Long term investigation of resveratrol content in Moravian red wines in relation to climatic conditions

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Introduction

The content of phenolic compounds in grape vines, as well as in other plants is influenced by locality, soil composition, method of cultivation, and the climatic and atmospheric conditions of course. The composition and quantity of substances in wine is largely influenced also by the process of inification. The contained substances of wine (anthocyanins, flavanols, flavonols, phenolic acids, stilbens, arbohydrate, organic acid) are responsible for taste and colour. While red wines contain about 1.0 – 2.5 g/L of phenolic compounds, white wine only 0.2 g/L. The phenolic compounds have antioxidative, bactericidal and fungicidal properties. These compounds are localized in the skin and seeds of grapes.

Results and discussion

We have studied the content of *trans*-resveratrol in wines from typical varieties grown in South Moravia region during 1999 - 2005 (Table 1) in relation to climatic and soil conditions [1]. Wines were always from the same producer and were manufactured with the same process of vinification during these years.
According long term observation of climatic conditions and mean temperatures in South Moravia and according wine quality, the most promising vintages were in 1999 and 2000 [2] (Table 2). In these years we found the highest amount of *trans*-resveratrol; Blau Frankisch wine region Velké Pavlovice, producer Révovín contained 7.83 mg/L of *trans*-resveratrol in 1999 and 6 mg/L of resveratrol in 2000.

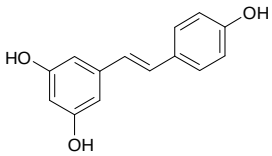
In wines from 2004 and 2005, we determined also *cis*-resveratrol and glucoside derivatives of resveratrol *trans*- and *cis*-piceid. The dominant stilbenes in wines are *trans*-stilbenes. The amounts of *cis*-piceid and *cis*-resveratrol were generally less than the *trans*- forms of stilbenes. The largest amounts 4.85 mg/L and 3.14 mg/L of *trans*-piceid were found in 2004 in the variety of Blau Frankish from producers Forman respectively Baloun.

The further monitoring of the contents of resveratrol and piceid is not possible because some producers have changed the vinification processes. After comparing the available climatic data with content of stilbenes we found that the sun irradiation has the greatest influence. Our results are consistent with results of Ronald et al. [3]. They found that the most important is sun irradiation in the period of maturation of the fruit.

Tab. 1 The content of *trans*-resveratrol in Moravian red wines

No.	Grape varieties	Quality grade	Wine region	Producer	*trans*-resveratrol [mg/l]						
					2005	2004	2003	2002	2001	2000	1999
1	Zweigeltrebe	quality wine	V. Pavlovice	Révovín	0.98	1.03	1.22	1.38	1.86	1.01	5.13
2	St. Laurent	quality wine	V. Pavlovice	Révovín	0.29	0.46	1.17		1.56	1.27	6.11
3	Blau Frankisch	quality wine	V. Pavlovice	Révovín	0.49	1.72	2.14		**3.98**	**6.00**	**7.83**
4	Cabernet Morava	quality wine	V. Pavlovice	Révovín		1.38					0.05
5	Pinot Noir	quality wine	V. Pavlovice	Révovín		1.28					0.05
6	Blauer Portugieser	quality wine	V. Pavlovice	Révovín		0.62	1.40				3.73
7	Neronet	quality wine	V. Pavlovice	Ing.Veverka	0.07		0.50	0.52			0.97
8	St. Laurent	last harvest	V. Pavlovice	Baloun	0.77	1.63	1.06	2.89	1.38	0.97	0.05
9	Blau Frankisch	select. of grapes	V. Pavlovice	Baloun	2.24	2.47	1.94	2.00	1.23	2.14	0.05
10	Zweigeltrebe	quality wine	Strážnice	Blatel	1.41	1.18		1.62	1.33		0.15
11	André	quality wine	Strážnice	Blatel	0.84	0.69		2.05	0.66		0.34
12	St. Laurent	quality wine	Strážnice	Blatel	0.99	0.97			3.16		1.72
13	Pinot Noir	quality wine	Strážnice	Blatel	**2.63**	**2.60**		0.82	0.66	4.90	1.27
14	Zweigeltrebe	quality wine	Znojmo	Vin.skl.Lech.			0.82				3.43
15	St. Laurent	select. of grapes	Znojmo	Vin.skl.Lech.	0.59	0.53	0.77	1.97	3.32	1.38	1.11
16	Blau Frankisch	last harvest	Znojmo	Vin.skl.Lech.	1.17		2.66	**3.00**	2.29	4.00	5.57
17	Pinot Noir	quality wine	Brno	Forman	1.77		0.98	2.61		0.93	0.60
18	Blau Frankisch	quality wine	Brno	Forman	1.18	1.20	**2.75**	1.65	2.63	1.08	0.08
19	St. Laurent	quality wine	Brno	Forman	1.27	1.08	0.90	2.15	2.61	1.11	2.56

The annual maximum values are highlighted red colour. Empty fields – the samples were not available.



trans-resveratrol

South Moravia wine region

Tab. 2 The climatic conditions and wine quality [2]

Year	Yields per hectare in tons	Annual rainfall in mm	Average annual temperature in °C	Average temperature in the warmest month	Rainfall in August and September in mm	Wine quality
1999	6.11	487	10.45	21.25	56	
2000	6.03	481	11.20	21.06	92	
2001	6.60	549	9.75	20.51	170	
2002	5.23	569	10.54	21.46	153	

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