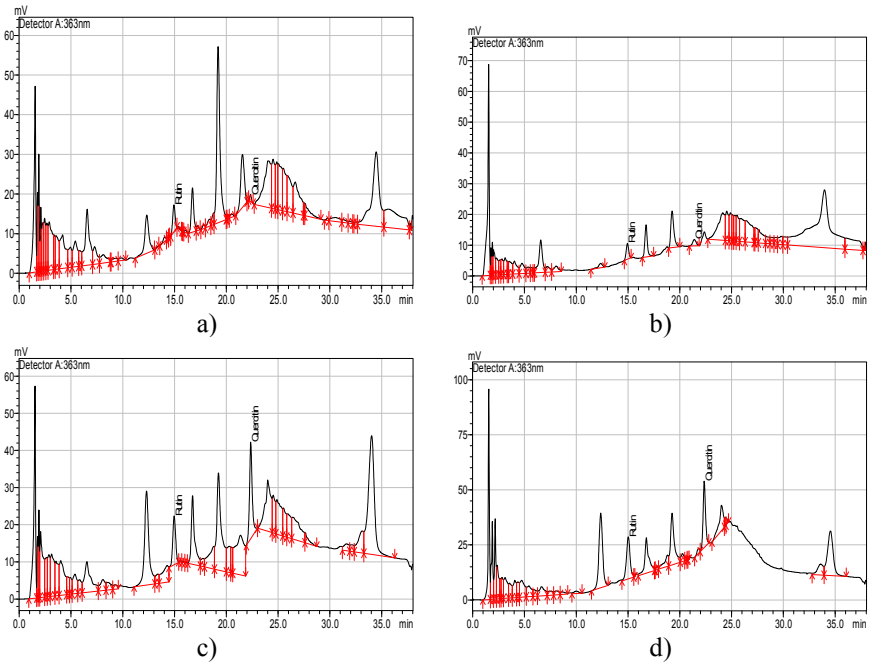

Fig. 1. Chromatogram quercetin and rutin in red wines: a) Feteasca Neagra b) Rara Neagra c) Kodrinsky d) Cabernet Sauvignon.

According to the results presented in *Table 2* and *Figure 1*, the wine from local grapes and Feteasca Neagra Rara Neagra the content of quercetin and rutin were markedly different from the classic Cabernet Sauvignon and Merlot, these substances in the past it was much more. While wine varieties Kodrinsky the content of quercetin - 4.57 and routine - 12.67 mg/dm^3 consistent Cabernet Sauvignon and Merlot.

Of monomeric polyphenols neflavonoidnyh grapes we have identified resveratrol, shown in *Table 3* and *Figure 2*.

Table 3. Stilbene compounds in red grape wines in Moldova

Red wines	Resveratrol, mg/dm^3	
	vintage 2009	vintage 2010
Feteasca Neagra	7,36	9,47
RaraNeagra	1,21	4,04
Kodrinsky	5,86	4,66
Cabernet-Sauvignon	3,20	4,25
Merlot	3,80	4,15

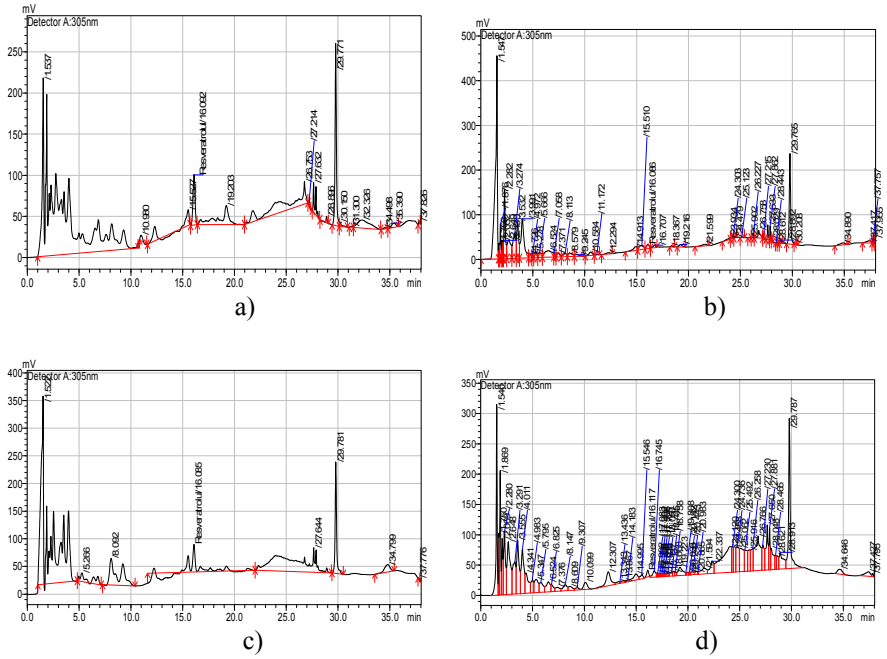

Fig. 2. Chromatogram of the resveratrol in red wine: a) Feteasca Neagra b) Rara Neagra c) Kodrinsky d) Cabernet Sauvignon.

According to the content of resveratrol Moldovan grape wines Feteasca Neagra (9.47 mg/dm^3) and Kodrinsky (5.86 mg/dm^3) can compete with European varieties. This suggests that these varieties are worthy of further study.

Conclusion

We found that the polyphenols in grapes, which have antioxidant activity in red Moldovan wines are mostly monomeric anthocyanins and their derivatives (cyanidin, delphinidin, peonidin, petunidin), flavonoids (quercetin and rutin) and stilbene compounds (resveratrol).

Concentration, in which these substances are contained in the studied wines can judge their biological activity or sufficient value because, in the opinion of many scientists, these groups of polyphenols act as antioxidants and antimutagenic in humans [4,9].

Studies on the identification of polyphenols have biological activity, it is appropriate to continue, given the wide range of red grapes grown in Moldova, and the objective justification of new technology making red wines, fortified by these substances

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