STUDIES REGARDING THE TOTAL POLYPHENOLS CONTENT FROM SEVERAL RED GRAPE VARIETIES

STUDII PRIVIND CONŢINUTUL TOTAL DE POLIFENOLI DIN CÂTEVA SOIURI DE STRUGURI ROŞII

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Abstract: *The latest studies outlined the important role of polyphenols from grapes and wines, especially from red variety. The polyphenols are those antioxidants compound who favouring the biochemical reactions which protect the cardiovascular system and also have an antiviral and bactericidal effect. The aim of this paper was to determinate the variations of polyphenols content in different parts of grapes. The grapes varieties taken for study are*: *Cabernet Sauvignon, Merlot, Burgund mare and Muscat Hamburg.*

Rezumat: *Ultimele studii au evidenţiat rolul important al polifenolilor din struguri şi vin, mai ales din soiurile roşii. Polifenolii sunt compuşii antioxidanţi care favorizează reacţiile biochimice ce protejează sistemul cardiovascular, având de asemenea şi efect bactericid .Scopul acestei lucrări a fost de a determina variaţia conţinutului în polifenoli din diferitele părţi ale strugurilor. Soiurile luate în studiu sunt: Cabernet Sauvignon, Merlot, Burgund mare and Muscat Hamburg.*

Polyphenols are antioxidant compounds found in grapes, especially in skin, seeds and rachis of grapes. Antioxidants are substances that protect cells from oxidative damage caused by molecules called free radicals. In grapes and wine the polyphenols include: catechins, epicatechins, gallic acid, anthocyans, flavones, resveratrol

When wine is made the alcohol produced by the fermentation process dissolves cells membranes and the polyphenols contain in the skin and seeds pass in wine. So, for this reason, the red wine contains more polyphenols than white wine because the making of white wine requires the removal of the skins after the grapes are crushed. The last years the interest in these components has increase due to their relationship to human health. Several studies have proved that antioxidants such as polyphenols help the body to protect against deteriorative reactions and diseases. [1] Gutiérrez (2002) demonstrated that polyphenols may have a protective effect against cardiovascular diseases or even some kinds of cancer. Polyphenols extract from grape help the body to protect against damage produced by sun shines, to improve vision and blood circulation, to reduce LDL (Low Density Lipoproteins) oxidation and the occurrence of coronary diseases.[5] Medina et al. (2002) indicated that polyphenolic extracts of grape and apple present a high antioxidant of natural fats and oils. Beyond the benefits for human health, polyphenols have a wide range of applications in the food industry as

colorants, functional additives in beverages, dairy products, candies, bakery and cereals. Natural antioxidants for example can be used to increase shelf life of food by preventing lipid peroxidation and protecting oxidative damage. [4]

MATERIALS AND METHODS

Polyphenolic content of grape varies with: variety, soil composition, climate, geographic origin, and cultivation practices. Total phenolic content is higher in red varieties due almost entirely to anthocyanin density in red grape skin compared to absence of anthocyanins in white grape skin. [7]

For this motive we have been studied four red grape varieties harvested from two viticulture areas: West Carpathian Area (Timiş vineyard, Recaş wine-growing centre) and South Carpathian Area (Dealul Mare vineyard, Merei wine-growing centre). We took in study three grape wine varieties: Cabernet Sauvignon, Merlot, Burgund mare and one table grape variety: Muscat Hamburg.

The grapes were harvested at the stage of complete maturity. The sample size, used for the mechanically analyze, was one kilo for each grape variety. The pulp berries, skins (peels), seeds and rachis of grapes were separated from fresh grapes.

The peels, seeds and rachis were dried at 60-70°C, made powder and stocked at 25°C. The must was filtrated and kept in the freezer at -20°C. The samples used further for analysis was prepared in AGRIAL (Biomedical and Agroalimentary Expertise Laboratory) from USAMV Cluj-Napoca. The polyphenolic constituents were extracted from the plant material by a series of successive extraction [6].

For extraction, 0,5 ml must samples (**M)** were mixed up with 4,5 ml solvent (ethanol 40%). Samples were exposed to ultrasound at a constant frequency 15min. After that, samples were taken out of ultrasound bath and for measurement was used 2 ml.

100 mg of dried samples **(**peels-**P**, seeds-**S** and rachis-**R)** were added by 15ml of solvent (ethanol 40%), shaken until to homogenizes and exposed, in an ultrasound bath, to ultrasound treatments at a constant frequency over 30 min. The extract obtained was filtered through filter paper and then was measured by spectrophotometer. Total polyphenols content of extracts was determined as catechol and galoil equivalents by using a calibration curve of catechol solutions of known concentration.

The total polyphenols were determinate by spectrophotometry method with Folin-Cicâlteu reagent. After the reaction with [$FeNH_4(SO_4)_2$] reagent, we have been determinate the absorption at 578 nm for catechil groups and at 680 nm for galoil groups. The measurement was made as against gallic acid standard curve (in 4 different concentrations). Standard curve ecuation is:

$$Abs = A + B \times c$$

where: A = 0,0571
B = 0,4886

$$c = \frac{Abs - A}{B}$$

Regarding samples dilutions formula is:

$$Conc(\ mg/100\ g\ sample\ s) = \frac{c \times 10^5 \times V_1}{m \times V_2}$$

where: V_1= 25 ml; V_2= 4 ml
m – mass of peels (**P**); seeds (**S**); rachis (**R**) must (**M**)

For must dilutions final formula is: $$Conc(\ mg/100\ g\ samples\ ) = \frac{c \times 100 \times V_1}{V_2 \times V_0}$$

where: V_0= 1 ml; V_1= 10 ml; V_2= 8 ml

RESULTS AND DISCUSSIONS

The results regarding total polyphenols content after determination and measurements made of samples are present in table 1.

Table 1.

Total polyphenols content of peels (P); seeds (S); rachis (R) must (M) samples

Grape variety	Total polyphenols			
	(mg./100g. sample)			(mg./100 ml. sample)
	P	S	R	M
Cabernet Sauvignon Recaş	1000	16250	7750	8,75
Burgund mare Recaş	1187,5	19500	12500	12,50
Merlot Recaş	562,5	15250	17750	16,25
Merlot Dealu Mare	1125	18750	5750	32,50
Muscat Hamburg Recaş	1062,5	14750	11500	27,50

In 100 grammas of samples of seeds, the biggest quantities of total polyphenols were found at Burgund mare variety (19500 mg) and Merlot-Dealu Mare (18750mg). Also in rachis samples of Merlot-Recaş, it was found the higher level of total polyphenols (17750mg). In all skins samples the polyphenols content are lowest comparative to seeds and rachis, but the higher value was obtain Burgund mare variety (1187,5 mg). To all grapes variety, polyphenols content of must has the lowest values between 8.75 mg (Cabernet Sauvignon) to 32.5 mg. (Merlot- Dealu Mare).

The catechil and galoil groups were evaluated in units of absorption (UA) determinate at 578nm for catechil groups and at 680nm for galoil groups.(Table 2). The catechil group (578nm) has the higher value in seeds of Burgund mare variety (0,7381 UA) and little lower in rachis at Merlot- Recaş variety (0,6794 UA). The bigger values at the galoil group (680nm) were determinate at the same varieties: in seeds of Burgund mare (0.6107 UA) and in rachis of Merlot (0.5050 UA). The quantity of total polyphenols in skin grapes (P) and in must (M) was smaller at all varieties as against in seeds and in rachis. In the skin grape the catechil and galoil groups were found in very small quantity and in must there were only traces. For determination we used must obtained whiteout maceration-fermentation process.

Table 2

Units of absorption (UA) of catechil and galoil groups

Grape variety	catechils (c) and galoils (g) groups (units of absorption, UA)					
	P		S		R	
	c 578	g 680	c 578	g 680	c 578	g 680
Cabernet Sauvignon Recaş	0,0721	0,052	0,5685	0,4942	0,1855	0,1717
Burgund mare Recaş	0,0070	0,055	0,7381	0,6107	0,4502	0,3732
Merlot Recaş	0,0070	0,055	0,5228	0,4036	0,6794	0,5050
Merlot Dealu Mare	0,0090	0,060	0,4660	0,3763	0,2081	0,1763
Muscat Hamburg Recaş	0,0800	0,050	0,4507	0,3941	0,3021	0,2774

CONCLUSIONS

To the grape varieties taken for study, the biggest quantity of total polyphenols and were found in seeds and rachis of Burgund mare variety (19500 mg) and Merlot-Dealu Mare (18750mg). The smaller values were in skin grape and must for all varieties.

The catechil (578nm) and galoil group (680nm) have the higher value in seeds samples of Burgund mare variety (0,7381 UA, 0,6107 UA). In skin grape the catechil and galoil groups were found in very small quantity and in must there were only traces.

Polyphenolic content of grape varies with: variety and vineyard eco-climate.

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