

THE STUDY OF THE ANTIRADICALIC ACTIVITY OF SOME POLYPHENOL EXTRACTS OBTAINED FROM *VITIS VINIFERA*

STUDIUL ACTIVITĂȚII ANTIRADICALICE A UNOR EXTRACTE POLIFENOLICE OBȚINUTE DIN *VITIS VINIFERA*

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Abstract. Many polyphenol compounds from medicinal plants and food have an antiradicalic role, mainly in what the digestive tract is concerned because of the enzyme inhibition that catalyses the formation of species of reactive oxygen and/or by capturing them, having a benefic role in preventing and improving aging degenerative affections; that is poor immunity, brain dysfunctions of the nervous system etc. In this context it was studied the antiradicalic activity of three polyphenol extracts that were obtained from the following varieties Negru de Drăgășani, Arcaș and Chambourcine. The antiradicalic properties were evaluated through the inhibition capacity of the organic radical 1,1-diphenyl-2-picryl-hydrazyl (DPPH). Therefore it was determined that the antiradicalic activity of the studied extracts is in general high going to very high, this kind of activity was noticed at Negru de Drăgășani variety.

Key words: seed, grape, polyphenols, antiradical activity

Rezumat. Mulți compuși polifenolici din plantele medicinale și alimente au un rol antiradicalic în principal în tractul digestiv prin inhibarea enzimelor ce catalizează formarea speciilor oxigen reactive și/sau captarea lor, cu rol benefic în prevenirea și ameliorarea afecțiunilor degenerative ale îmbătrânirii, respectiv imunitate deficitară, disfuncții ale creierului și ale sistemului nervos etc. În acest context a fost studiată activitatea antiradicalică a trei extracte polifenolice obținute din semințele soiurilor Negru de Drăgășani, Arcaș și Chambourcine. Proprietățile antiradicalice au fost evaluate prin capacitatea de inhibare a radicalului organic 1,1-difenil-2-picril-hidrazil (DPPH). Astfel, s-a constatat că activitatea antiradicalică a extractelor studiate este în general mare, spre foarte mare, remarcându-se soiul Negru de Drăgășani.

Cuvinte cheie: semințe, struguri, polifenoli, activitate antiradicalică

INTRODUCTION

Many studies concerning the antioxidant and the caption activity of the free-radicals by the polyphenol compounds from plants have highlighted the key role of the free-radicals in many fundamental cellular activities and have suggested that the oxidative stress may be important for the pathology of the common diseases (Fukumoto et al., 2000; Shih et al., 2007; Elisia et al., 2008).

Many polyphenol compounds from medicinal plants and food have an antioxidant role, mainly in the digestive tract through the inhibition of the

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enzymes that catalyze the formation of reactive species of oxygen and/or their caption with a benefic role in the prevention and the improvement of aging degenerative affections; that is poor immunity, brain dysfunctions and dysfunctions of the nervous system etc. (Ames et al., 1993; Okezie and Aruoma, 1998). Recent research has shown that the active oxygen radicals participate at the carcinogenesis. There was also signaled the contribution of the oxygenated radicals concerning the initiation and the development of the tumors but also the inhibant effect of the antioxidants that have the properties to capture the free-radicals (Matito et al., 2003). In this context, the researches from this paper aim at highlighting the antiradicalic activity of some polyphenol extracts obtained from *Vitis vinifera*.

MATERIAL AND METHOD

The polyphenol extracts that were studied were obtained from grape seeds from Arcaş, Negru de Negreşti and Chambourcine. The extraction procedure was done in a continuous system in the Soxhlet device, being used ethanol as a solvent in a proportion of 1/10 (vegetal material (g)/ solvent (mL)). For the preliminary characterization of the polyphenol extracts were determined the total polyphenols using the Folin-Ciocalteu method and the index of tanoid matters (ITM) through the method that was established by Bourzex. Also, by analyzing the HPLC (chromatography of high performance liquids) were identified and quantized a series of stilbens (trans-resveratrol), non-hydrolyzable tannins (catechin and epicatechin) as well as some flavones (rutin and quercetin).

It was evaluated the capacity of antiradicalic properties of polyphenol extracts to inhibit the organic radical 1,1-diphenil-2picryl-hydrazyl (DPPH) (Brand – Williams et al., 1995). Therefore, on the basis of the concentrations of DPPH radical that remained unknown in the methanolic solution, the dilution was identified as being efficient, ED 50, meaning that dilution of the extract that reduces with 50% the quantity of DPPH radical from the initial solution (D0 dilution).

RESULTS AND DISCUSSIONS

Concerning the evaluation of the antiradicalic properties, the polyphenol extracts that were studies were first submitted to a process of characterization, the results being written in table 1

Table 1

The characterization of the polyphenol extracts obtained from grape seeds

Parametrii analizați	Arcaş extract	Negru de Drăgășani extract	Chambourcine Extract
Analyzed parameters	2.53	1.90	2.75
Total polyphenols, g echiv. galic acid/L	38.4	31.6	41.6
Index of tanoid matter	2.427	2.435	2.433
Trans-resveratrol, mg/L	3.949	9.319	2.162
Catechin, mg/L	3.691	3.584	3.890
Epicatechin, mg/L	1.074	0.749	1.125
Rutin, mg/L	1.752	1.752	1.529

From the values that were obtained it is noticed a reduced variability of the chemical constants depending on the taxonomy of the vegetal matter (seeds) that was submitted to the extraction procedure. However it is noticed the polyphenolic

extract that was obtained from Negru de Drăgășani, which has even higher values for catechin (9,319 mg/L), in comparison with the other two polyphenol extracts that are studied.

The analysis of the antiradical activity of the extracts was based on developing more dilutions, from D0 to D4, to which was measured their capacity to reduce to half the quantity of added DPPH• radicals. It is known the fact that if the effective dilution – DE50 is higher, then the antiradical activity is superior. For each determination it was eliminated from the calculus the oxidation of the diphenyl-picryl-hydrazyl radical from the methanolic solution under the influence of factors like environment, air, light and temperature. Therefore it was used a “blind” sample, that contains only methanolic solution in which case it was traced its antiradicalic power until it was obtained a plateau for each of the 5 dilutions.

In the case of the seeds extract from Negru de Drăgășani were used five dilutions, the results that were obtained previously to the reading of the spectrophotometer are presented in table 2.

Table 2

Antiradicalic activity of the seeds extract from Negru de Drăgășani

Quantity of analyzed extract	Equivalent dilution	Read absorbance	DPPH concentration	% DPPH remained
D0 0 μL extract	control sample	0.955	0.078432	0
D1 7,5 μL extract	1/533	0.057	0.004880	93.7780655
D2 5 μL extract	1/800	0.422	0.034776	55.6611458
D3 2,5 μL extract	1/1600	0.654	0.053778	31.433405
D4 1 μL extract	1/4000	0.774	0.063607	18.901815

From the figure 1 it may be observed that for a concentration of 50% DPPH that remained are needed 4,5 micro liters of extract that correspond with a dilution of 1/888. This dilution of 1/888 is equal or higher than the specific values for a red wine.

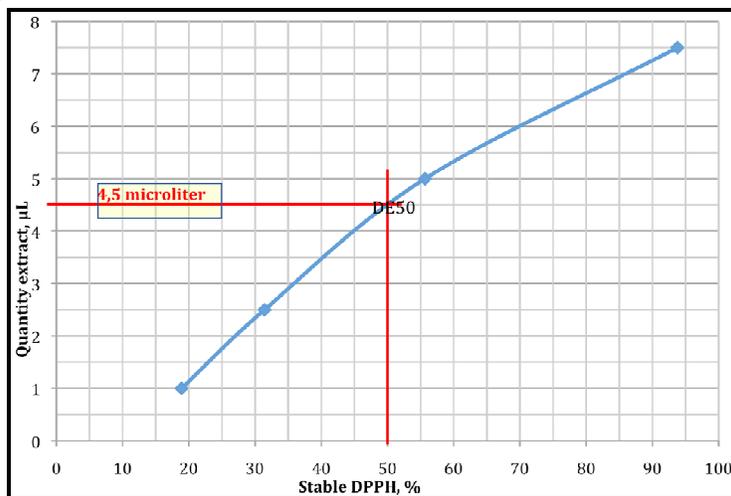


Fig. 1 – Efficient dilution (ED50) for the seeds extract obtained from Negru de Drăgășani

In the case of the seeds extract from Arcaș it is noticed that for a

concentration of 50% DPPH that remained are necessary 7,3 microliters of extract, which correspond with a dilution of 1/689 (table 3, figure 2). This dilution of 1/689 is equal or even higher than the specific values for a red wine.

Table 3

Antiradical activity of the seeds extract from Arcaş

	Quantity of analyzed extract	Equivalent dilution	Read absorbance	DPPH concentration	% DPPH remained
D0	0 µL extract	control sample	1	0.082118	0
D1	12,5 µL extract	1/320	0.045	0.003897	95.25424
D2	7,5 µL extract	1/533	0.484	0.039854	51.46721
D3	5 µL extract	1/800	0.699	0.057464	30.02254
D4	2,5 µL extract	1/1600	0.88	0.072289	11.96912

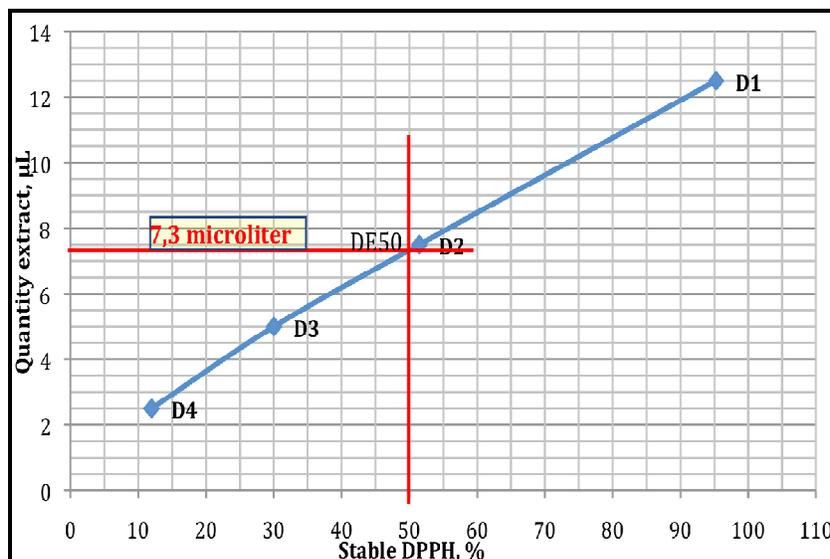


Fig. 2 – Efficient dilution (ED50) for the seeds extract obtained from Arcaş

Also, in the case of the seed extract from Chambourcine it is noticed that for a concentration of 50% DPPH that remained are necessary 5,6 microliters of extract, which correspond with a dilution of 1/714 (table 4, figure 3). And in this case, the dilution of 1/714 is equal to or even higher than the specific values for a red wine.

Table 4

Antiradical activity of the seeds extract from Chambourcine

	Quantity of analyzed extract	Equivalent dilution	Read absorbance	DPPH concentration	% DPPH remained
D0	0 µL extract	control sample	0.958	0.078678	0
D1	7,5 µL extract	1/533	0.26	0.021507	72.66443
D2	5 µL extract	1/800	0.549	0.045178	42.57844
D3	2,5 µL extract	1/1600	0.8	0.065737	16.4484
D4	1 µL extract	1/4000	0.873	0.071716	8.848821

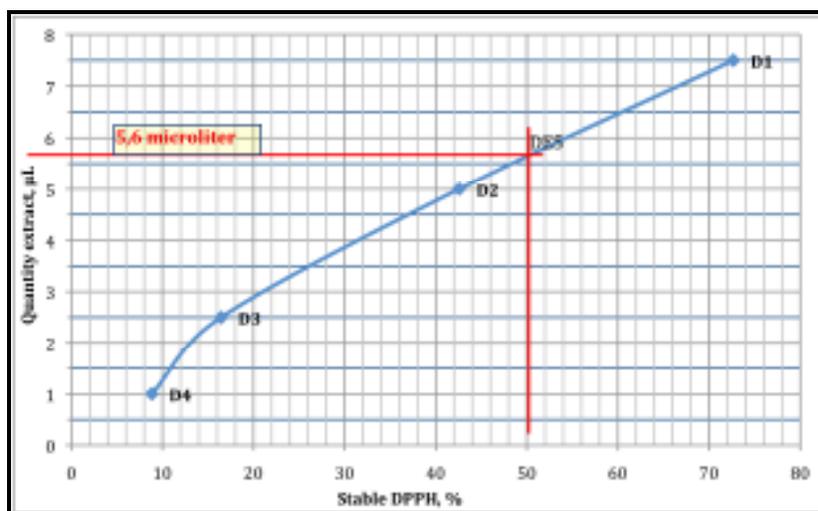


Fig. 3 – Efficient dilution (ED50) for the seeds extract obtained from Chambourcine

The antiradical power of the extracts that were studied is generally higher. Although it is important to know that the blockage of the free radicals does not take place immediately but in a higher or a smaller interval, a thing that allows certain reactions of the chemical compounds from the polyphenol extracts. This element is important mainly because of the evaluation of the biological effects of the extracts, that is the activities of the tissues from the body.

CONCLUSIONS

1. The results of the preliminary characterization process of the polyphenol extracts that were obtained from varieties of seeds like Arcaş, Negru de Drăgăşani and Chambourcine, justify the study of the antiradicalic properties.
2. The antiradicalic activity of the extracts that were studied is high going on very high, it is similar with the one of the red wines, being noticed the extract that was obtained from the seeds of Negru de Drăgăşani.

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