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Apple Waste Preservation for Extraction of Antioxidants

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We dedicate this poster to Zaid Saleh, our supervisor and colleague

Introduction

- ◆ A huge amount of apple waste is generated from juice, cider and other apple products industries. This can cause environmental problems and represent a cost.
- ◆ The disposal and utilization of waste products is complex by virtue of the initial microorganism load, high moisture content, combined with high enzymatic activity and unstable autoxidation.
- ◆ The apple peels and cores contain valuable components such as polyphenolic compounds.
- ◆ The polyphenols are antioxidants which can be extracted from the waste and exploited commercially.
- ◆ Proper methods of waste pasteurization would stop its degradation and allow its preservation.

Objectives

- ◆ To process the diluted apple waste with three different technologies: thermal processing (TP), high pressure processing (HPP) and low pressure assisted thermal processing.
- ◆ To investigate the effect of processing temperature and pressure on the waste native yeasts and moulds, and inoculated *Saccharomyces cerevisiae* yeast.
- ◆ To investigate the effect of processing temperature and pressure on the waste antioxidant properties.

Method

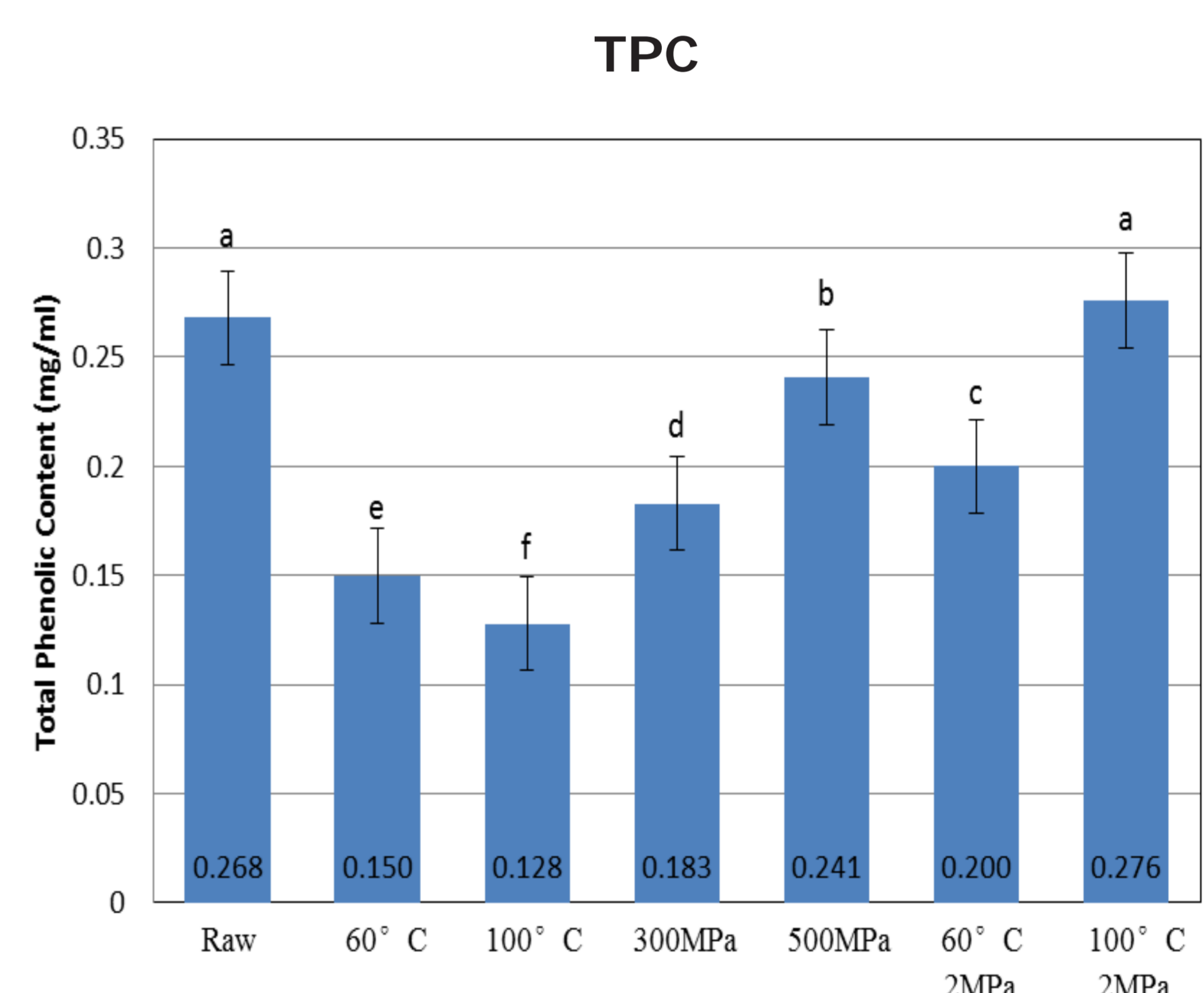
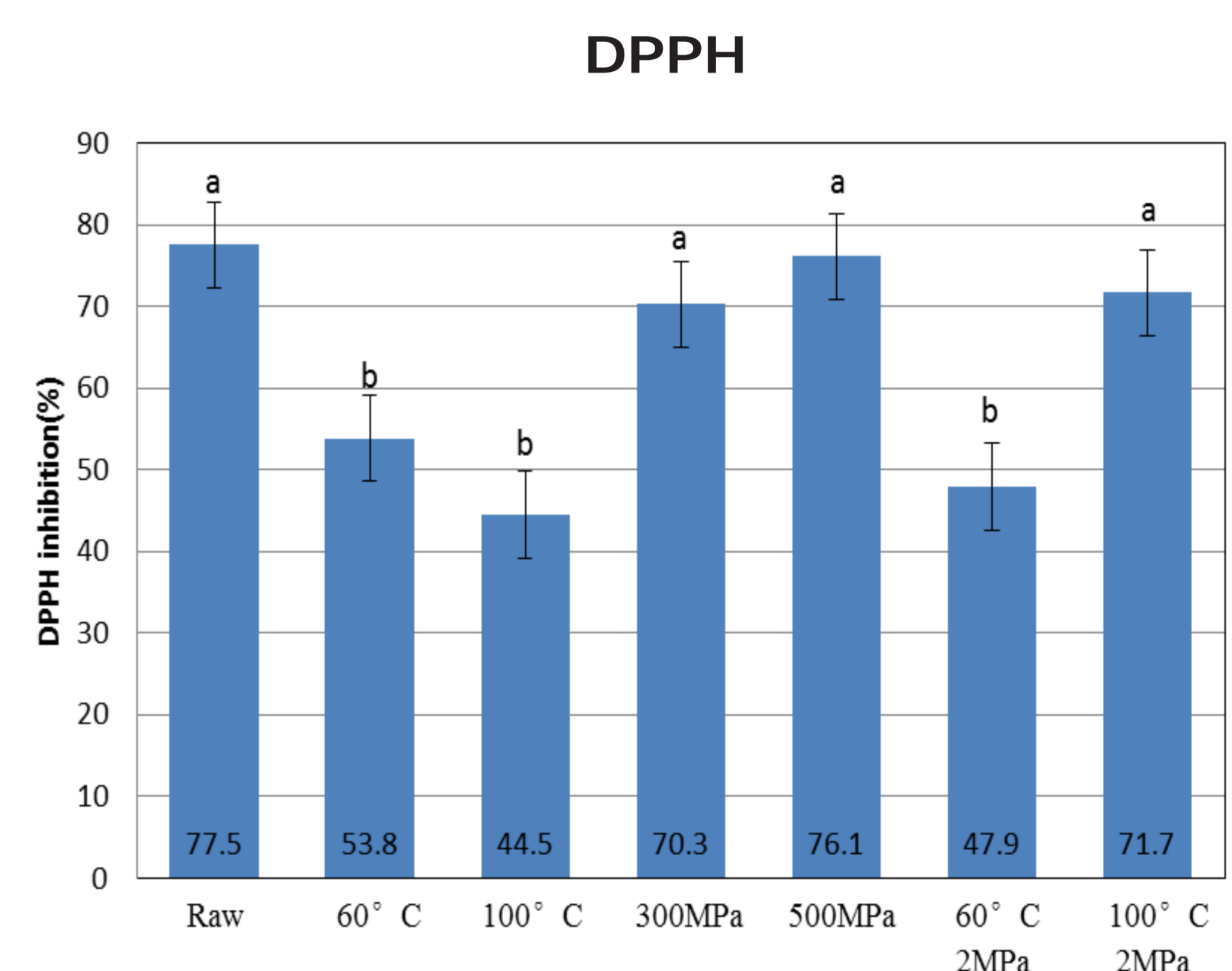
- ◆ TP at 60 and 100°C for 30 min.
- ◆ HPP at 300 and 500 MPa for 10 min.
- ◆ Low pressure assisted thermal processing at 60 and 100°C and 2 MPa for 30 min.
- ◆ The native yeasts and moulds, and inoculated *S. cerevisiae* (~10⁵ cfu/g) in diluted apple waste were enumerated before and after processing using the serial dilution technique, and incubation for 5 days at 28 °C.
- ◆ The antioxidant activity was assessed by the DPPH radical-scavenging activity and the total phenolic content (TPC).
- ◆ 10 µL of extract and 190 µL of DPPH solution were mixed and incubated in dark for 30 min. The absorbance was measured at 517 nm. The DPPH radical-scavenging activity was expressed as inhibition percentages as follows:

$$I\% = \left(\frac{Abs_{blank} - A_{sample}}{Abs_{blank}} \right) \times 100\%$$

- ◆ For TPC the waste was extracted with diluted acetone using an ultrasound bath. After evaporation of the solvent, the reconstitution of residue in methanol was analyzed using the Folin-Ciocalteu method.

Results and Discussion

- ◆ The total yeasts and moulds in the diluted untreated apple waste was $6.6 \pm 1.6 \times 10^1$ cfu/g, which was fully inactivated by the three technologies and all processing conditions.
- ◆ The inoculated *S. cerevisiae* in the waste was reduced by 5-log or more with all processing methods/conditions.



- ◆ The HPP did not affect the antioxidant activity (DPPH-radical scavenging).
- ◆ However, both TPC and DPPH radical scavenging decreased with TP ($p < 0.05$).
- ◆ The results of this study can be helpful for designing appropriate methods and processing conditions to pasteurise fruit industry by-products for further extraction of high value antioxidants.

Acknowledgements

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