

CHEMICAL CHARACTERIZATION OF WHITE AND RED WINES FROM OVCHE POLE REGION

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INTRODUCTION

This study was focused on the evaluation of white wines (Zilavka and Smedervka) and red wine (Vranec), all produced from grapes grown in the Ovche Pole wine region, Republic of N. Macedonia. All wines were from vintage 2024 and produced using traditional methods.

Fast and accurate analytical technique, fourier-transform infrared spectroscopy (FT-IR), was used to determine the chemical composition of wines. Basic parameters such as alcohol, density, glycerol pH, total acidity, total sugars, individual carbohydrates (glucose and fructose), Folin-Ciocalteu index, as well as individual organic acids (tartaric, lactic, malic and gluconic) have been determined.

MATERIALS AND METHODS

White wines: Zilavka and Smederevka
Red wines: Vranec (Rujno, Bulka and Mak)
All wines were from Ovche Pole wine region in Macedonia.

Winemaking: Traditional wine making was applied on all wines, followed by addition of yeast for fermentation and SO₂ to protect the wines from oxidation. Short maceration time of few hours was applied for the white wines and maceration of 10 to 15 days for the red Vranec wines.

FT-IR analyses of the following parameters:
Alcohol, density, pH, total acidity, volatile acidity, total sugars, free SO₂ and total SO₂. Folin-Ciocalteu index (FI)
Carbohydrates: glucose and fructose.
Organic acids: tartaric, malic, lactic, and gluconic.

RESULTS AND DISCUSSION

Table 1. Basic chemical parameters

Wines/Parameters	Alcohol (%)	Density (g/cm ³)	pH	Total acidity (g/L)	Volatic acidity (g/L)	Reducing sugars (g/L)	Glycerol (g/L)
Zilavka	11.65±0.06	0.9905±0.001	3.27±0.02	5.56±0.11	0.34±0.28	2.24±0.15	7.19±0.12
Smederevka	11.51±0.001	0.9899±0.001	3.41±0.01	5.67±0.1	0.35±0.37	1.04±0.15	8.99±0.11
Vranec - Rujno	14.67±0.001	0.9884±0.001	3.57±0.01	5.43±0.1	0.39±0.12	2.23±0.11	10.77±0.11
Vranec - Bulka	13.63±0.02	0.9937±0.001	3.62±0.01	6.05±0.12	0.47±0.21	4.48±0.18	11.93±0.23
Vranec - Mak	14.32±0.01	0.99224±0.01	3.65±0.01	5.70±0.1	0.49±0.32	3.33±0.014	10.92±0.22

Table 2. Content of carbohydrates, SO₂ and Folin-Ciocalteu index (FI)

Wines/Parameters	Fructose (g/L)	Glucose (g/L)	Free SO ₂ (mg/L)	Total SO ₂ (mg/L)	FI
Zilavka	0.61±0.15	0.69±0.15	8.97±0.17	202±3.86	16.81±0.71
Smederevka	0.88±0.2	0.15±0.12	15.83±0.15	166±3.81	15.53±0.26
Vranec - Rujno	1.91±0.21	0.47±0.10	20.98±0.15	157±4.62	36.64±0.87
Vranec - Bulka	2.17±0.18	0.55±0.11	8.20±0.08	44.9±2.14	75.23±2.02
Vranec - Mak	1.17±0.15	0.47±0.13	9.56±0.06	83.3±3.21	85.03±2.53

Table 3. Content of organic acids

Wines/Parameters	Tartaric acid (g/L)	Malic acid (g/L)	Lactic acid (g/L)	Gluconic acid (g/L)
Zilavka	2.04±0.03	0.85±0.02	0.82±0.1	n.d.
Smederevka	1.98±0.05	1.13±0.06	0.81±0.1	0.39±0.03
Vranec - Rujno	1.73±0.05	1.31±0.08	0.16±0.05	0.86±0.02
Vranec - Bulka	2.22±0.03	0.26±0.06	0.04±0.03	1.02±0.05
Vranec - Mak	1.63±0.02	0.50±0.04	n.d.	0.61±0.02



Zilavka grapes



Smederevka grapes



Vranec grapes

All results in the tables are presented as average of three repetitions ± SD (standard deviation).

CONCLUSION

- Wines contained a relatively high content of alcohol.
- All wines were chemically and microbiologically stable and well-protected from oxidation.
- Tartaric acid was the dominant compound followed by malic acid and lactic acid.
- Overall, all wines presented very good physical, chemical and microbiological stability, characteristic for high quality white and red wines.