

Can pulsed electric field pretreatment improve the phenolic profile of virgin olive oil from Croatian varieties?

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Introduction

Pulsed electric field (PEF) technology is based on the use of short electric field pulses that lead to electroporation of cell structures. Incorporating the PEF reactor into the virgin olive oil (VOO) production line can significantly improve the yield of VOO production. Although PEF is a non-thermal, innovative technique, it is expected to influence the chemical compounds of the VOO produced. One of the most interesting compounds are the olive phenols, which have an important influence on the nutritional value of VOO and its oxidative stability.

Therefore, the aim of this work was to investigate how PEF as a pretreatment for malaxation affects the phenolic composition of VOO from four Croatian varieties.

Materials and methods



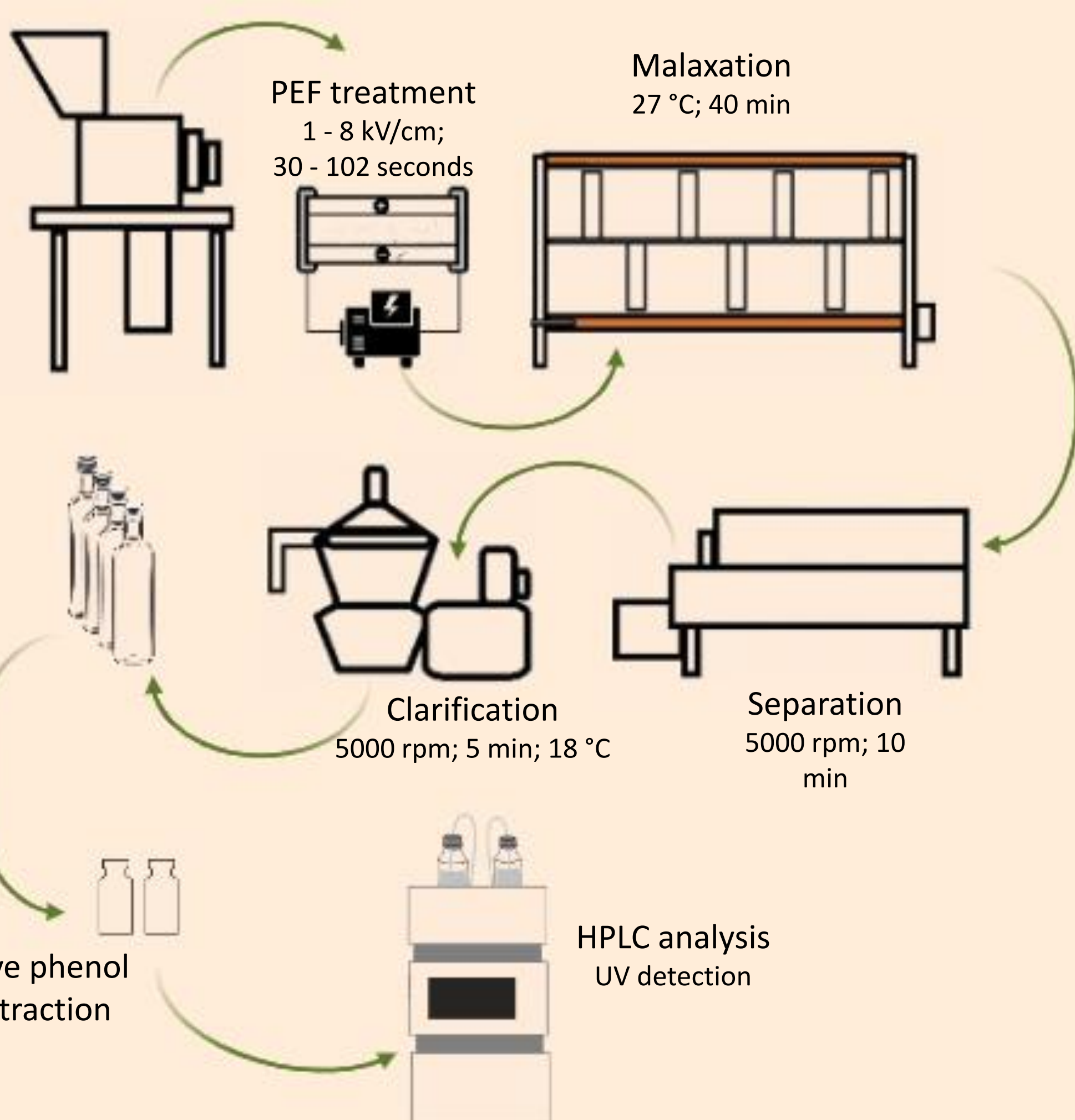
Oblica

Levantinka

Istarska bjelica

Rosulja

Crushing



Results

Table 1. Correlation matrices of phenolic compounds with electric field strength (left) and PEF pretreatment time (right) in Croatian varieties

Variable	Oblica	Levantinka	Istarska bjelica	Rosulja	Variable	Oblica	Levantinka	Istarska bjelica	Rosulja
	Electric field strength (kV/cm)					Time (s)			
Hydroxytyrosol	-0.623	0.153	0.451	0.033	Hydroxytyrosol	-0.208	-0.087	0.092	0.305
Tyrosol	-0.422	0.27	0.508	0.130	Tyrosol	0.042	0.013	0.156	0.279
Oleacein	-0.171	-0.163	-0.579	0.040	Oleacein	-0.18	0.253	-0.138	-0.374
Oleocanthal	-0.276	-0.1	-0.21	-0.041	Oleocanthal	-0.239	0.28	0.147	-0.161
Ligstroside	0.11	0.064	-0.255	-0.258	Ligstroside	0.352	0.149	0.149	-0.366
Secoiridoid group I	0.088	-0.023	-0.446	-0.17	Secoiridoid group I	0.092	0.11	-0.12	-0.332
Secoiridoid group II	0.139	0.351	-0.234	-0.269	Secoiridoid group II	0.246	-0.124	0.217	-0.362
Secoiridoid group III	-0.541	-0.126	-0.48	-0.277	Secoiridoid group III	-0.181	0.315	-0.034	-0.332
Secoiridoid group IV	-0.545	0.282	-0.395	-0.31	Secoiridoid group IV	-0.066	0.171	-0.028	-0.324
Total phenols	-0.602	0.064	-0.361	-0.061	Total phenols	-0.083	0.315	0.069	-0.248

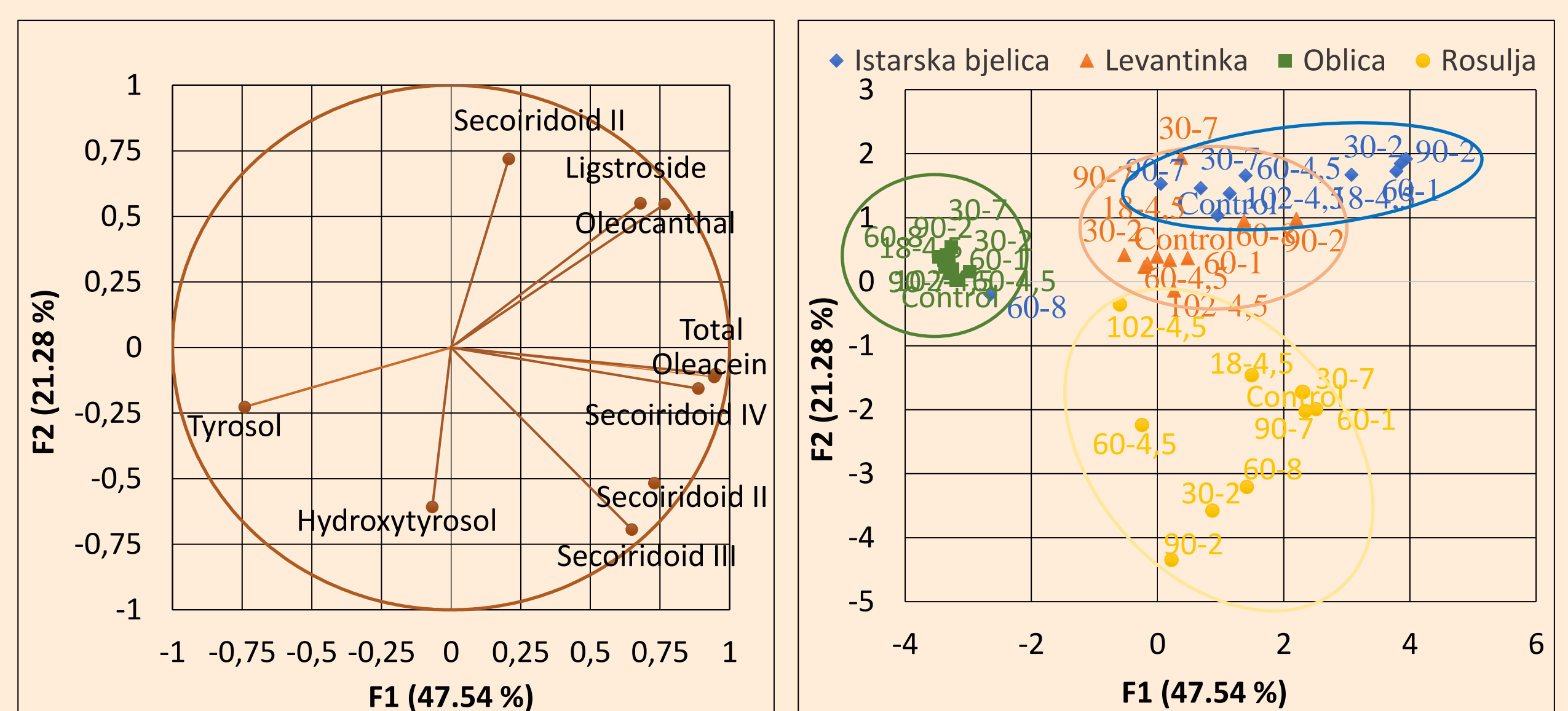


Figure 1. PCA plots (PC1 vs. PC2) of phenolic compounds (left) and Croatian VOO produced with PEF pretreatment (right)

Conclusions

The olive variety has the greatest influence on the phenolic composition of VOOs and PEF pretreatment has different effects on varieties studied. The electric field strength had a negative influence on the phenolic compounds of Istarska Bjelica and Oblica VOOs. The duration of the treatment had influence only on the phenolics in the Rosulja variety, a negative one.

Acknowledgments

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