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INTERSPECIFIC VS. TRADITIONAL VARIETIES FOR ROSÉ WINES PRODUCTION

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Abstract

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This study was aimed on comparison of interspecific and traditional varieties suitable for rosé wines production. For samples of wines – 'Laurot', 'Cerason', 'Merlan', three interspecific Czech varieties and 'St. Laurent', 'Blaufränkisch' two traditional varieties and furthermore new Slovak variety 'Nitra' and Austrian 'Blauer Wildbacher' were carried out measurements of fundamental analytical values. Furthermore, total and individual phenolic compounds, total anthocyanins, optical density at 280 nm (OD_{280}), total flavanols, reducing power and antiradical activity were determined. The results show that most phenolic compounds and highest antiradical activity has the Austrian variety 'Blauer Wildbacher' which was in sensory evaluation in last place. From Czech varieties it was 'Cerason' and 'Laurot'. In the sensory evaluation landed the best variety 'Blaufränkisch'. Very good results then reached a variety 'Laurot' as in 2008. Due its higher resistance to fungal diseases, health benefits and good sensory properties appears to be interesting for the production of rosé wines, not only from organic production.

rosé wines, interspecific varieties, wholesomeness substances, antiradical activity, reducing power, anthocyanins, phenolic compounds

Rosé wines have gained a great popularity not only in Czech Republic but also elsewhere in the world. Rosé in CZE are produced mostly from traditional varieties such as 'Pinot Noir', 'Blaufränkisch', 'Zweigeltrebe', 'André' and 'Cabernet Sauvignon'. But now there are rosé wines made from newly registered varieties such as 'Merlot' or 'Cabernet Moravia'. Entirely new act play rosé wines made from blue Czech interspecific grape varieties (IGP), such as 'Cerason' or 'Laurot'. These varieties have improved resistance to fungal diseases often include multiple colors in berries, but also other substances of phenolic nature, therefore flavanols, catechins, stilbenes. A number of these components have antiradical activity and therefore health benefits. Wines from these varieties tend to have higher color, are fresh and intensely fruity.

MATERIALS AND METHODS

For experiment, there were selected two rosé wines from Czech registered interspecific varieties 'Cerason' and 'Laurot' and two samples of new Czech variety 'Marlen' (syn. MI-5-26, is in the registration procedure), all year 2009. All these varieties originated from interspecific crosses 'Merlan'('Merlot' x 'Seibel 13 666') x 'Fratava' ('Blaufränkisch' x 'St. Laurent'). These varieties are recommended for organic production due its resistance to fungal diseases, particularly downy mildew of the vine. For comparison, there were selected two rosé from traditional varieties 'Blaufränkisch' and 'St. Laurent' year 2009. All these samples came from Moravia. As a matter of interest, there were analysed trademark Austrian rosé wine 'Schilcher' year 2009 (variety 'Blauer Wildbacher') and rosé from newly registered Slovak grape variety 'Nitra' ('Castets' x 'Abouriou'). 'Blauer Wildbacher' is used specially for rosé and sparkling wine.

Determination of total phenols: total phenols content in wine was determined by modified Folin – Ciocalteu method (Waterman and Mole, 1994). To 980 µl of water in 1.5 ml eppendorf tube was add 20 µl of sample, 50 µl Folin – Ciocalteu agent and mixture was thoroughly shaken. Accurately after 3 minutes was add 150 µl of sodium carbonate decahydrate (20%), reaction mixture was shaken vigorously and let the state 120 minutes in the dark at room temperature. Then, absorbance was measured at 750 nm against a blank, which was prepared for each series of determination, when the sample was replaced by dilution buffer. Concentration of total phenols was calculated from the calibration curve using gallic acid as standard (25–1000 mg.l^{-1}). The results are expressed in the form mg.l^{-1} equivalents of gallic acid (gallic acid Equivalents; GAE).

Determination of total anthocyanins and the optical density at 280nm (OD_{280}): measurements were carried out using SO_2 (Somers *et al.*, 1977; Zoecklein *et al.*, 1990). In 2 ml eppendorf tube was shaking 200 µl of sample with 1.8 ml of 1.1 M HCl. Blank test was prepared with each sample in the same manner in which the HCl was replaced with fresh solution of 0.22 M $K_2S_2O_5$ (SO_2). After 180 minutes was measured absorbance of the sample with HCl at 280 nm and 520 nm. The sample of SO_2 was measured only at 520 nm. All measurements were made as compared with demineralized water.

Calculations:

$$\text{Total Anthocyanins (mg.l}^{-1}) = 4 * \text{dilution} * [A(HCl)_{520} - (5/3)*A(SO_2)_{520}]$$

$$OD_{280} = 10 * \text{dilution} * A(HCl)_{280}$$

Determination of total flavanols: total flavanols concentration was determined using a method based on reaction with p-dimethylaminocinnamaldehydu (DMACA) (Li *et al.*, 1996). In this method, unlike the widely used reaction with vanillin, no interference with the anthocyanins exists. Moreover, a higher sensitivity and selectivity is reached. To 1.5 ml eppendorf tube with 980 µl reagent (0.1% DMACA and 300 mM HCl in MeOH) was added 20 µl of sample, shaken and left to react 12 minutes at room temperature. Absorbance was measured at 640 nm against blank prepared in the same manner in which the sample was replaced by dilution buffer. Concentration of total flavanols was calculated from the calibration curve using catechin as standard (10–200 mg.l^{-1}). The results are expressed in the form of mg.l^{-1} catechin equivalents.

Determination of reducing power (Reducing Power, PR): to determine the reducing ability of wine has been modified method based on reduction of iron ions (Ferric Reducing / antioxidant power, FRAP) (Pulido *et al.*, 2000). In 1.5 ml eppendorf tube was mixed 50 µl of solution of iron ions (3 mM $FeCl_3$ in 6 mM citric acid) with 20 µl of the sample and the mixture was incubated for 30 minutes at 37 ° C heating block. Then was added 930 µl of solution TPTZ (2,4,6-tripyridyl-s-triazine) in 50 mM HCl, and shaken for 12 minutes, absorbance was measured at 620 nm against a blank prepared in the same manner in which the sample was replaced by dilution buffer. Reducing power was calculated from calibration curves using ascorbic acid as standard (0,1–2 mM). The results are expressed in the form mM ascorbic acid equivalents.

Determination of antiradical activity (Antiradical Activity; AAR): method is based on the deactivation of the commercially available 2,2-diphenyl-β-pikrylhydrazyl radical (DPPH), manifested by the decrease of absorbance at 515 nm (Arnous *et al.*, 2001). To 980 µl solution of DPPH in methanol (150 µM) was added 20 µl of sample, shaking for 30 minutes and measured the absorbance at 515 nm compared with demineralized water. To determination of antiradical activity was used optical density difference of the blank (dilution buffer) and sample. Antiradical activity was calculated from the calibration curve, using gallic acid as standard (10–100 mg.l^{-1}). The results are expressed in the form mg.l^{-1} antiradical equivalents of gallic acid.

Determination of phenolic compounds by HPLC with DAD detection: Concentrations of phenolic compounds was determined unpublished method with direct sample injection. Wines were centrifuged (3,000 x g, 6 min). White and rosé wines were diluted with 2x 50 mM $HClO_4$, red wines were diluted with 4x 30 mM $HClO_4$.

After the analysis has been conducted and sensory evaluation of wines. Tasting panel consisted of seven assessors, all assessors with CAFIA (Czech Agriculture and Food Inspection Authority) wine tasting certificate. Wines were evaluated by 100 points system. Subsequently, the wines were evaluated by 5 points system for the presence of lactate tone.

RESULTS AND DISCUSSION

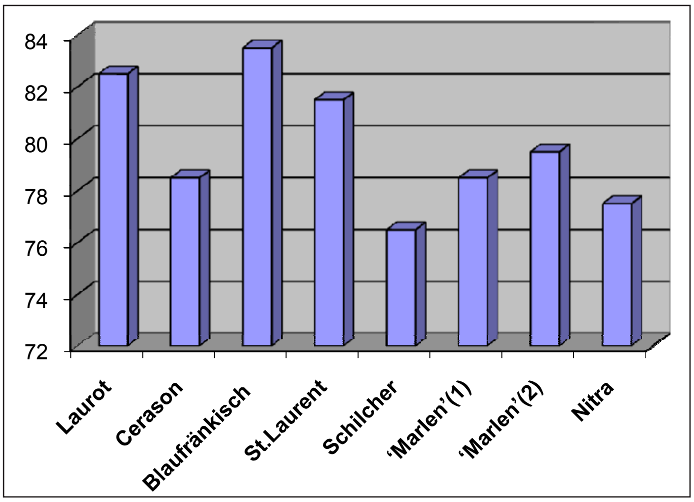
As in 2008 (Bábíková *et al.*, 2009), for samples of wines were made standard measurements of fundamental analytical values such as pH, acidity (g.l^{-1}), residual sugar (g.l^{-1}), sugar-free extract (g.l^{-1}) and alcohol (vol. %), in table I.

The fig. 1 shows that the assessors considered the best rosé wine manufactured from a variety ‘Blaufränkisch’. Very good results achieved interspecific variety ‘Laurot’ belonging to the Czech crossing. After the sensory page has been rated the worst rosé wine ‘Blauer Wildbacher’, for high color, acidity and bitterness.

The results obtained using spectrophotometric determination are presented in table II. The results show that most phenolic compounds and antiradical activity has Austrian wine ‘Blauer Wildbacher’, but it ended up in the sensory evaluation as a last place. From table II it is obvious that Slovak variety ‘Nitra’ has very good value for all spectrophotometric characteristics. Antiradical activity of new Czech varieties (‘Laurot’, ‘Cerason’) is higher than the tradi-

I: *The basic analytical characteristics of the selected rosé wines*

Variety	pH	Titratable acids (g.l^{-1})	Residual sugar (g.l^{-1})	Alcohol %	Sugar-free extract (g.l^{-1})	Volatile acids (g.l^{-1})
Laurot	3.17	8.85	15.30	10.78	19.60	0.52
Cerason	3.36	7.69	4.30	13.54	22.30	0.39
Blaufränkisch	3.15	7.42	11.20	11.31	19.30	0.44
Saint Laurent	3.40	7.31	8.10	11.33	22.60	0.33
Blauer Wildbacher	3.46	9.93	2.50	11.86	26.50	0.47
'Marlen' 1 (MI-5-26)	3.30	6.56	1.50	11.47	17.90	0.25
'Marlen' 2 (MI-5-26)	3.62	6.23	2.50	12.17	18.70	0.66
Nitra	3.44	6.63	0.90	12.07	21.00	0.16



1: *Sensory evaluation of wines by 100 points system*

II: *Data from spectrophotometric determination*

	Laurot mg.l^{-1}	Cerason mg.l^{-1}	Blau Fränkisch mg.l^{-1}	St.Laurent mg.l^{-1}	Blauer Wildbacher mg.l^{-1}	'Marlen'(1) mg.l^{-1}	'Marlen'(2) mg.l^{-1}	Nitra mg.l^{-1}
Σ polyphenols -Folin agent	394	443	348	323	589	381	325	501
Σ flavanols (catechins)	34.0	36.1	23.5	19.2	87.5	37.0	25.2	50.3
Antiradical activity	73.8	83.0	53.5	48.2	121.1	72.0	55.6	105.2
Reducing power AA	1.56	1.67	1.28	1.27	2.11	1.19	1.02	1.67
Reducing power GA	83.1	88.8	68.2	67.7	112.4	63.5	54.1	89.0

tional varieties, but below the values of the Austrian variety and rosé from the Slovak selections.

Major phenolic compounds measured by the method of liquid chromatography are presented in table III. These include *trans*-resveratrol, which in recent years has followed an important characteristic. Again, the highest value was determined in Austrian a Slovak variety 'Blauer Wildbacher' resp. 'Nitra'. Content of catechin and epicatechin is significant for varieties 'Blauer Wildbacher', 'Laurot' and 'Cerason'. The highest value of main antioxidant in rosé wines, total caffeic acid, was determined in IGP 'Laurot'.

Monitoring the amount of anthocyanins is another important factor for the production of rosé wines. Sensory evaluation showed that consumers

III: *Phenolic compounds obtained by HPLC analysis*

Phenolic compounds.	Laurot $mg.l^{-1}$	Cerason $mg.l^{-1}$	Blau Fränkisch $mg.l^{-1}$	St.Laurent $mg.l^{-1}$	Blauer Wildbacher $mg.l^{-1}$	'Marlen'(1) $mg.l^{-1}$	'Marlen'(2) $mg.l^{-1}$	Nitra $mg.l^{-1}$
Trans-resveratrol	0.11	0.10	0.17	0.17	1.59	0.47	0.18	0.74
Trans-piceid (fixed)	0.04	0.06	0.08	0.02	0.24	0.02	0.01	0.09
Cis-resveratrol	0.07	0.07	0.14	0.48	1.39	1.11	0.62	1.64
Cis-piceid	0.09	0.20	0.23	0.11	0.76	0.17	0.14	0.68
Trans-piceatannol	0.03	0.03	0.05	0.05	0.34	0.28	0.09	0.38
Trans-astringin (fix.)	0.11	n.d.	n.d.	0.10	n.d.	0.06	0.06	0.09
Total caffeic acid	53.08	26.66	27.78	20.36	48.59	10.54	9.71	19.56
Catechin	5.03	4.05	3.08	3.06	13.94	3.05	2.34	6.61
Epicatechin	4.05	2.38	2.20	1.74	7.76	2.75	1.21	0.36
Σ (HPLC) anthocyanins	96.4	134.0	70.4	56.2	117.1	83.9	50.1	169.1

* n.d. – not detected

prefer lighter shades of rosé wines. Therefore have the advantage of varieties with lower number of containing anthocyanins. From Table IV shows that it is mainly a European noble varieties. Interspecific varieties and variety 'Blauer Wildbacher' contrast, exhibit a high value. This is reflected in higher overall color of rosé wines produced from these varieties, although the method of immediate pressing whole grapes was used. In this case, the highest content of anthocyanins obtained from the Slovak variety 'Nitra'. Lower content of anthocyanins in the tested varieties exhibit 'Laurot' and MI-5-26 ('Marlen').

Table IV indicated proportions of individual color components, i.e. monoglucosids. The table shows that the main agent is Malvidin-3-Glc and Petunidin-3-Glc.

IV: *Percentage content of anthocyanin-3-glucosids*

Anthocyanins-3-glucosids	Laurot	Cerason	Blau Fränkisch	St.Laurent	Blauer Wildbacher	'Marlen'(1)	'Marlen'(2)	Nitra
Delphinidin	9.57	6.70	4.32	1.99	6.21	2.80	2.39	4.71
Cyanidin	0.47	1.67	0.64	0.25	0.59	0.27	0.29	0.48
Petunidin	15.92	12.50	7.97	6.02	8.62	7.17	5.56	8.34
Peonidin	4.67	3.90	8.85	2.76	9.55	0.77	5.40	2.29
Malvidin	69.37	75.23	78.22	88.98	75.04	88.99	86.36	84.17
Σ	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

CONCLUSIONS

Just as in 2008, were monitored interspecific and traditional Czech varieties suitable for the production of rosé wines. Wines of the studied varieties – 'Laurot', 'Cerason', 'Marlen', three interspecific, 'Saint Laurent', 'Blaufränkisch' two traditional, Slovak new variety 'Nitra' and the Austrian variety 'Blauer Wildbacher ', were subjected to sensory evaluation. The best variety was assessed 'Blaufränkisch' (83.5 points) followed by variety 'Laurot' (82.1 points). Furthermore, the wines have been subjected to analysis focused on consumer health. Especially in the amount of total polyphenols and antiradical capacity showed the highest values wines from Slovakia and Austria (105.2 respectively. 121.1), but failed in the sensory evaluation (77.5 respectively. 76.1 points). Our interspecific varieties fell on this site is better than traditional varieties. The last measurement was the content of anthocyanins. Consumers in recent years, rather choose lighter shades of pink wines, traditional varieties have been most acceptable in this regard. Given the strong resistance of interspecific varieties to fungal diseases, along with improved health effects of wine produced from these varieties would be advantageous to find the right technology and to add their range of rose wines. As very suitable for this purpose would be variety 'Laurot'.

SOUHRN

Interspecifické vs. tradiční odrůdy pro výrobu rosé vín

Stejně jako v roce 2008 byly sledovány interspecifické a tradiční české odrůdy vhodné pro výrobu rosé vín. Vína ze zkoumaných odrůd – 'Laurot', 'Cerason', 'Marlen', tři interspecifické, 'Svatovavřinecké', 'Frankovka', dvě tradiční, slovenský novošlechtěnec 'Nitra' a rakouská odrůda 'Blauer Wildbacher' byla podrobena senzorickému hodnocení. Nejlépe byla hodnocena odrůda 'Frankovka' (83.5 bodů) následována odrůdou 'Laurot' (82.1 bodů). Dále byla vína podrobena analýzám zaměřeným na zdraví konzumentů. Především v množství celkových polyfenolů a antiradikálové kapacitě vykazovala nejvyšší hodnoty vína ze Slovenska a Rakouska (105,2, resp. 121,1), která však propadla v senzorickém hodnocení (77,5, resp. 76,1 bodů). Naše interspecifické odrůdy dopadly po této stránce lépe než odrůdy tradiční. Posledním sledovaným znakem byl obsah barviv – antokyanů. Konzument v posledních letech volí spíše světlejší odstíny růžových vín; tradiční odrůdy byly v tomto ohledu nejpřijatelnější. Vzhledem k výrazné odolnosti interspecifických odrůd k houbovým chorobám spolu s lepšími zdravotními účinky vín vyrobených z těchto odrůd by bylo výhodné nalézt správnou technologii a doplnit jimi sortiment růžových vín. Jako velice vhodná se k tomuto účelu jeví především odrůda 'Laurot'.

rosé vína, interspecifické odrůdy, zdraví prospěšné látky, antiradikálová aktivita, redukční síla, antokyany, fenolické látky

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