

## Screening of antioxidant activity of fermented papaya

Mariana Leitão <sup>1,2,3\*</sup>, Luísa Barreiros <sup>2,4</sup>, Fernando Moreira <sup>2,3</sup>, Pablo García <sup>5</sup>, Patrícia Correia <sup>2,3</sup>

<sup>1</sup> PhD student in Pharmacy and Health (Pharmacy Faculty), University of Salamanca, Salamanca, Spain

<sup>2</sup> ESS, Polytechnic of Porto, Rua Dr. António Bernardino de Almeida, 4200-072 Porto, Portugal

<sup>3</sup> CISA, ESS, Polytechnic of Porto, Rua Dr. António Bernardino de Almeida, 4200-072, Porto, Portugal

<sup>4</sup> LAQV, REQUIMTE, Department of Chemical Sciences, Faculty of Pharmacy, University of Porto, Porto, Portugal

<sup>5</sup> Department of Pharmaceutical Sciences, Pharmaceutical Chemistry section, Faculty of Pharmacy, Institute for Biomedical Research of Salamanca (IBSAL), University of Salamanca, Salamanca, Spain

\*[marianaleitaofa@gmail.com](mailto:marianaleitaofa@gmail.com)

**Background:** Papaya is the fruit of *Carica papaya* L., consumed for its beneficial properties, directly or as a fermented fruit supplement [1]. **Objective:** Compare the total phenolic content (TPC) and the antioxidant activity (Ferric Reducing Antioxidant Power, FRAP) evolution in a variety of papaya fermentation experiments using fruit natural microorganisms (spontaneous fermentation) *versus* fermentation with *Gluconobacter oxydans* bioinoculation. **Methods:** Different papaya fermentations were performed: spontaneous (P1 and P2, during 7 days; P3, P4 and P5, during 9 days) and with bioinoculation (P6 and P7, during 9 days). Then, TPC was determined according to the Folin-Ciocalteu (FC) procedure [2], mixing 250  $\mu\text{L}$  of sample with 2.5 mL of FC reagent, followed by an addition of 2 mL of sodium carbonate solution (7.5 % w/v). This mixture was incubated at 45 °C for 15 minutes, and then kept in the dark at room temperature for 30 minutes. Absorbance was measured at 765 nm. The FRAP method [3] was performed mixing 1.2  $\mu\text{L}$  of freshly FRAP reagent with 40  $\mu\text{L}$  of sample, and then incubating for 15 minutes at 37 °C. Absorbance was read at 593 nm. **Results:** The lowest TPC was observed on day 7 of P4 ( $121.20 \pm 0.12 \mu\text{g GAE} \cdot \text{mL}^{-1}$ ), and the highest content was observed on day 8 of P7 ( $260.18 \pm 0.02 \mu\text{g GAE} \cdot \text{mL}^{-1}$ ). TPC decreased from the first to the last day of fermentation in all tests, except for the tests where bioinoculation strategy was used. Those tests also showed a higher FRAP content, although from day 1 to day 7, FRAP also slightly increased in P1, P2, and P3 (spontaneous fermentations). **Conclusions:** Antioxidant capacity increased as a result of fermentation with *G. oxydans*, probably due to the increased amount of phenolic compounds observed. The final product may be used as a functional food or cosmetic applications.

**Keywords:** Acetic acid bacteria; antioxidant activity; fermented papaya; papaya; phenolic compounds;

### Acknowledgements

Financial support from PT national funds (FCT/MCTES, Fundação para a Ciência e a Tecnologia and Ministério da Ciência, Tecnologia e Ensino Superior) through the projects UIDB/50006/2020 and UIDP/50006/2020 is acknowledged Luísa Barreiros acknowledges funding from FCT through program DL 57/2016-Norma transitória. The authors gratefully acknowledge the Research Centre on Health and Environment, Department of Pharmacy, School of Allied Health Sciences, Polytechnic Institute of Porto, Porto, Portugal, for providing installations, and supervisors for helpful suggestions.

### References

[1] Logozzi M, Di Raimo R, Mizzoni D, Andreotti M, Spada M, Macchia D, Fais S. Beneficial Effects of Fermented Papaya Preparation (FPP®) Supplementation on Redox Balance and Aging in a Mouse Model. *Antioxidants*. 2020; 9:1-17.

[2] Alves RC, Costa ASG, Jerez M, Casal S, Sineiro J, Núñez MJ, Oliveira, B. Antiradical Activity, Phenolics Profile, and Hydroxymethylfurfural in Espresso Coffee: Influence of Technological Factors. *Journal of Agriculture and Food Chemistry*. 2010; 58(23):12221-12229.

[3] Benzie IFF, Strain JJ. Ferric reducing/antioxidant power assay: Direct measure of total antioxidant activity of biological fluids and modified version for simultaneous measurement of total antioxidant power and ascorbic acid concentration. *Methods in Enzymology*. 1999; 299:15-27.