ANTIOXIDANT ACTIVITY IN RED WINES FROM LOCAL VARIETIES OF REPUBLIC MOLDOVA

Skorbanov E.
Obadă L., Taran N., Tampei O., Rinda P., Degteari N., Cernei M.

Scientific and Practical Institute of Horticulture and Food Technology
Skorbanov E., e–mail: oenocontrol@rambler.ru

Summary: Most red varieties of grapes grown in Moldova, accumulate a fairly large amount of phenolic substances, which have a pronounced antioxidant activity. In red wines the main representatives of these compounds and their derivatives are monomeric anthocyanins (cyanidin, delphinidin, peonidina, petunidin), flavonoids (quercetin and rutin) and stilbenes (resveratrol).

Using high performance liquid chromatography (HPLC) allows the determination in red wine of local varieties, the differentiated anthocyanins: cyanidin, delphinidin, peonidin, petunidin; resveratrol, quercetin, rutin, gallic acid and antioxidant activity (AAO, mg/dm3 expressed in quercetin).

These compounds and AAO index were studied in red wine: Codrinschii, Rara neagră, Copceac, Feteasca neagră, Flacăra, Negru de Căușeni, Negru de Ialoveni, Demetra, Busuioacă de Bohotin in different years made in section micro–winemaking IȘPHTA. It was found that the content of these compounds in wines analyzed are: gallic acid – (2.6 to 17.8) mg/dm3, quercetin (0.4 to 10.7) mg/dm3, routine – (0.7 to 14 6) mg/dm3, rezveratrol – (1.2 to 9.5) mg/dm3, AAO – (431–1136) mg/dm3 expressed in quercetin.

Concentrations in which these substances are found in red wines from local grape varieties provide their biological activity.

Key words: red wines, antioxidant activity, red wines, local varieties, Moldova

Introduction

The antioxidant activity in red wines due to the content in red grapes of many compounds, especially phenolic compounds: flavonoids (quercetin, rutin, proanthocyanidins), resveratrol, phenolic acids, micro– and macro–elements, amino acids, organic acids, etc.

Phenolics are the most common components of red grapes as carbohydrates and organic acids. Biological activity of catechins, flavonoids and their glycosides in grapes are well known in the art. According to some researchers [1, 2, 3, 4], antioxidant activity depends on the characteristics of grape varieties, cultivation site, winemaking technology.

Previously, the antioxidant properties of red wine associated only with trans–resveratrol [5]. In recent years, however, have shown that a significant contribution to total antioxidant activity of making and other compounds such as phenolic – catechins, epicatechin rutin, quercetin, myricetin, kempferolul, flavonoids, anthocyanins (delphinidin, cyanidin, petunidin, peonidin, malvidin) [6, 7].

In addition, red wines contain organic acids with antioxidant properties: benzoic acids (gallic, lilac, proto catechin, vanillic) coumaric (p–coumaric, caffeic, ferulic, sinapic), ascorbic and citric. It has been found that even at relatively low concentrations (from 0.01 to 0.001%), antioxidants reduce the oxidation rate of the process [8].

Most red varieties of grapes grown in Moldova, accumulate a fairly large amount of phenolic substances, which have a pronounced antioxidant activity. In red wines the

main representatives of these compounds and their derivatives are monomeric anthocyanins (cyanidin, delphinidin, peonidina, petunidin), flavonoids (quercetin and rutin) and stilbenes (resveratrol).

Materials and methods

Have been researched red wines from local varieties: Codrinschii, Rara Neagră, Feteasca Neagră, Flacăra, Negru de Căușeni, Demetra, Busuioacă de Bohotin, Copceac.
For determination of the rutin, quercetin, resveratrol, ascorbic and gallic acids was used the method HPLC , chromatograph LC–20A Prominence, Shimadzu, column: ODS 5 um hypersil (4.6mm x 150mm), detector: SPD–20AV UV / VIS.
For determination of the colorants – spectrophotometric method [9], of antioxidant activity (AOA) – colorimetric method wherein AOA is expressed in terms of quercetin [10].

Results and discussion

In the table 1 shows the average amount of the compounds referred to above, in red wines from local grapes, vintage 2011, 2012 and 2013. Data represent the arithmetic mean of the results obtained from the analysis of several samples of each wine grape varieties. Number of samples is indicated in each case (*).

It should be noted a significant difference in the content of the studied components causing AOA in red wines of local varieties of vintage 2011, 2012 and 2013. So in wine of Codrinschii in different years amount of resveratrol ranged from 0.6 to 3,7 mg/dm3 and was slightly higher than in other varieties of wines. Rutin contains from 5,7 mg/dm3 (Negru de Ialoveni) to 59 mg/dm3 (Copceac). The greatest number of quercetin found in the variety of Demetra 4,5 mg/dm3 to 8,5 mg/dm3. Ascorbic acid was present in all the wines in small quantities. Gallic acid was second after rutin by the contents. Its amount in wines ranges from 5 mg/dm3 (Busuioaca de Bohotin) to 21,8 mg/dm3 (Codrinschii). The difference in the content is also was observed in different years of vintage.

Differed varieties and accumulation of colorants. The greatest number of them contained in the wines Copceac (412–417 mg/dm3), Flacara (475–602 mg/dm3) and Negru de Causeni (401 mg/dm3). A small amount of colorants was observed in wines Rara Neagra (127–209 mg/dm3) and Busuioaca de Bohotin (116 mg/dm3).

The greatest value of the index AOA was observed in Copceac (1002–1008 mg/dm3 expressed in quercetin) and Negru de Causeni (1136 mg/dm3 expressed in quercetin). Smallest – the Rara Neagra (361–431 mg/dm3 expressed in quercetin) and Busuioaca de Bohotin (407 mg/dm3 expressed in quercetin). This may indicate some correlation AOA indicator and concentration colorants This agrees with data from other investigators [6, 7]. In wines Codrinschii, Feteasca Neagra, Negru de Ialoveni and Flacara AOA indicator was high enough from 602 to 862 mg/dm3 expressed in quercetin.

Table 1. The average content of different compounds that determine antioxidant activity in red wines produced from local varieties

Titles of samples	Vintage	Colorants mg/dm^3	Diglico–zid malvidin mg/dm^3	Resverat–rol mg/dm^3	Rutin, mg/dm^3	Querci–tin mg/dm^3	Ascorbic acid, mg/dm^3	Galic acid mg/dm^3	AOA, mg/dm^3 expressed in [illegible]
Codrinschii	2011–2013	248–371	0,7–12,7	0,6–3,7	10,7–16,1	0,6–7,2	0,5–2,4	5,8–21,8	660–866
Rara Neagra	2011–2013	127–209	0,8–2,3	0,5–1,8	6,7–23,8	0,2–5,8	0,1–1,1	6,3–20,3	361–431
Feteasca Neagra	2011–2013	264–381	1,5–3,0	0,6–2,6	6,2–11,9	0,2–3,7	0,7–1,0	7,5–18,9	806–895
Negru de Ialoveni	2013	267	6,8	0,4	5,7	12,8	1,9	26,4	602
Copceac	2012–2013	412–417	2,7–3,1	0,3–1,7	24,8–59,0	2,1–11,1	0,1–1,3	10,3–18,3	1002–1086
Flacara	2012–2013	475–602	103–124	0,1–0,2	11,0–18,8	6,3–9,7	0,1–0,6	13,1–13,5	770–862
Demetra	2012–2013	240–285	0,7–2.6	1,7–2,2	12,1–14,8	4,5–8,5	0,4–0,8	14,2–19,8	490
Negru de Causeni	2013	401	4,0	1,2	48,0	1,7	1,6	17,8	1136
Busuioaca de Bohotin	2013	116	1,0	0,3	13,9	0,2	0,5	5,0	407

*Codrinschii – 13 samples; Rara Neagra – 7 samples; Feteasca Neagaă – 9 samples; Copceac – 2 samples; Flacăra – 8; Negru de Causeni – 2 samples; Demetra – 6 samples, Negru de Ialoveni, Busuioaca de Bohotin – 1 sample

Conclusion

Studies have shown that red wine from local grapes Copceac, Negru de Causeni, Codrinschii, Feteasca Neagra, Negru de Ialoveni Flacara have sufficiently high antioxidant activity.

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