

INFLUENCE OF MACERATION TIME ON BIOACTIVE PHENOLIC COMPOUNDS AND ANTIOXIDANT ACTIVITY OF STANUŠINA WINES

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Introduction

The quality of red wines is determined by phenolic composition, the most important components which determine the colour, mouthfeel, astringency and bitterness of the wine. Phenolic composition mainly depends on the grape variety, climate conditions, soil, ripening stage, vine cultivation as well as on winemaking practices. **Stanušina is a red grape variety indigenous of the Republic of Macedonia and herein only cultivated, i.e. it is found nowhere else in the world.** Consequently, there are no data available in the scientific literature about the chemical composition of this grape variety.

✓The aim of the work was to evaluate the phenolic composition of Stanušina wines during maceration monitored with the time (3, 6 and 9 days).

Materials and Methods

Winemaking



HPLC analysis - Dionex system

Anthocyanins

Column: Gemini RP-C18, 530 nm

Mobile phase: solvent A (water/methanol (70/30, v/v) containing 6 mL/L of 70% perchloric acid) and solvent B (water/methanol (25/75, v/v) containing 6 mL/L of 70% perchloric acid), flow 0.9 mL/min

Gradient, solvent B: 0 min, 0%; 23 min, 25%; 51 min, 70%; 60 min, 100%; 65 min, 0%. [1]

Hydroxycinnamic acid derivatives and flavan-3-ols

Column: Aquapore ODS-300 RP-C18, 280, 308 and 324 nm

Mobile phase: solvent A (water/formic acid, 98/2, v/v) and solvent B (acetonitrile/water/formic acid, 80/12/2, v/v/v), flow 0.5 mL/min

Gradient, solvent B: 0-50 min, 9%; 65-70 min, 10%; 77 min, 30%; 80-97 min, 0%. [1]

Antioxidant activity

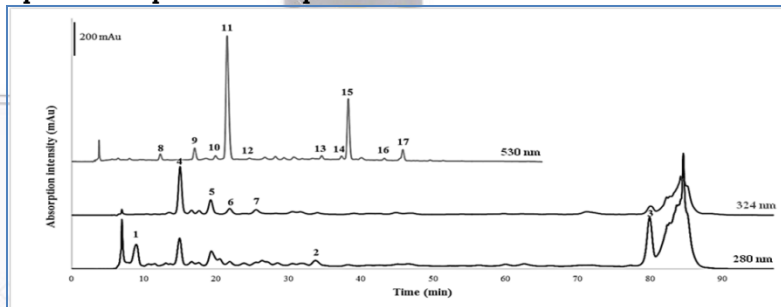
A volume of 200 μ L of wine was added to 3 mL of a methanol solution of the radical DPPH with concentration of 0.025 mol/L, and measured at 515 nm after 1 h storage at dark. [1]

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Results

Separation of phenolic compounds in Stanušina wines



Peak identification: gallic acid, (1); (+)-catechin, (2); (-)-epicatechin adducts (3); caffeic acid, (4); coumaric acid, (5); caffeic acid, (6); ferulic acid, (7); delphinidin-3-glucoside, (8); petunidin-3-glucoside, (9); peonidin-3-glucoside, (10); malvidin-3-glucoside, (11); vitisin B, (12); petunidin-(6 acetyl)-3-glucoside, (13); peonidin-(6 acetyl)-3-glucoside, (14); malvidin-(6 acetyl)-3-glucoside, (15); peonidin-coumaroyl-3-glucoside, (16); malvidin-coumaroyl-3-glucoside, (17)

Quantification of phenolic compounds in Stanušina wines

Wines	Stanušina		
Compounds/ Maceration time	3 days	6 days	9 days
Pt-Glc	4.34	5.13	2.62
Mv-Glc	101	115	87.8
Total Glc	105	120	90.4
Mv-AcGlc	9.92	10.4	7.88
Total AcGlc	9.92	10.4	7.88
Pn-coumGlc	0.00	1.16	0.15
coumGlc	13.7	21.6	14.5
Total coumGlc	13.7	22.8	14.7
Total			
anthocyanins	129	153	113
Σ Glc/ Σ AcG	10.6	11.6	11.5
Σ Glc/ Σ coumGlc	7.69	5.28	6.17
Σ AcGlc/ Σ coumGlc	0.72	0.46	0.54

Wines	Stanušina		
Compounds/ Maceration time	3 days	6 days	9 days
Protocatechuic acid	18.2	n.d.	15.8
Gallic acid	67.4	141	158
Syringic acid	21.8	22.0	n.d.
Total HBA	107	163	174
p-Coumaric acid	2.24	3.45	4.51
Caffeic acid	428	425	373
Coumaric acid	18.5	26.2	24.4
Caffeic acid	47.7	35.7	30.1
Ferulic acid	14.9	20.5	21.8
Total HCA	511	511	454
Total Phenolic acids	619	674	628
Catechin	139	214	262
AA (mg/L, TE)	102	100	105

Abbreviations: Dp-delphinidin, Cy-cyanidin, Pt-petunidin, Pn-peonidin, Mv-malvidin, Glc-glucoside, AcGlc-acetylglucoside, coumGlc-coumaroylglucoside, HBA-hydroxybenzoic acids, HCA-hydroxycinnamic acids, HCAD-hydroxycinnamic acid derivatives, AA-antioxidant activity, TE-Trolox equivalents, n.d. – not detected.

Conclusion

Anthocyanins reached highest content at 6th day of maceration. Hydroxybenzoic acids increased during winemaking and reached to the highest concentration in the wines after 9 days of maceration. Hydroxycinnamates reached to maximum concentration after 3 days of maceration. All wines showed high values of antioxidant activity.

References

[1] Ivanova-Petropulos V., Durakova S., Ricci A., Parpinello G.P., Versari A. Extraction of natural occurring bioactive compounds and change in antioxidant capacity of Macedonian red wines during vinification. *Journal of Food Science and Technology*, in press. DOI: 10.1007/s13197-016-2235-7.