Thermosonication Applied to Blueberry Juice – Impact on Quality Properties

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Introduction

The conventional heat treatment (HT) is still used by the food processing industry as a solution to inactivate pathogenic agents and to extend the shelf-life of juice products. However, pasteurization involves quality modifications of the final product by losing part of its nutritional value and properties. This factor is critical in industrial juice manufacture, whose freshness is essential.

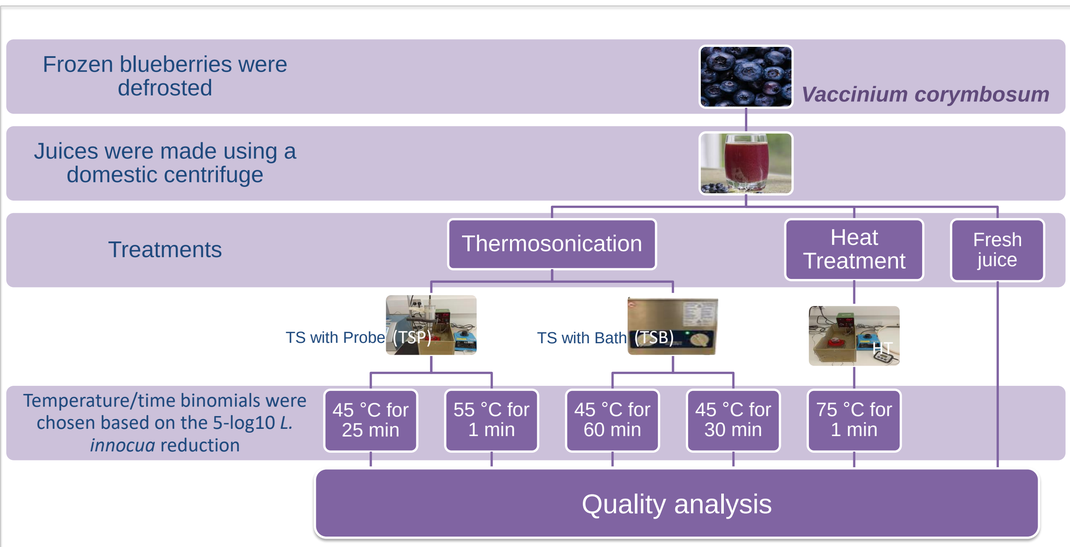
Objectives

To apply thermosonication (TS) processes to blueberry juice and evaluate the impact on:

- physicochemical parameters
- anthocyanins content
- total phenolics
- antioxidant activity
- enzymes (POD and PPO) activity

Materials & Methods

1 | Sample preparation and Treatments



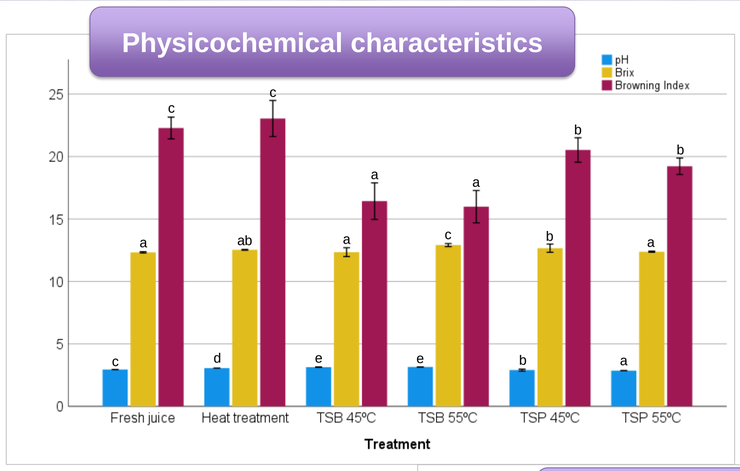
2 | Quality analysis

- Physicochemical parameters
  - pH
  - Soluble Solids Compounds (SSC)
  - Colour
- Bioactive compounds & Antioxidant activity
  - Anthocyanins
  - Phenolics
  - Antioxidants (ABTS and DPPH)
- Enzymatic activity
  - Peroxidase (POD)
  - Polyphenol oxidase (PPO)

3 | Data analysis Three replicates were performed ; ANOVA + Post-hoc tests

Results

Physicochemical characteristics



In general, physicochemical parameters (pH, SSC and colour) were significantly affected by all treatments

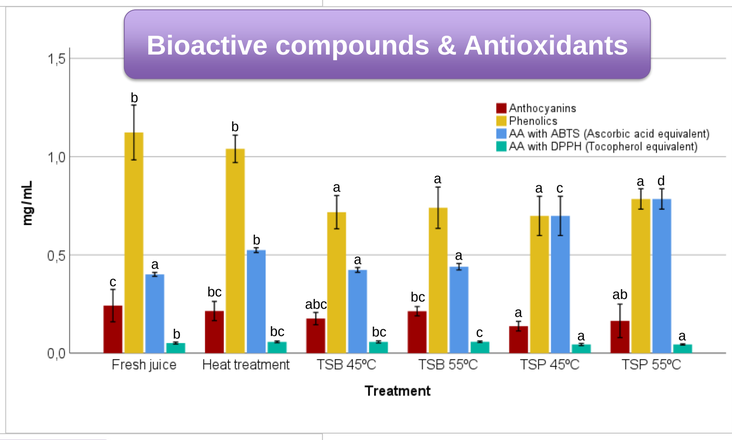
However, it should be highlighted the significant decrease on the browning index of the thermosonicated juice samples

Anthocyanins were negatively affected by TSP treatments

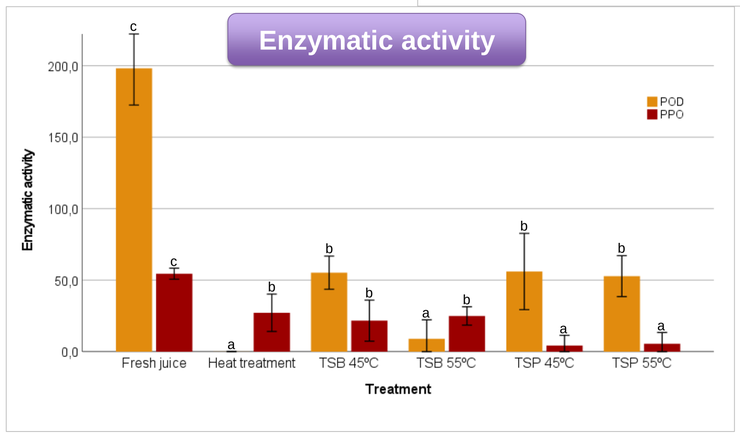
A significant reduction of Phenolics was observed in thermosonicated samples

Antioxidants (with ABTS scavenging method) significantly increased after TSP treatments

Bioactive compounds & Antioxidants



Enzymatic activity



Although POD was totally inactivated by HT, a residual activity of 50% was still present for PPO

TSP treatment attained a significant reduction on both enzymes (a residual activity of about 25% and 1% was achieved for POD and PPO, respectively)

The bars are limits of the confidence intervals of the mean at 95%
Cases with different letters differ significantly ($p < 0.05$)

Conclusions

- Heat treatment seemed to preserve bioactive compounds but had a negatively impact on juice colour parameters.
- Thermosonication maintained or improved most blueberry juice quality characteristics compared with fresh juice. Nevertheless, since TSB needs a higher treatment time for the 5log10 microbial inactivation, physicochemical parameters were more negatively affected.
- Thermosonication (especially TSP) seems a possible processing option to preserve blueberry juice quality.

FCT Fundação para a Ciência e a Tecnologia · República Portuguesa · União Europeia · POCH

This work was supported by National Funds from FCT - Fundação para a Ciência e a Tecnologia through project UID/Multi/50016/2020