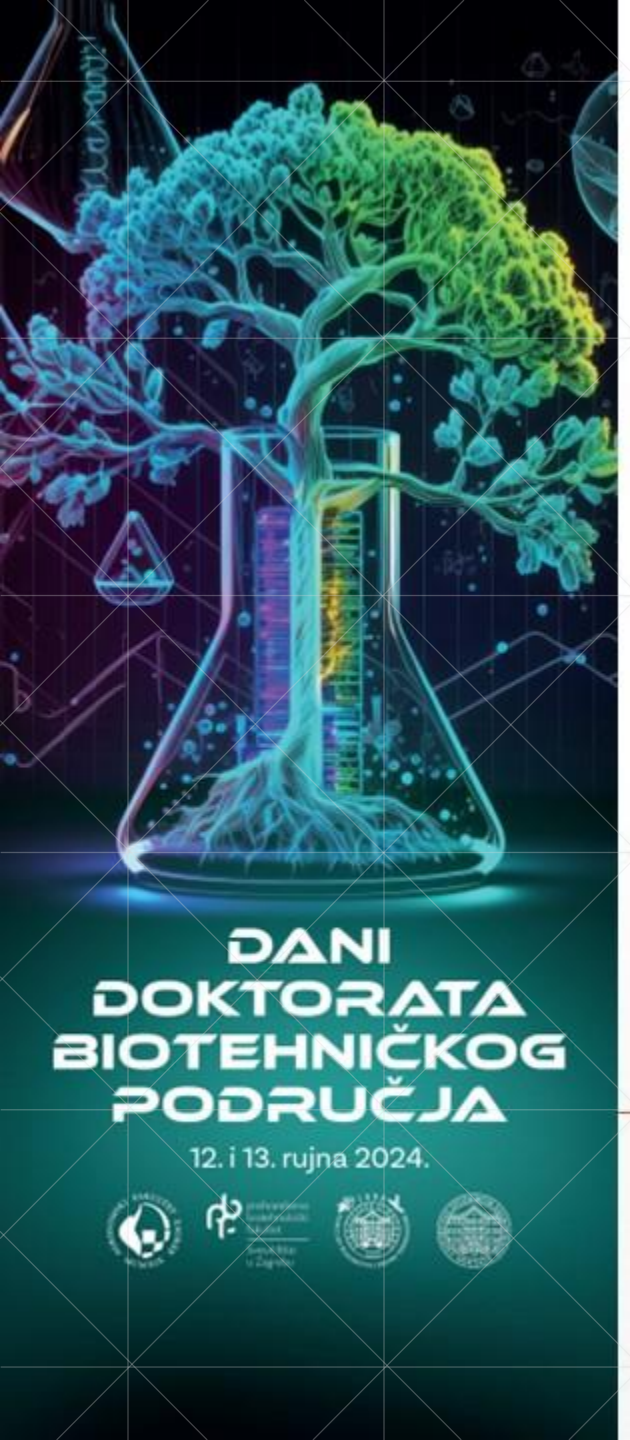

2024 DANI DOKTORATA BIOTEHNIČKOG PODRUČJA

The influence of innovative technologies on the antioxidant capacity, oxidation stability and concentration of antioxidants in virgin olive oils

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HrZZ Croatian Science Foundation

Introduction

Innovative technologies

Olive fruit variety

AIM

- to determine the influence of **flash thermal treatment** (**FTT**), **ulstrasound (US)**, **pulsed electric field (PEF)** and their **combinations** used as **pretreatments** to malaxation or **without malaxation** (WM) on the **antioxidant capacity (AC)**, **oxidation stability (OSI)** and the concentration of **antioxidants** of **virgin olive oils (VOOs)** of the **Levantinka** variety.

Materials and methods

1.) VOO production:







CLEANING AND WASHING → CRUSHING → INNOVATIVE TECHNOLOGY TREATMENT → (MALAXATION) → CENTRIFUGAL EXTRACTION → OIL STORAGE







Materials and methods

Sample	Parameters of innovative technology applied				
	FTT	US		PEF	
	Temperature	Ultrasonic bath power	Treatment time (min)	Electric field strength (kV/cm)	Treatment time (s)
Control	/	/	/	/	/
FTT	19.5 °C	/	/	/	/
US	/	576 W	5	/	/
PEF	/	/	/	2	90
FTT+US	19.5 °C	576 W	5	/	/
US+PEF	/	576 W	5	2	90
FTT+PEF	19.5 °C	/	/	2	90
FTT+US+PEF	19.5 °C	576 W	5	2	90
FTT+US without malaxation (WM)	19.5 °C	576 W	5	/	/
US+PEF WM	/	576 W	5	2	90
FTT+PEF WM	19.5 °C	/	/	2	90
FTT+US+PEF WM	19.5 °C	576 W	5	2	90

Materials and methods

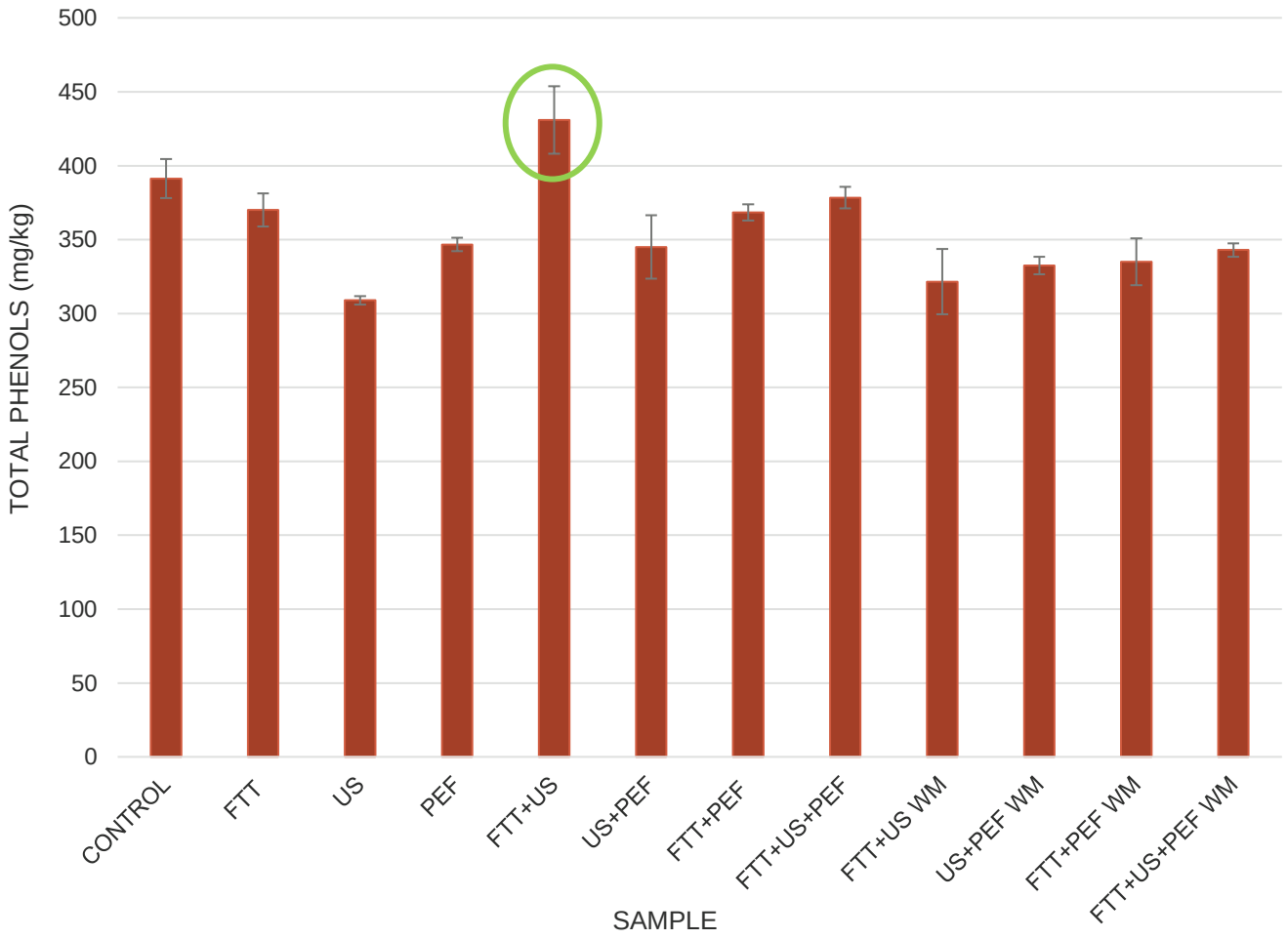
2) Antioxidant capacity

3) Oxidation stability index

4) α-tocopherol and phenols concentration

COI (2022) Determination of biophenols in olive oils by HPLC. COI – International Olive Council, Madrid.
ISO 9936:2016 Animal and vegetable fats and oils — Determination of tocopherol and tocotrienol contents by high-performance liquid chromatography

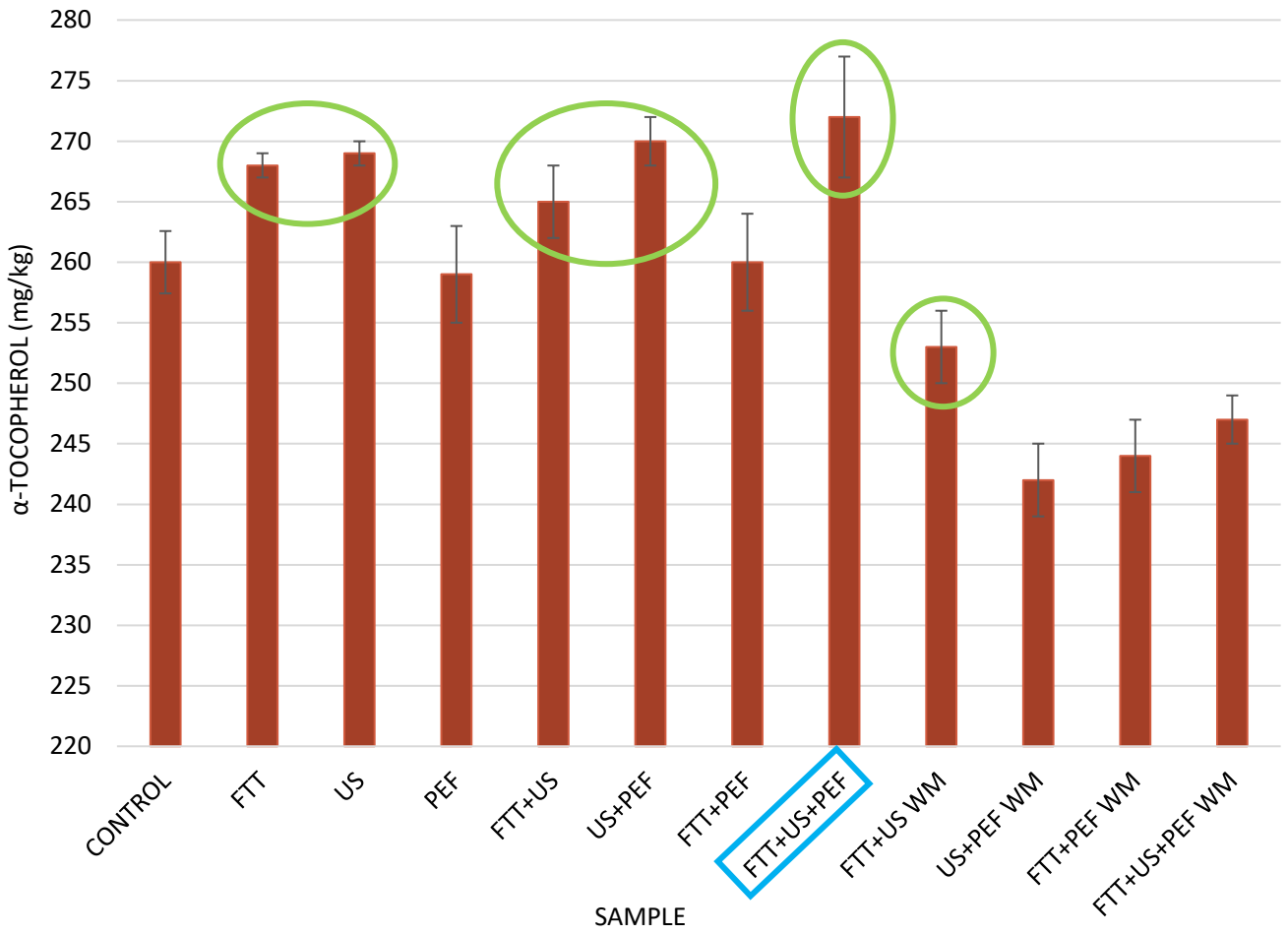
Results and discussion



- Figure 1. Total phenols concentraction (mg/kg)

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

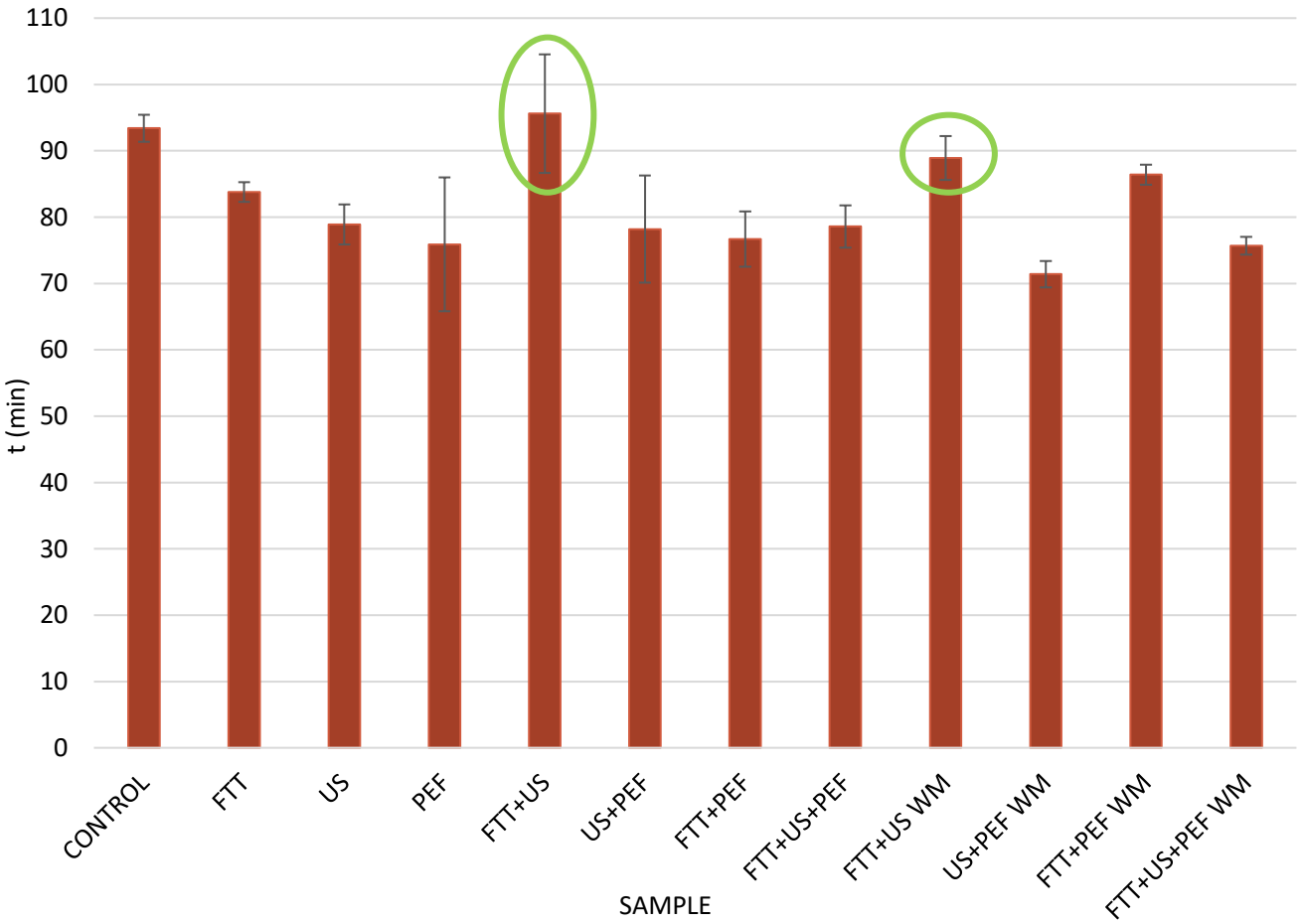
Results and discussion



ANOVA for α-tocopherol		
source of variation	p value	level of significance
innovative technology	<0.0001	extreme
malaxation	<0.0001	extreme
innovative technology* malaxation	<0.0001	extreme

- Figure 2. α-tocopherol concentration (mg/kg)

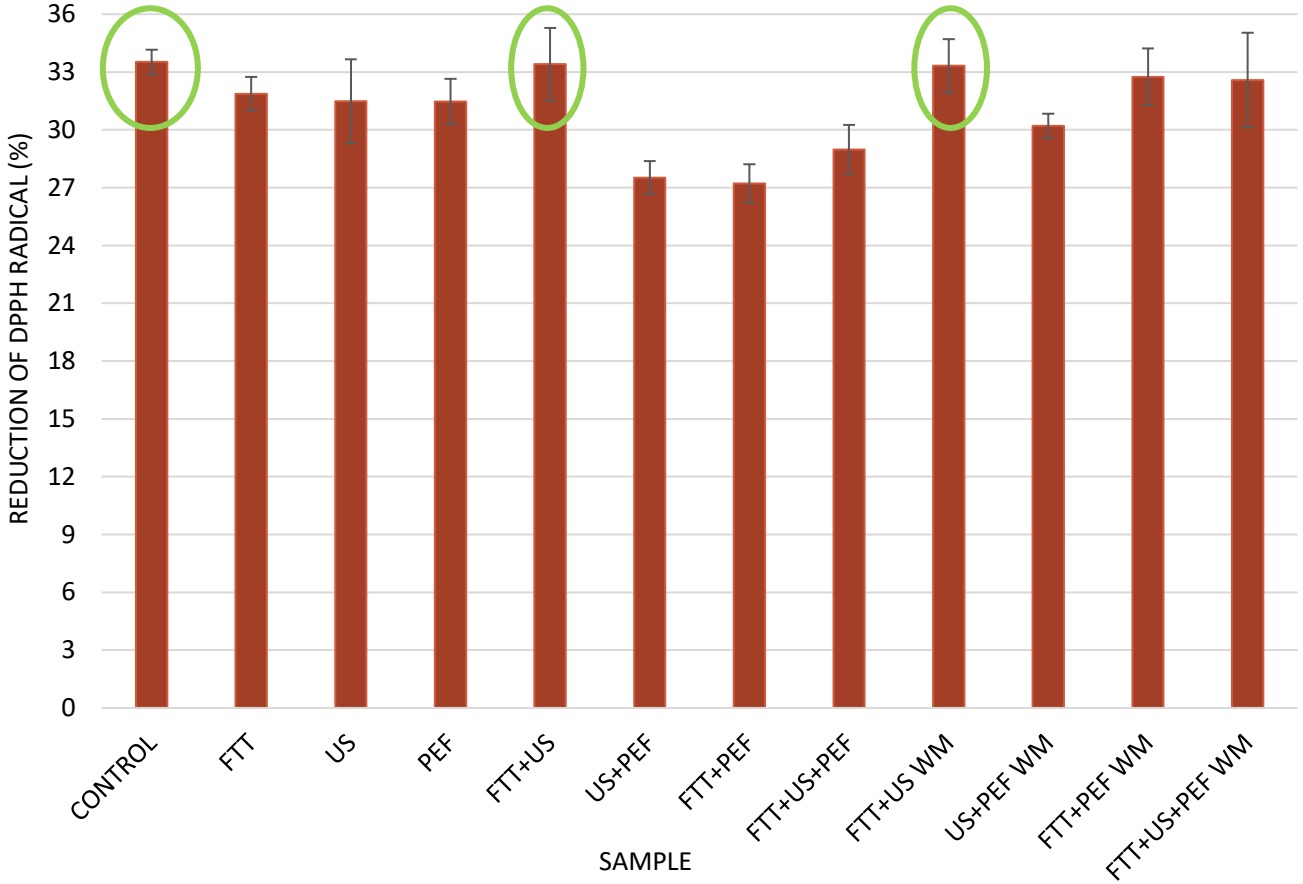
Results and discussion



ANOVA for OSI		
source of variation	p value	level of significance
innovative technology	<0.0001	extreme
innovative technology* malaxation	0.005	significant

- Figure 3. Oxidation stability index

Results and discussion



ANOVA for AC		
source of variation	p value	level of significance
innovative technology	<0.0001	extreme
malaxation	<0.0001	extreme
innovative technology* malaxation	0.009	significant

- Figure 4. Antioxidant capacity

Conclusions

- the increase in α-tocopherol concentration occurred only in the samples with US and with FTT as a separate technology
- the concentration of phenols and OSI increased only in the sample FTT+US
- the highest AC was recorded in the control sample
- the combination of FTT+US can be recommended
- samples without malaxation showed lower concentration of α-tocopherol and phenols and also lower OSI but higher AC compared to the samples with malaxation
- malaxation phase cannot be replaced by any combination of innovative technologies

Thank you for your attention!