



# Resveratrol in wines – potential antioxidant responsible for “French Paradox”

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## Introduction

The antioxidant and antimicrobial efficiency of resveratrol provides health benefits, such as the prevention of cardiovascular diseases, arteriosclerosis and cancer. Originally, epidemiological studies indicated an inverse relationship between moderate wine consumption and the risk of coronary heart disease, the so-called “French Paradox”. The main objective of this study was to examine the content of resveratrol and piceid in Vranec and Merlot wines produced under different winemaking conditions, as well as the resulting antioxidant capacity. This included the application of different maceration times (3, 6, and 10 days), SO<sub>2</sub> dosage and a study of the effect of different types of yeast.



## Materials and methods

Twelve red wines from Vranec grape variety (V1–V12) and 12 red wines from Merlot variety (M1–M12) produced at the Experimental Laboratory of the Department for Enology, Institute of Agriculture, Skopje, Macedonia, were the subject of this investigation. In brief, grapes from both varieties were harvested at optimal maturity (22 Brix for Vranec and 20 Brix for Merlot) and, after crushing, the grape mash was divided into 12 lots collected in 25 L plastic fermentation tanks. Aqueous solutions of potassium metabisulphite were added to the mashes of both varieties to give six tanks with 30 mg/L of total SO<sub>2</sub> and six tanks with 70 mg/L of total SO<sub>2</sub>. Two yeasts (*Saccharomyces cerevisiae*) were used for fermentation: Vinalco, selected by Yeast Factory, Bitola, R. Macedonia, and Levuline, isolated in the terroirs of Champagne and selected by CIVC 8130 (Interprofessional Committee of Champagne Wines), France. Vinalco (20 g/100 L) was applied to three lots containing 30 mg/L of SO<sub>2</sub> and three other lots containing 70 mg/L of SO<sub>2</sub> of each variety. Levuline (30 g/100 L) was applied to the other lots of both varieties. Maceration times of 3, 6, and 10 days were applied for wine production of both varieties, each containing two doses of SO<sub>2</sub> and two yeasts for fermentation. After stabilisation for 2 weeks (at 4 °C), wines were bottled and analysed after 2 years of storage.

## Results and discussion

The prolonged maceration time of 10 days and addition of Macedonian yeast “Vinalco” enabled production of Vranec and Merlot wines with highest amounts of resveratrol. The proposed therapeutic attributes and the mode of molecular actions of resveratrol are not established yet. The recent pharmacologic efforts emphasized the poor bioavailability of resveratrol and influence the transition between body systems in humans. Red wines can be good source of resveratrol but Resveratrol-enriched supplements might be suitable to allow daily uptake of 1 g in combination with red Macedonian wines.

## Conclusion

The results from our analyses suggest highest concentrations of both stilbenes after 10 days of maceration. The tendency was the same for antioxidant activity of wines from both varieties. Concentrations of both stilbenes were higher by application of French yeast rather than Macedonian yeast.

**Table 1**

Concentration of *trans*-piceid and TEAC values in Vranec wines.

	Days of maceration	Type of yeast	Concentration of SO <sub>2</sub> (mg/L)	<i>trans</i> -Piceid <sup>a</sup> (mg/L)	TEAC <sup>b</sup> (6 min)
V1	3	Macedonian	30	0.23 ± 0.00	4.10 ± 0.01
V2	3	French	30	0.56 ± 0.00	3.44 ± 0.22
V3	3	Macedonian	70	0.13 ± 0.02	6.24 ± 0.21
V4	3	French	70	0.20 ± 0.09	5.75 ± 0.58
V5	6	Macedonian	30	0.94 ± 0.01	8.74 ± 0.22
V6	6	French	30	1.49 ± 0.00	8.68 ± 0.56
V7	6	Macedonian	70	1.48 ± 0.00	9.38 ± 0.28
V8	6	French	70	1.49 ± 0.01	8.14 ± 0.19
V9	10	Macedonian	30	0.87 ± 0.00	7.13 ± 0.10
V10	10	French	30	1.58 ± 0.05	9.94 ± 0.07
V11	10	Macedonian	70	0.88 ± 0.02	10.03 ± 0.17
V12	10	French	70	2.24 ± 0.08	10.99 ± 0.74

<sup>a</sup> Concentrations are expressed in mg/L ± SD of two replicates.

<sup>b</sup> Expressed as mmol Trolox per litre. Each value corresponds to the mean and standard deviation of two repetitions ± SD.

**Table 2**

Concentration of *trans*-piceid, *trans*-resveratrol and TEAC values in Merlot wines.

	Days of maceration	Type of yeast	Concentration of SO <sub>2</sub> (mg/L)	<i>trans</i> -Piceid <sup>a</sup> (mg/L)	<i>trans</i> -Resveratrol <sup>a</sup> (mg/L)	TEAC <sup>b</sup> (6 min)
M1	3	Macedonian	30	2.17 ± 0.21	0.22 ± 0.19	6.66 ± 0.50
M2	3	French	30	2.91 ± 0.07	0.81 ± 0.07	4.72 ± 0.01
M3	3	Macedonian	70	2.54 ± 0.19	0.22 ± 0.05	6.88 ± 0.00
M4	3	French	70	2.75 ± 1.00	0.30 ± 0.10	5.36 ± 0.21
M5	6	Macedonian	30	2.95 ± 1.38	1.49 ± 0.06	6.25 ± 0.07
M6	6	French	30	3.83 ± 0.21	1.22 ± 0.09	5.60 ± 0.21
M7	6	Macedonian	70	3.18 ± 0.76	0.89 ± 0.00	6.60 ± 0.12
M8	6	French	70	4.10 ± 0.86	0.00 ± 0.00	6.00 ± 0.07
M9	10	Macedonian	30	4.21 ± 0.70	0.43 ± 0.06	8.98 ± 0.23
M10	10	French	30	4.65 ± 0.46	1.43 ± 0.19	7.91 ± 0.05
M11	10	Macedonian	70	2.89 ± 0.57	0.44 ± 0.09	8.65 ± 0.14
M12	10	French	70	4.48 ± 0.18	1.75 ± 0.21	7.01 ± 0.03

<sup>a</sup> Concentrations are expressed in mg/L ± SD of two replicates.

<sup>b</sup> Expressed as mmol Trolox per litre. Each value corresponds to the mean and standard deviation of two repetitions ± SD.

## References:

Kostadinović S, Wilkens A, Stefova M, Ivanova V, Vojnoski B, Mirhosseini H, Winterhalter P. Stilbene levels and antioxidant activity of Vranec and Merlot wines from Macedonia: effect of variety and enological practices. *Food Chem.* 2012 Dec 15;135(4):3003-9. doi: 10.1016/j.foodchem.2012.06.118.