

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

DANI
DOKTORATA
BIOTEHNIČKOG
PODRUČJA

12. i 13. rujna 2024.



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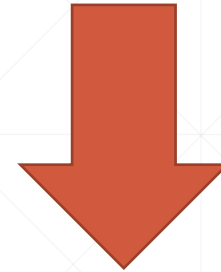
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Introduction



Innovative technologies

Olive fruit variety



AIM

- to determine the influence of **flash thermal treatment (FTT)**, **ultrasound (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



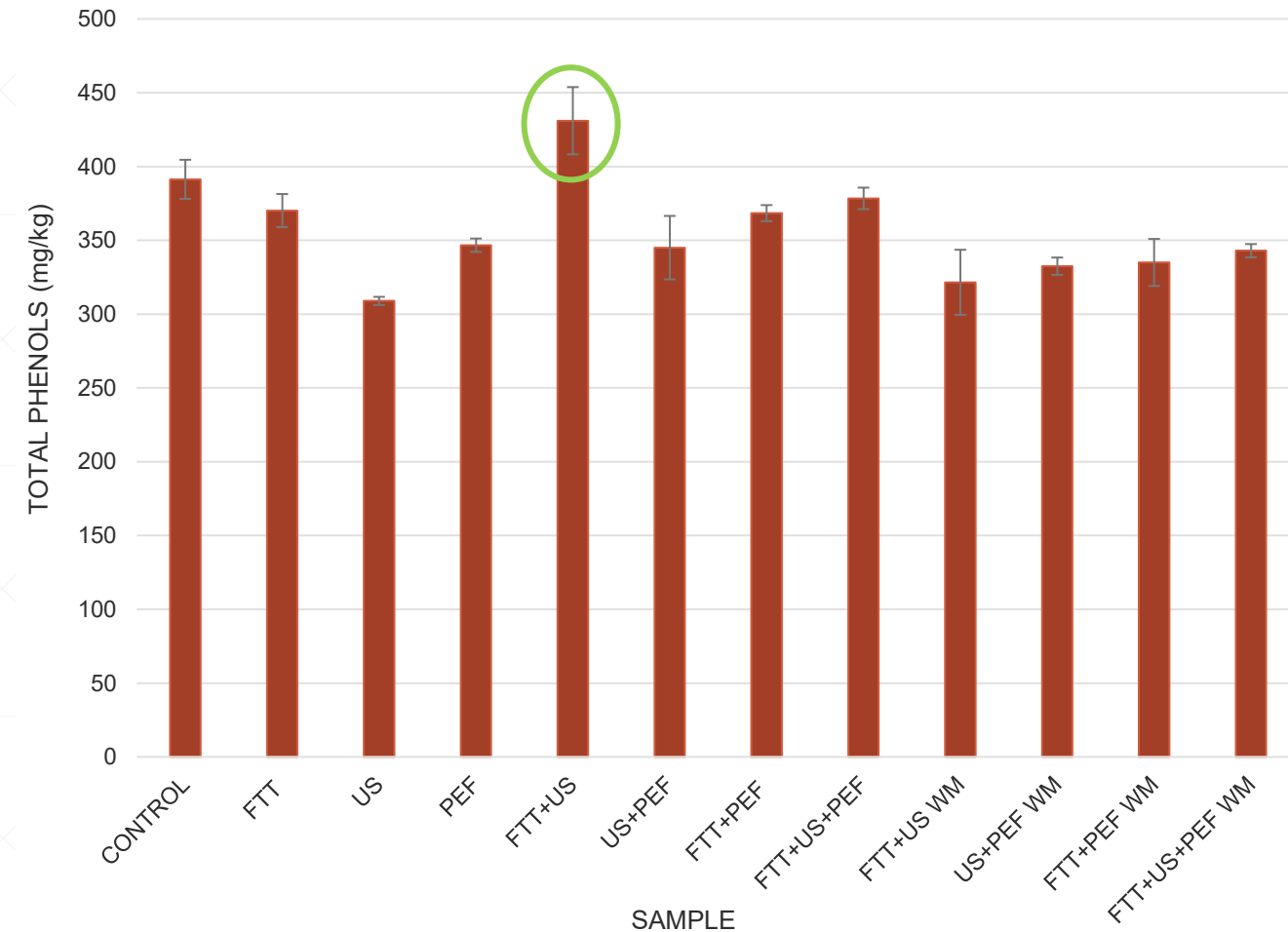
4) α -tocopherol and phenols concentration



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

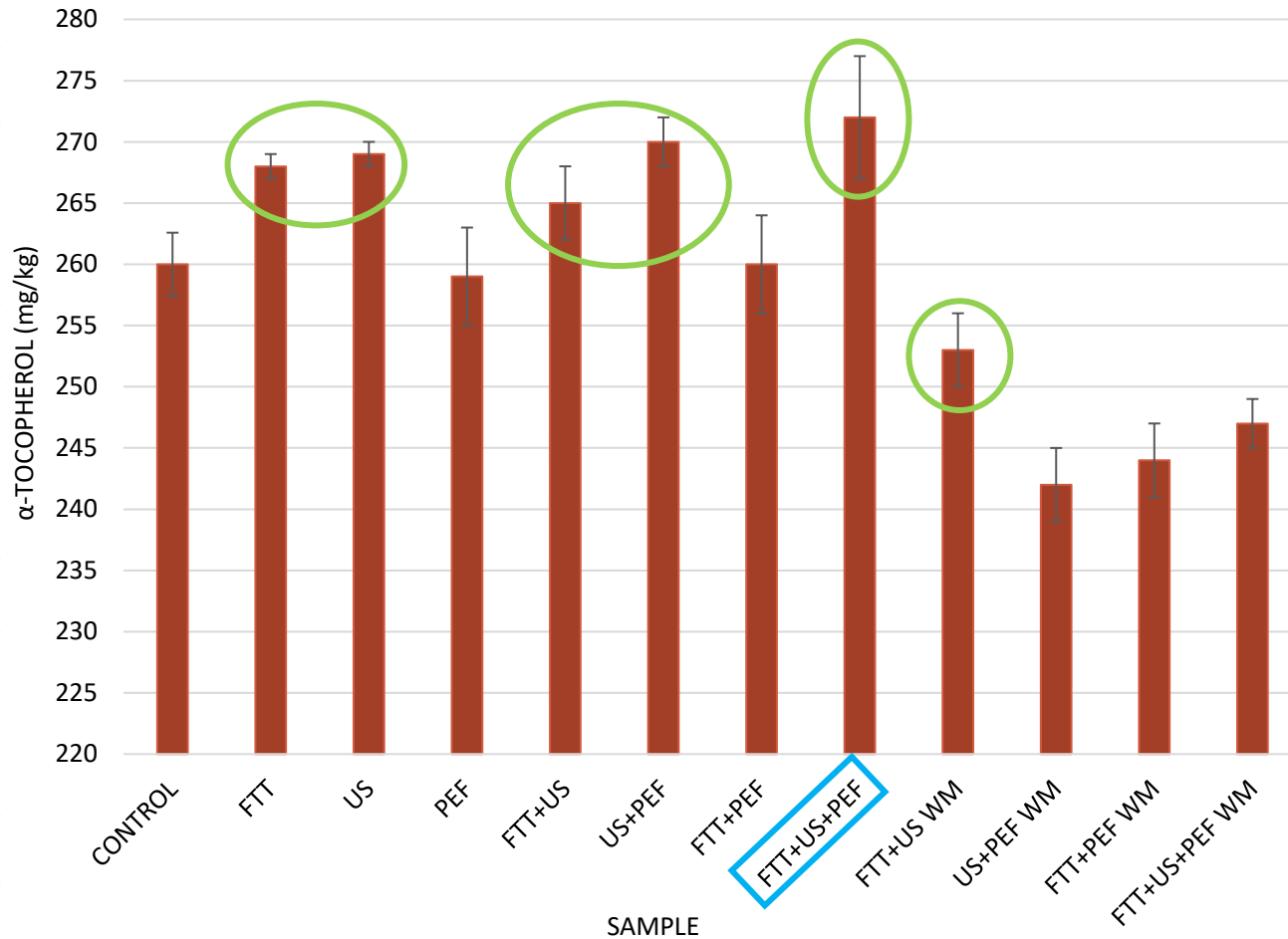


ANOVA for total phenols		
source of variation	p value	level of significance
innovative technology	0.000	extreme
malaxation	<0.0001	extreme
innovative technology* malaxation	<0.0001	extreme

■ Figure 1. Total phenols concentration (mg/kg)



Results and discussion

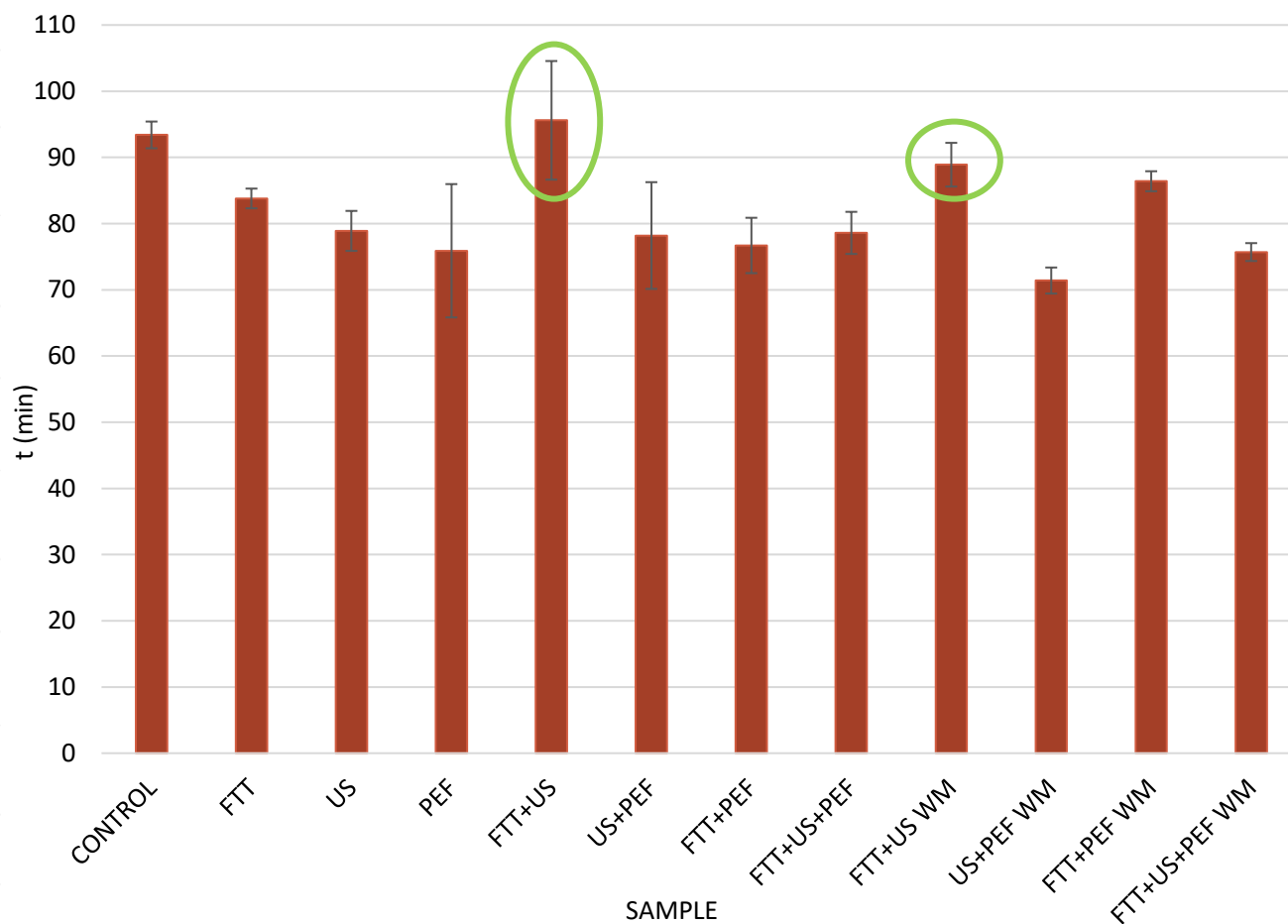


ANOVA for α-tocopherol		
source of variation	p value	level of significance
innovative technology	<0.0001	extreme
malaxation	<0.0001	extreme
innovative technology* malaxation	<0.0001	extreme

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



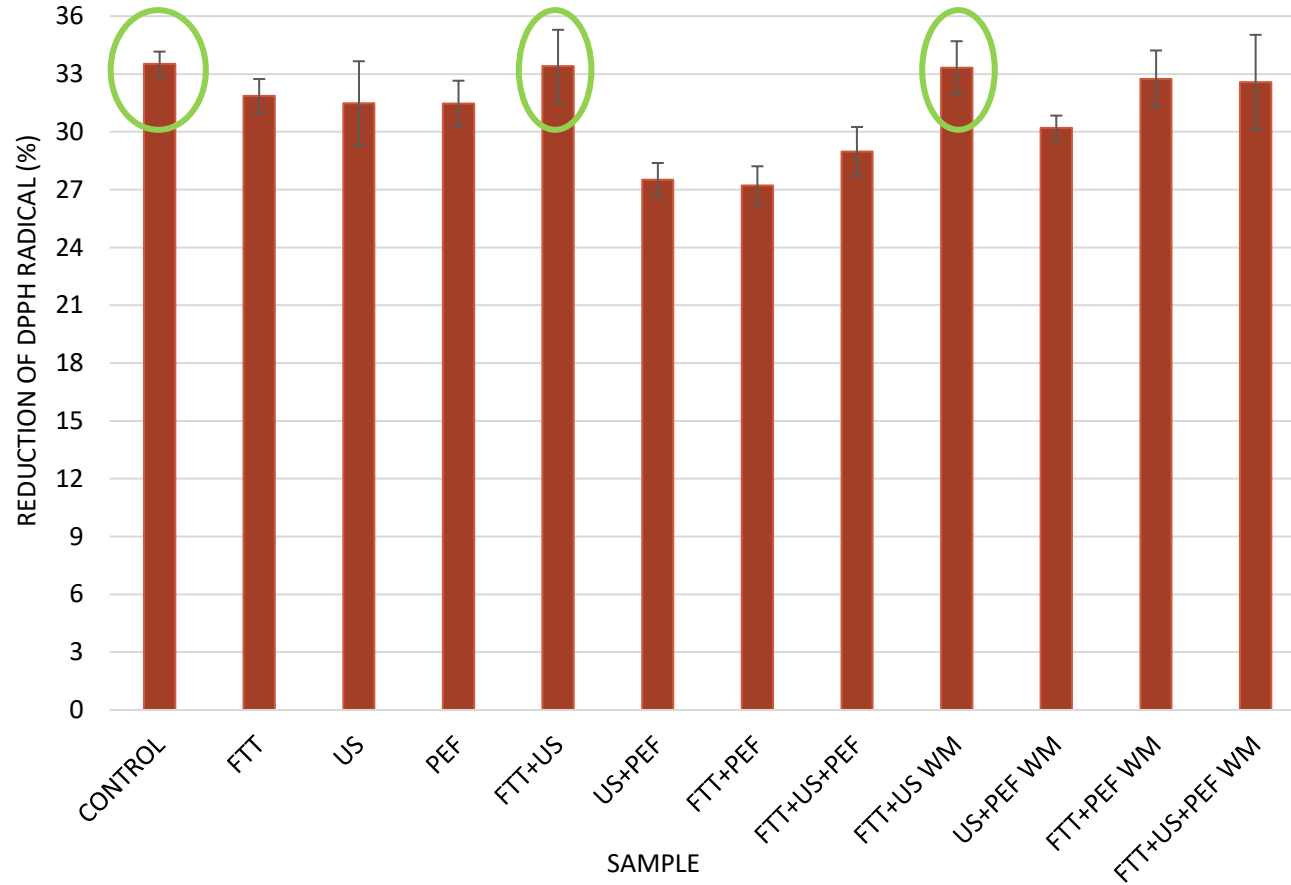
Results and discussion



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!

