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University of Zagreb Faculty of Food Technology and Biotechnology



„Impact of innovative technologies on the nutritional value, sensory properties and oxidation stability of virgin olive oils from Croatian autochthonous olive varieties ”

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THE INFLUENCE OF INNOVATIVE TECHNOLOGIES IN THE PRODUCTION OF VIRGIN OLIVE OIL

Međunarodni znanstveno-stručni skup
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INTRODUCTION



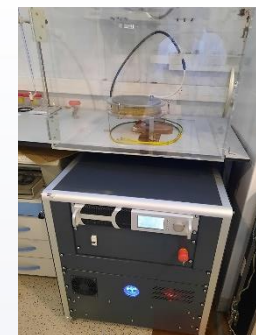
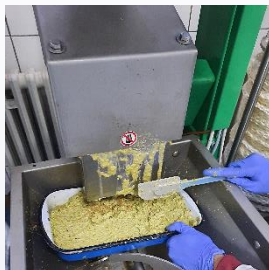
AIM

- to investigate the influence of
 - **flash thermal treatment (FTT)**
 - **ultrasound (US)**
 - **pulsed electric field (PEF)**
 - and their **combinations**
 - as **pretreatments to malaxation** or **without malaxation**
 - on the production **yield (Y)**,
 - **phenols** and
 - **sensory characteristics** of
 - **virgin olive oils (VOOs)** of the **autochthonous Croatian olive variety Levantinka**



MATERIALS AND METHODS

1) VOO production



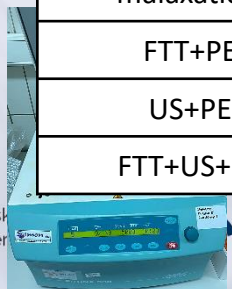
CLEANING AND WASHING

(MALAXATION)

SAMPLES
CONTROL
FTT
US
PEF
FTT+US
FTT+PEF
US+PEF
FTT+US+PEF
FTT+US without malaxation (WM)
FTT+PEF WM
US+PEF WM
FTT+US+PEF WM

INNOVATIVE TECHNOLOGY

- FTT - temperature 19.5 °C
- US - ultrasonic bath power 576 W and duration 5 min
- PEF - electric field strength 2 kV/cm and duration 90 s



3) Sensory analysis

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2) Phenolic composition



Figure 1

PROFILE SHEET FOR VIRGIN OLIVE OIL INTENSITY OF PERCEPTION OF DEFECTS

Fusty/muddy sediment _____

Musty/humid/earthy _____

Winey/vinegary
acid/sour _____

Frostbitten olives
(wet wood) _____

Rancid _____

Other negative
attributes: _____

Metallic Dry hay Grubby Rough

Descriptor: Brine Heated or burnt Vegetable water

Esparto Cucumber Greasy

INTENSITY OF PERCEPTION OF POSITIVE ATTRIBUTES

Fruity _____
Green Ripe

Bitter _____

Pungent _____

Name of taster: _____ Taster code: _____

Sample code: _____ Signature: _____

Date: _____

Comments: _____

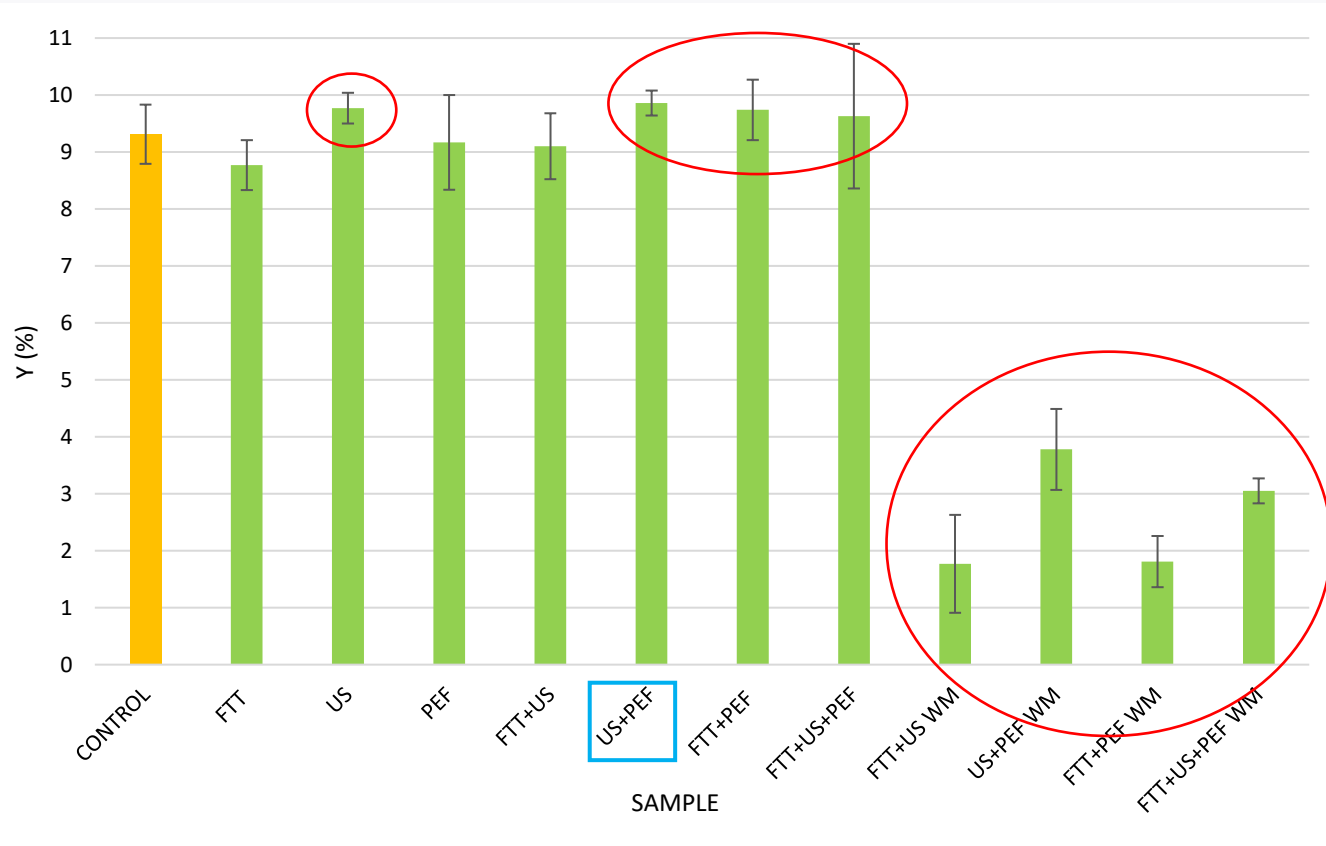
*International Olive Council (IOC) Determination of biophenols in olive oils by HPLC (2022) Madrid, Spain.

*International Olive Council (IOC) Sensory analysis of olive oil - Method for the organoleptic assessment of virgin olive oil (2018) Madrid, Spain.



RESULTS AND DISCUSSION

1) Extraction yield



ANOVA for extraction yield

source of variation	p value	level of significance
innovative technology	0.015	statistical
malaxation	<0.0001	extreme



RESULTS AND DISCUSSION

2) Total phenols

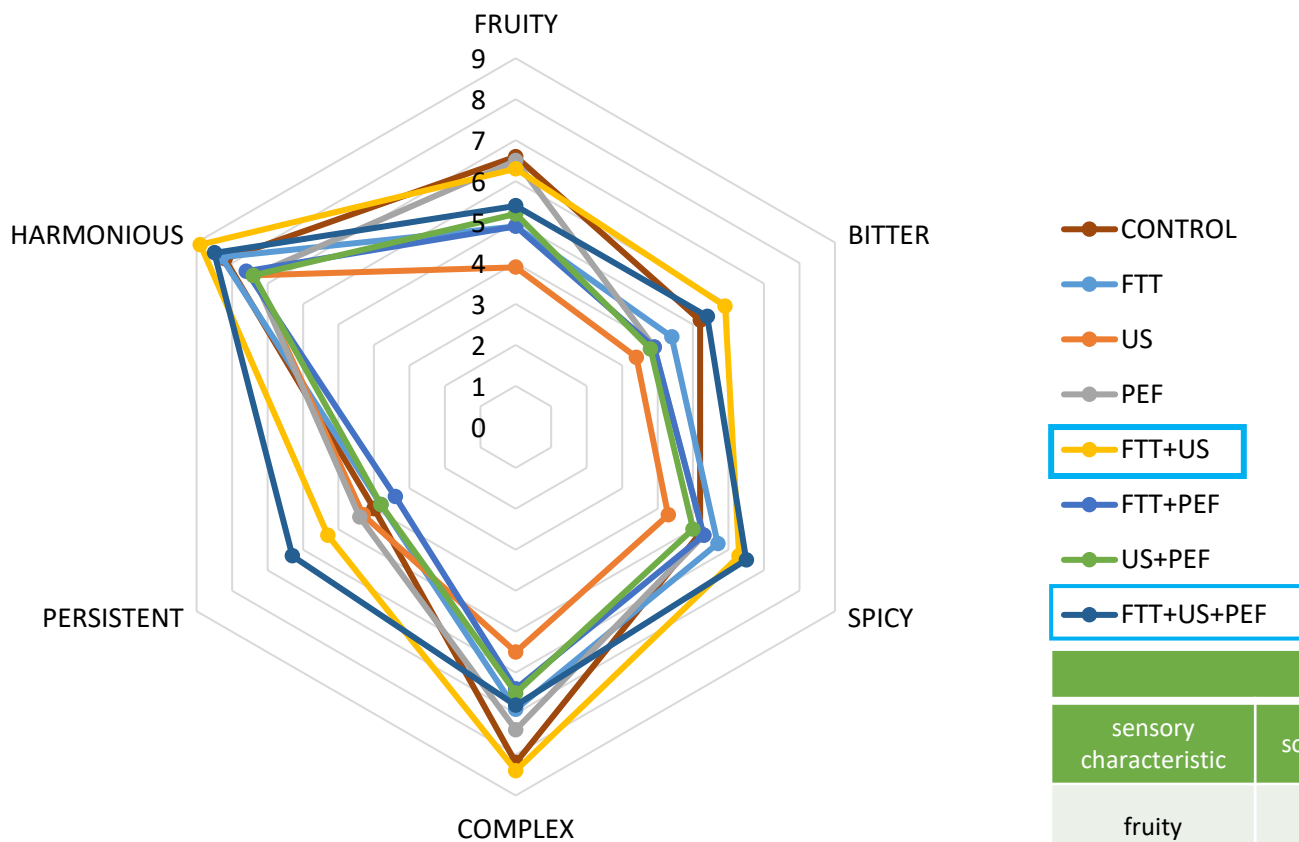


ANOVA for total phenols		
source of variation	p value	level of significance
innovative technology	0.000	extreme
malaxation	<0.0001	extreme
innovative technology* malaxation	<0.0001	extreme



RESULTS AND DISCUSSION

3) Sensory characteristics



ANOVA			
sensory characteristic	source of variation	p value	level of significance
fruity	innovative technology	<0.0001	extreme
bitter	innovative technology	<0.0001	extreme
complex	innovative technology	0.002	significant
persistant	innovative technology	<0.0001	extreme
harmonious	innovative technology	0.008	significant

SAMPLE	GREEN	OLIVE LEAF	GRASS	WOODY	FLORAL NOTES
CONTROL	+	+	+		+
FTT					+
US		+		+	
PEF	+		+		+
FTT+US			+		+
FTT+PEF	+	+			+
US+PEF			+		+
FTT+US+PEF			+		+

SAMPLE	SWEET	RIPE FRUITS	APPLE	BANANA	FIG	WALNUT	ALMOND	VEGETABLE NOTES	ARTICHOKE	ARUGULA	TOMATO	PUNGENT	CHILI
CONTROL	+		+	+	+		+	+	+	+		+	+
FTT	+		+	+	+	+	+						
US	+	+			+	+	+	+	+				
PEF	+		+	+	+	+	+						
FTT+US	+		+	+	+		+		+	+	+	+	+
FTT+PEF	+		+	+	+	+	+				+		
US+PEF	+		+	+	+	+							
FTT+US+PEF	+		+	+	+	+	+						



CONCLUSIONS

- US and all the combinations with PEF led to the increase in Y
- the increase in total phenols was recorded only in the sample FTT+US
- sensory analysis showed no defects but improvement of sensory characteristics in comparison to the control sample
- sensory quality of produced VOOs was not impaired by the application of innovative technologies and their combinations
- the combinations of innovative technologies cannot replace malaxation





Thank you for your attention!

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