

# Improvement Of Antioxidant Activity And Microbial Safety Of Carrot Juice

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## Objectives

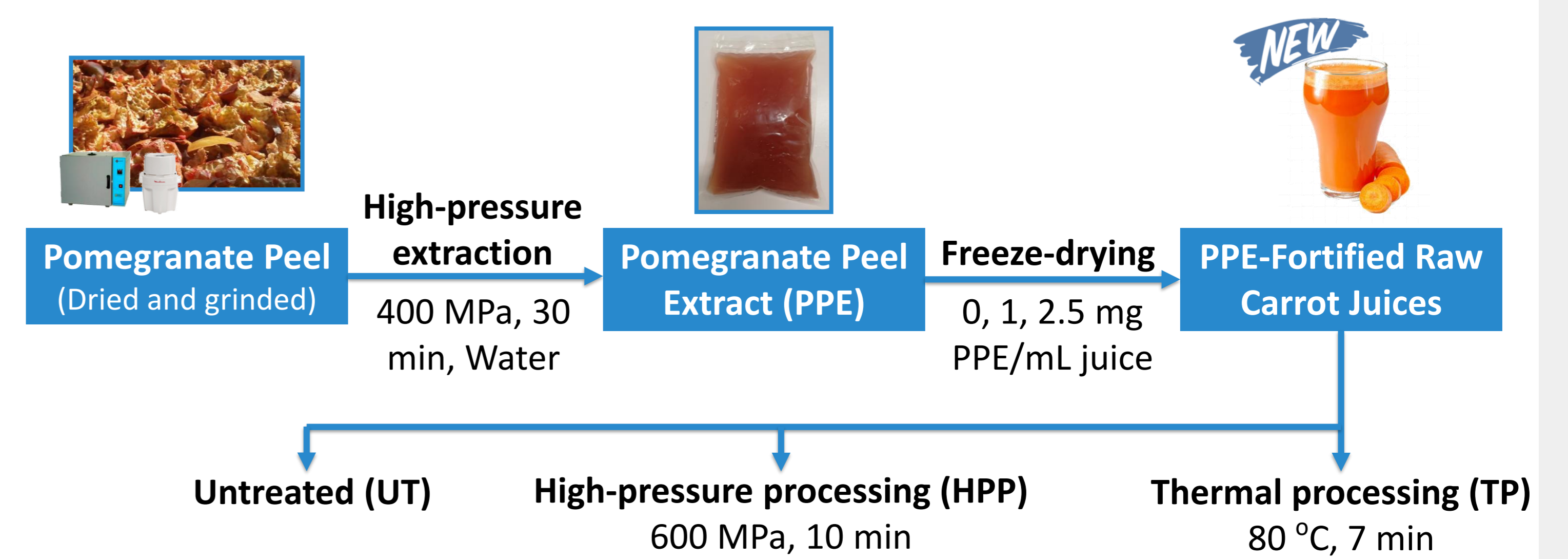
- Valorisation of pomegranate peel through the incorporation of its extracts in raw carrot juice
- Preservation of fortified carrot juices using high-pressure processing and conventional heat processing

## Introduction

- Annually, 0.5 billion tons of fruits and vegetables produced worldwide are lost or wasted [1]. Thus, the extraction of bioactive compounds from these by-products is a key point for their valorisation. In addition to being used successfully as a processing method, high pressure technology have also been studied as an extraction methodology and can be a promising alternative to conventional extraction procedures overcoming their limitations [2].
- Pomegranate peel was selected as case study mainly due its (i) high content in phenolic compounds and (ii) high availability from juice industry producers, whereas carrot juice was selected since it is a highly perishable food product and displays the lowest antioxidant activity when compared to other vegetable juices [3-4].

## Methods

### 1) Preparation of Fortified Carrot Juices



### 2) Analysed Parameters Over Storage (4 °C)

#### Microbiological assays

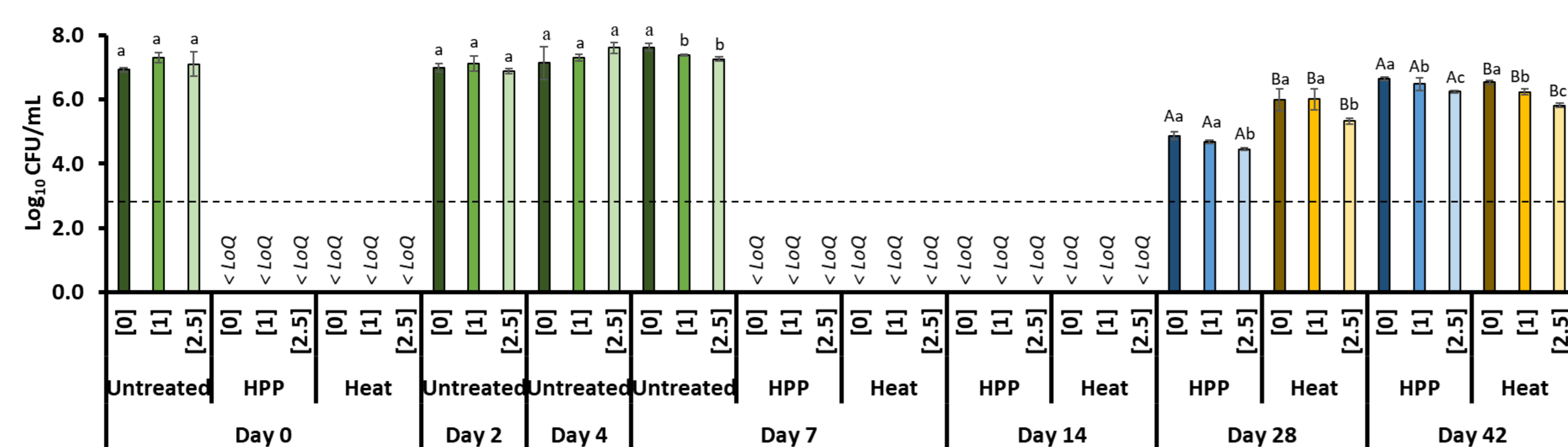
- Total Aerobic Mesophiles
- Total Aerobic Psychophiles
- Yeasts & Moulds

#### Antioxidant assays

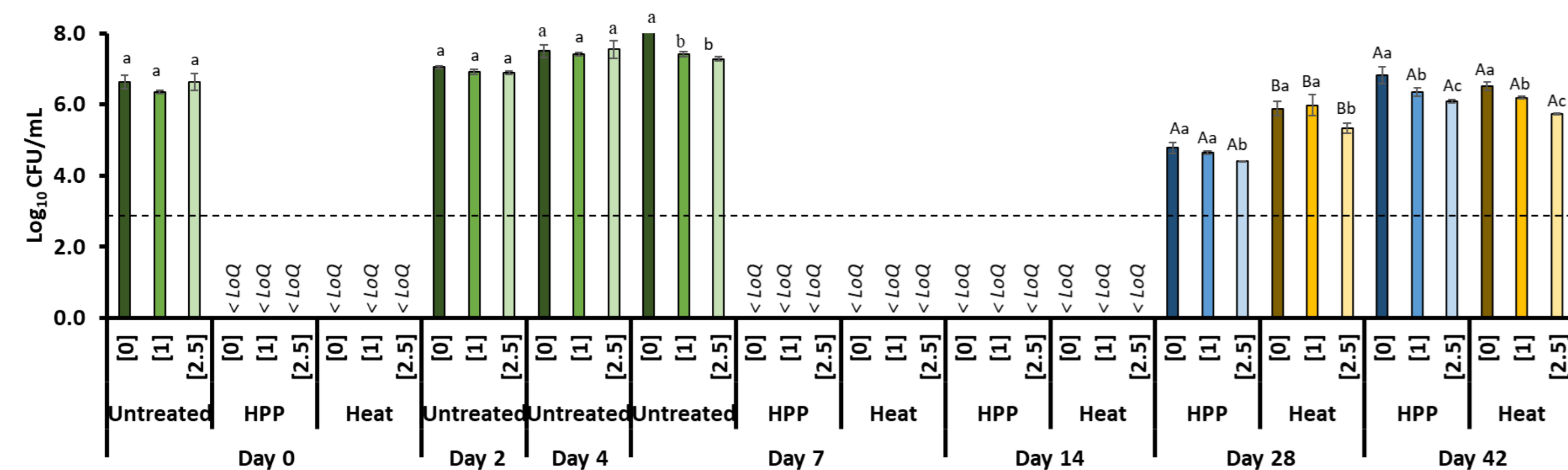
- ABTS
- FRAP
- ORAC

## Results

### Total Aerobic Mesophiles (TAM)



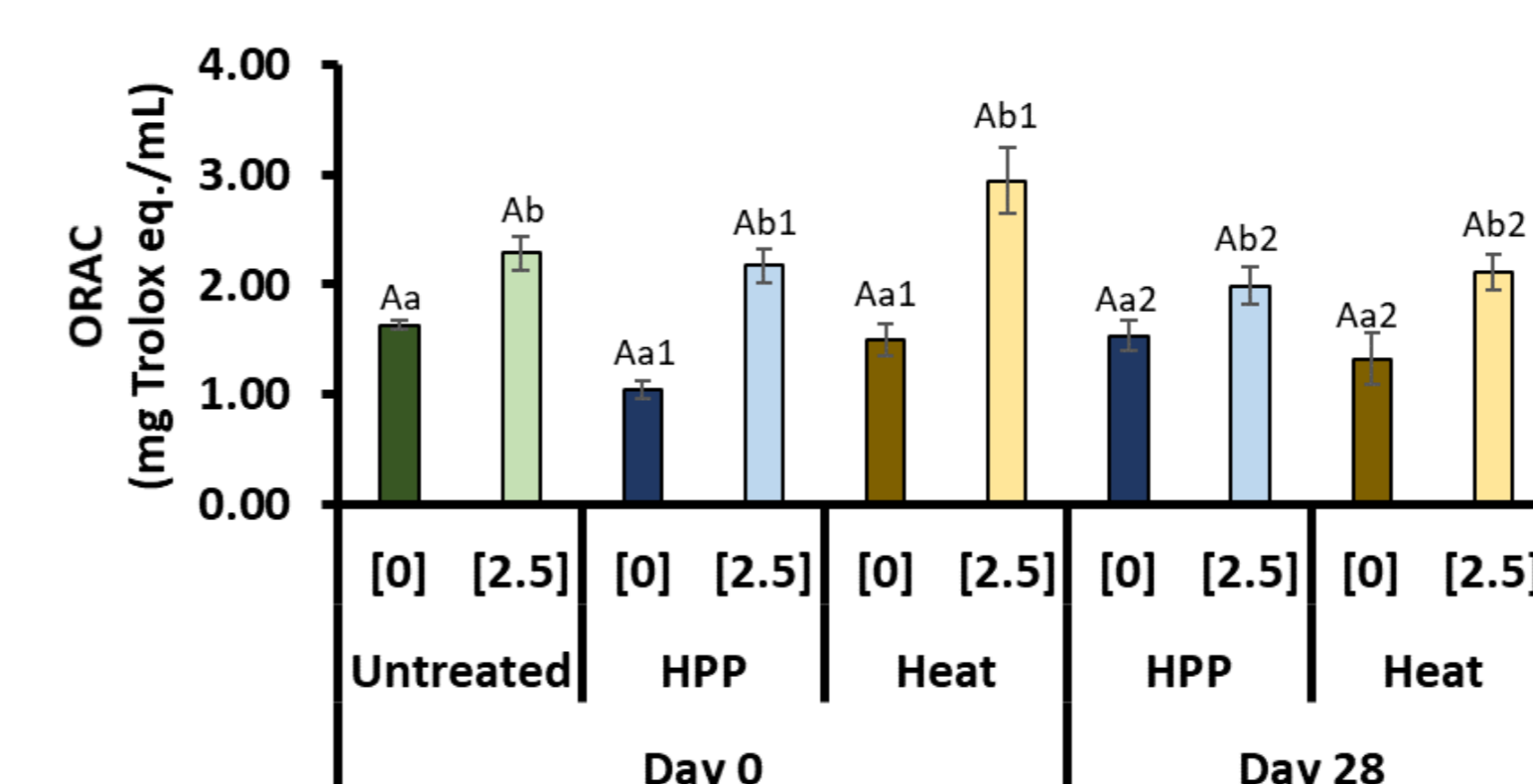
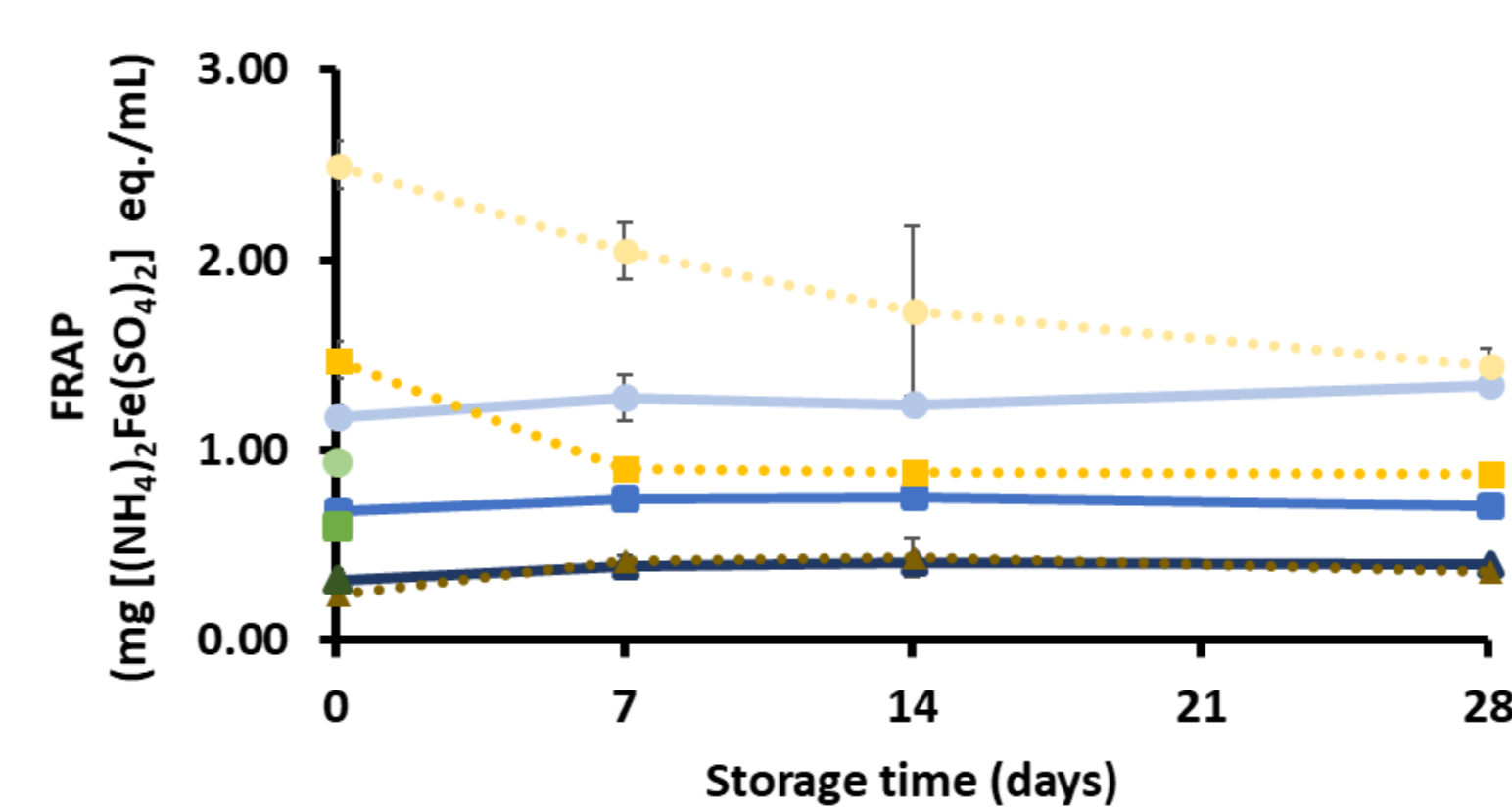
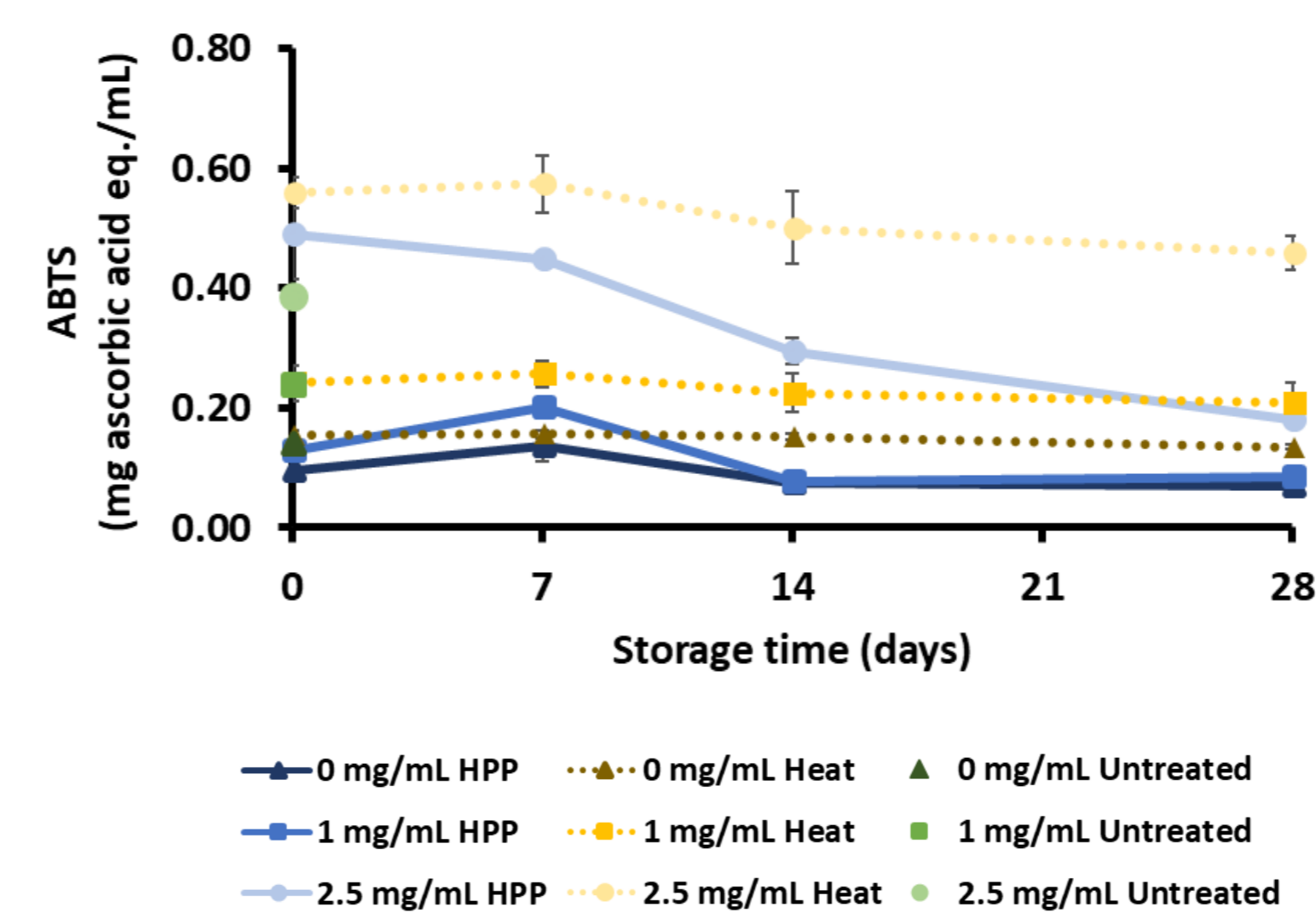
### Total Aerobic Psychophiles (TAP)



A-B: Within the same day different letters mean differences between treatments  
a-b: Within the same day different letters mean differences between concentrations  
1-2: Different numbers mean differences between days

- On day 28, HPP samples exhibited lower TAM and TAP counts relatively to TP samples and fortified juices (2.5 mg/mL) showed a count decrease ( $p < 0.05$ ) of about 9 and 11% for pressurized and heated juices, respectively ( $p < 0.01$ )
- On day 42, TAM and TAP counts were above the established maximum load (6.00  $\log_{10}$  CFU/mL)
- No yeasts & moulds counts for treated samples were detected over storage

### Antioxidant Assays



- No differences between untreated and treated samples ( $p > 0.05$ )
- Day 0: enriched juices (1 and 2.5 mg/mL) had a 1.7- and 3.8-fold increase, respectively, in comparison to UT-0 ( $p < 0.01$ )
- Days 0-28: ABTS values decreased ( $p < 0.05$ ) and fortified samples (1 mg/mL) were similar to the non-fortified ones ( $p > 0.05$ )
- Similar results to ABTS assay, however, on day 0, TP juices exhibited higher FRAP values than HPP and UT juices ( $p < 0.05$ ), possibly due to the thermal hydrolysis of PPE-hydrolysable tannins
- Both preservation treatments were similar to the UT group ( $p > 0.05$ )
- Antioxidant capacity of fortified juices improved 1.3 to 1.8-times, in comparison to UT-0 ( $p < 0.01$ )
- During storage, a decline in ORAC values was noticed ( $p < 0.05$ )

## Conclusions

- Over storage, 2.5 mg pomegranate peel extract/mL juice improved microbial safety as well as antioxidant activity of HPP- and TP-treated carrot juices
- High-pressure was successfully used as extraction and preservation method

## References

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