THE ANTIOXIDANT CAPACITY OF NEGRU AROMAT WINES ENRICHED WITH ARONIA MACERATE

CAPACITATEA ANTIOXIDANTĂ A VINULUI DE NEGRU AROMAT IMBOGĂȚIT CU MACERAT DE ARONIA

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Abstract. *This study was aimed to identify a source of antioxidants, compatible with the composition of the wine in order to be used for obtaining an antioxidant capacity of wines with a value of 4000 µmol Trolox/150 mL wine. The optimal dose of the macerate was established on the basis of the relationship between the dose of the macerate and total antioxidant capacity of the wine. For the enriched wine the polyphenolic and sensorial profile was established. The macerates of Aronia were made in wine and in synthetic wine solution. The maceration in wine, at a rate of 7, 15 and 25% was performed at room temperature. The total antioxidant capacity of wines was estimated using the TEAC method. The relationship between the dose of added macerate and total antioxidant capacity of the wine was linear and statistically. The lower dose 7% of Aronia macerate didn't modified the sensory profile and polyphenolic content of wines, while average doses of 15, 25% had improved the wines quality.*
Key words: antioxidant capacity, *Aronia* macerat, polyphenolic content

Rezumat. *Studiul a fost realizat pentru a identifica o sursă de antioxidanți, compatibilă cu compoziția vinului, care să fie utilizată pentru realizarea capacității antioxidante proiectate a vinului de 4000 µmol Trolox/150 mL vin. Doza optimă de macerat s-a stabilit pe baza relației dintre doza de macerat şi capacitatea antioxidantă totală a vinului. Vinului imbogatit i s-a definit profilul polifenolic şi senzorial. Maceratele de Aronia au fost realizate în vin şi în soluție sintetică de vin. Macerarea în vin s-a realizat la temperatura ambiantă. Maceratele au fost adaugate în vin în proporție de 7, 15 şi 25% (vol/vol). Capacitatea antioxidantă a vinului a fost estimată prin metoda TEAC. Relația dintre doza maceratului adăugat în vin şi capacitatea antioxidantă totală a vinului a fost liniară şi asigurată statistic. Dozele mici (7%) de macerat de Aronia, nu au modificat profilul polifenolic şi senzorial al vinului, iar dozele medii (15, 25%) au îmbunătățit calitatea vinului.*
Cuvinte cheie: capacitate antioxidantă, macerat de Aronia, conținut de polifenoli

INTRODUCTION

The wine is a food whose biological value is given by its many therapeutic properties. Red wines contain high levels of antioxidants with an important role in

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preventing and repairing damages caused by free radicals (Elford, 1991). The beneficial effects of moderate consumption of wine, especially red wines, in the decrease on mortality risk caused by cardiovascular, neurodegenerative diseases and certain types of cancers have been highlighted by numerous epidemiological studies (Bagchi *et al*., 2000; Briviba *et al*., 2002; Katalinic *et. al*., 2004; Rusoo, 2007). Consequently, the interest in developing the methods to obtain wines very rich in antioxidants has incresed.

Antioxidants are compounds major, responsible for therapeutic effects of wine. As a consequence of increasing of concentration of antioxidant in wine, the biological value of the wine is greater. The total antioxidant capacity of grapes was valued at 2016 µmol Trolox/100 g, corresponding to wine production potential rich or very rich in antioxidants.

Phenolics are responsible for many important properties of wine including color, bitterness, astringency and antioxidant capacity. The concentration and composition of phenolics in red wine are depend on environmental and management factors such as climate, soil conditions, canopy management factor (Jackson and Lombard, 1993).

MATERIAL AND METHOD

The study was conducted during 2015 year, at the ICDVV Valea Călugărească Institute in microvinification conditions. Source of antioxidants dry bio *Aronia* fruit was used. The maceration was done in two variants, in synthetic solutions for wine and wine. The macerate in wine was performed at room temperature. The optimal duration of maceration was established as the duration of the total antioxidant capacity was maximum ratio of macerate. The ratio between fruit and wine was 125 g/1000 mL. The macerates were added to wine in a 7, 15 and 25% (vol/vol). Each experimental variant was conducted in three repetitions.

The total antioxidant capacity of wines was estimated using the TEAC method, based on the scavenging of $ABTS^{+\cdot}$. The red wines were diluted with ethanol 10 or 100 times, depending on the obtained absorbance. Then 100 µL of diluted sample, Trolox or ethanol were mixed with 2.9 mL diluted ABTS radical solution and after 3 min the absorbance was measured at 735 nm, the results being expressed as µmol Trolox/150 mL wine. The quntity of 150 mL is considered one serving of wine.

For the determination of the total content of polyphenolic compounds in wines the DO280 index was considered: wine was diluted with distilled water (1:100) and the absorbance was measured directly at 280 nm. The value of OD 280 index for each sample was given as the absorbance multiplied by the proper dilution rate (Ribereau-Gayon, Dubourdieu and Donèche, 2006).

The determination of catechins (flavan 3-ols) is based on the reaction of the phloroglucinol ring with vanillin, that produces a red colour with a maximum absorption at 500 nm. For quantitative evaluation, a calibration curve is traced, by using a solution of (+)-catechin in etanol de 96% (Amerine and Ough, 1974*).*

The experimental estimation of tartaric esters is based on the specific absorbtion wavelength of 320 nm.

RESULTS AND DISCUSSIONS

1. Evaluation of the total antioxidant capacity of dry Aronia fruits macerate and polyphenolic characterization of their composition

The maceration was done in Negru aromat wine, 2015 harvest, which had a total antioxidant capacity of 3654 µmol Trolox/150 mL was observed in case of macerate in wine. *Aronia* dry fruit maceration in synthetic solutions of wine and in wine caused obtain extracts that were differentially by their total antioxidant capacity (fig. 1). Minimum value (3250 µmol Trolox/150 mL) the macerate at wine synthetic solution.

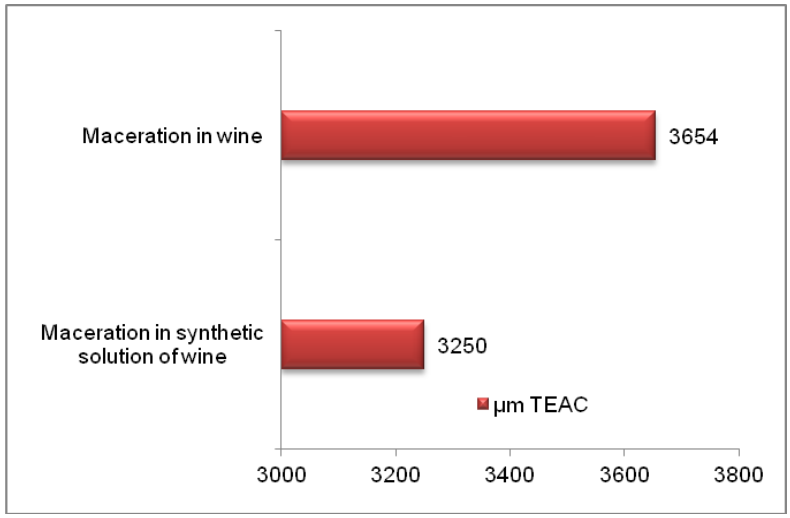

Fig. 1 The total antioxidant capacity (µmol Trolox/150 mL) of macerate from dry *Aronia* fruits

2. **Modeling the relationship between the dose of *Aronia* fruits macerate and total antioxidant capacity of wine enriched in antioxidants**

The relationship between the dose macerate for wine enrichment added antioxidants and total antioxidant capacity of wine was liniar (fig. 2). The coefficient of determination was 0.9968.

$$Y=115.88x + 3726.91$$

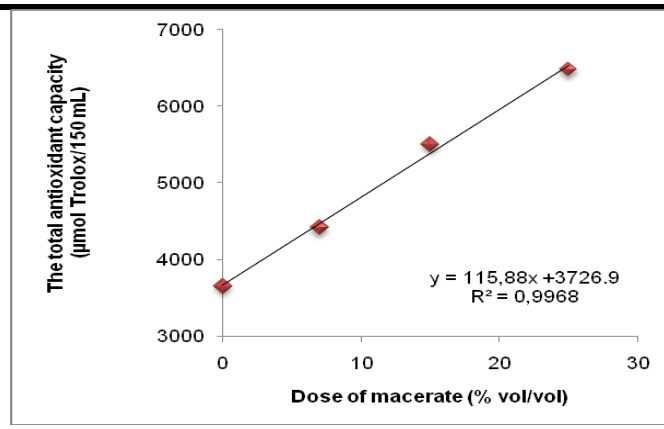

Fig. 2 The influence of the type and the dose of the macerate on the total antioxidant capacity of the Negru aromat wine, 2015 harvest

Comparative analysis of total antioxidant capacity calculated based on the mathematical model and determined by chemical analysis allowed to assert with a 95% probability that the results obtained were reproductibility of 15 micromol Trolox/150 mL wine.

3. Polyphenolic profile of Negru aromat wine enriched in antioxidants

The structure of polyphenolic profile of Negru aromat wine was more and less modified. The addition of 7% macerate, regardless of type, caused smaller increases (<10%) to DO280, anthocyanins and catechins (fig. 3). Substantial increases (<15%) were recorded at the tartaric acid esters of phenolic acids and tannins.

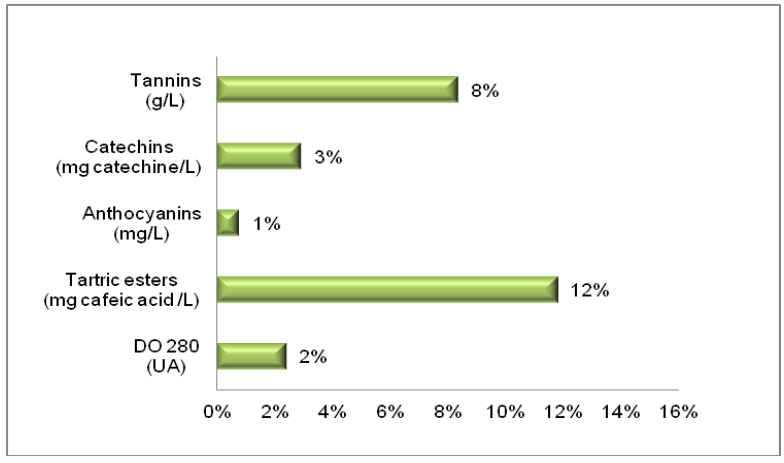

Fig. 3 Modification of polyphenolic content of Negru aromat wine by enrichment with 7% macerate of *Aronia*

The dose of *Aronia* macerate 15% significantly modified the concentration of all polyphenolic compounds, with the exception of the anthocyanins which recorded increases of less than 5% (fig. 4).

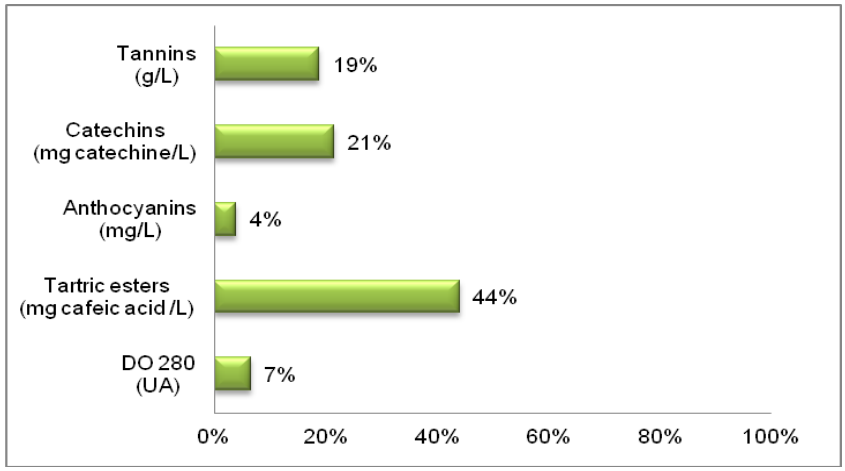

Fig. 4 Modification of polyphenolic content of Negru aromat wine by enrichment with 15% macerate of *Aronia*

When the macerate dose was 25% the full composition of the wine polyphenols has changed. Very high quantitative increase of acid esters of phenolic acids (67%), catechins 24%) and tannins (21%) were recorded (fig. 5).

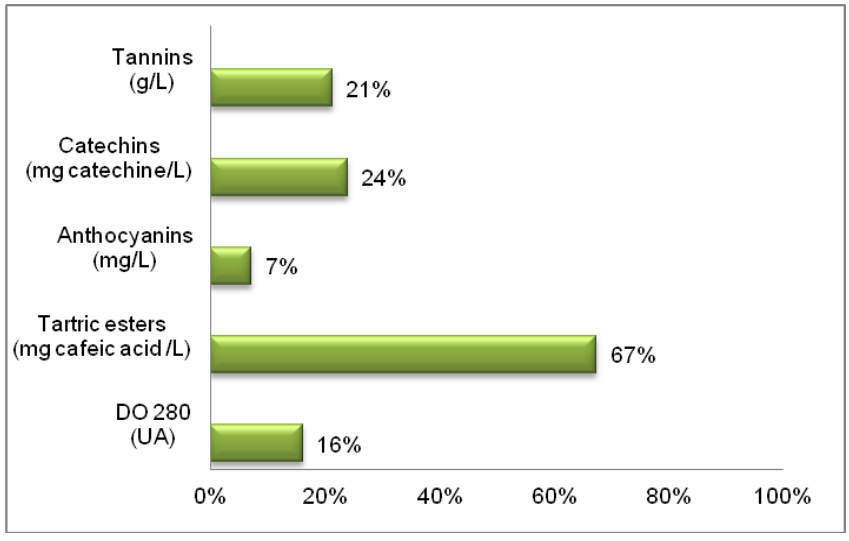

Fig. 5 Modification of polyphenolic content of Negru aromat wine by enrichment with 25% macerate of *Aronia*

CONCLUSIONS

1. The structure of polyphenolic profile of Negru aromat wine was more and less modified. The addition of 7% macerate, regardless of type, caused smaller increases (<10%) to DO280, anthocyanins and catechins.

2. The dose of *Aronia* macerate 15% significantly modified the concentration of all polyphenolic compounds, with the exception of the anthocyanins which recorded increases of less than 5%.

3. When the macerate dose was 25% has changed the full composition of the wine polyphenols. Very high quantitative increase were recorded from tartaric acid esters of phenolic acids (67%), catechins 24%) and tannins (21%).

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