

Impact of UV-C Radiation on Melon Peel

Fátima A. Miller, Joana F. Fundo, Gabriela Mandro, Cristina L. M. Silva and Teresa R. S. Brandão*

Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Arquitecto Lobão Vital, 172, 4200-374 Porto, Portugal

* Corresponding author: tbrandao@porto.ucp.pt



CATOLICA

CBQF · CENTRE FOR BIOTECHNOLOGY
AND FINE CHEMISTRY ASSOCIATE LABORATORY

CBQF

PORTO

Introduction

Melon is a fruit with high amounts of waste parts, particularly peel. Peel has a high content of bioactive compounds, considered to be health beneficial. Therefore, its valorization is crucial and may be attained by developing strategies to transform it into more convenient forms that may be used as food ingredients. Consequently, the impact of non-thermal processes on quality characteristics and decontamination is of main importance. UV-C radiation technology has a germicidal effect and has been applied to eliminate undesirable microorganisms in food products. Although this process is particularly effective in liquid foods, research is needed to be considered an alternative non-thermal processing that can be applied to solid foods.

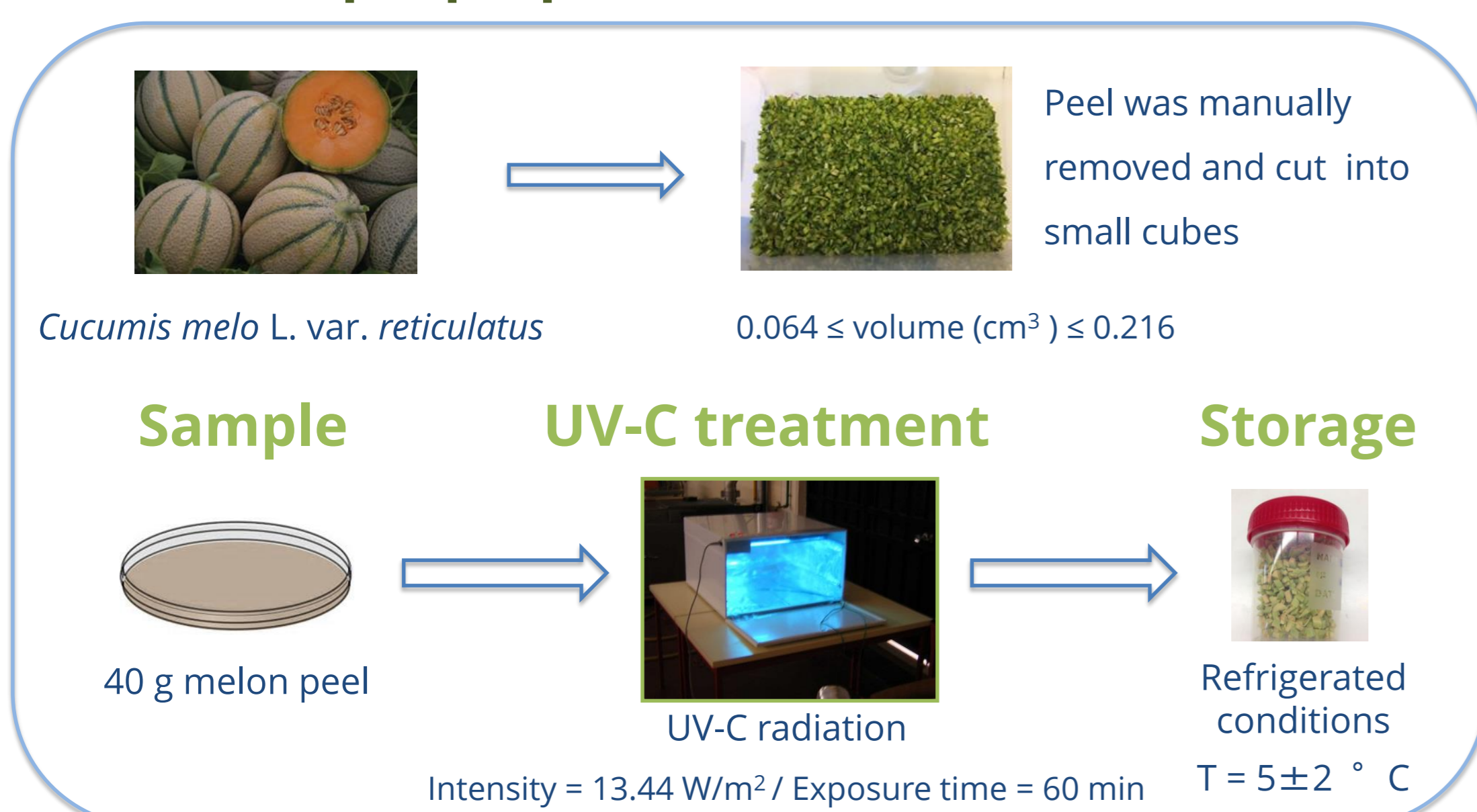
Objectives

The main goal of this study was to evaluate the effect of UV-C radiation on some quality characteristics and microbiological decontamination of *Cantaloupe* melon (*Cucumis melo* L. var. *reticulatus*) peel, during refrigerated storage.

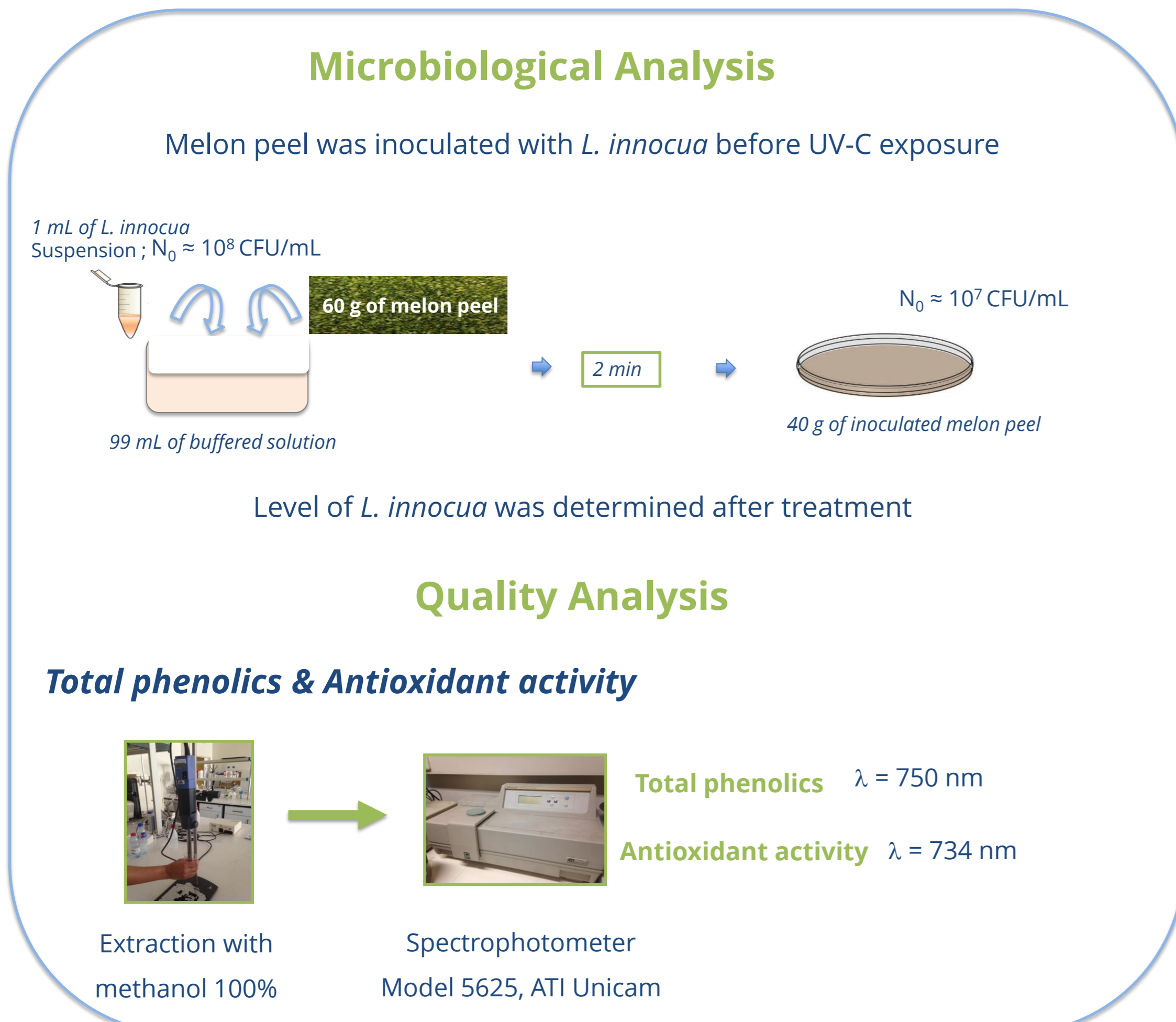
- Microbiological indicators - *Listeria innocua* (non-pathogenic surrogate of *L. monocytogenes*)
- Quality characteristics - total phenolics and antioxidant activity
- Storage - 13 days at refrigerated conditions

Methods

Sample preparation & Treatment



Microbiological and Quality Analysis



Data analysis

Three replicates were performed; Means comparison tests

Results and Discussion

UV-C treatment effect

Table 1. Effect of UV-C radiation exposure on *L. innocua* survival, total phenolic content and antioxidant activity. The values are mean \pm margin of confidence interval at 95%.

Melon peel	Parameters analyzed		
	<i>L. innocua</i> (CFU/g)	Total phenolics ($\mu\text{g/g}$)	Antioxidant activity ($\mu\text{g/g}$)
Non-treated	7.0 ± 0.9	400.7 ± 62.1	320.2 ± 101.4
UV-C treated	6.1 ± 0.7	412.0 ± 26.4	485.9 ± 157.7

A reduction of 0.9 ± 0.4 log-cycles on *L. innocua* was observed after 60 minutes of radiation. For quality parameters, no significant differences were detected between treated and non-treated samples.

UV-C treatment effect after 13 days of refrigerated storage

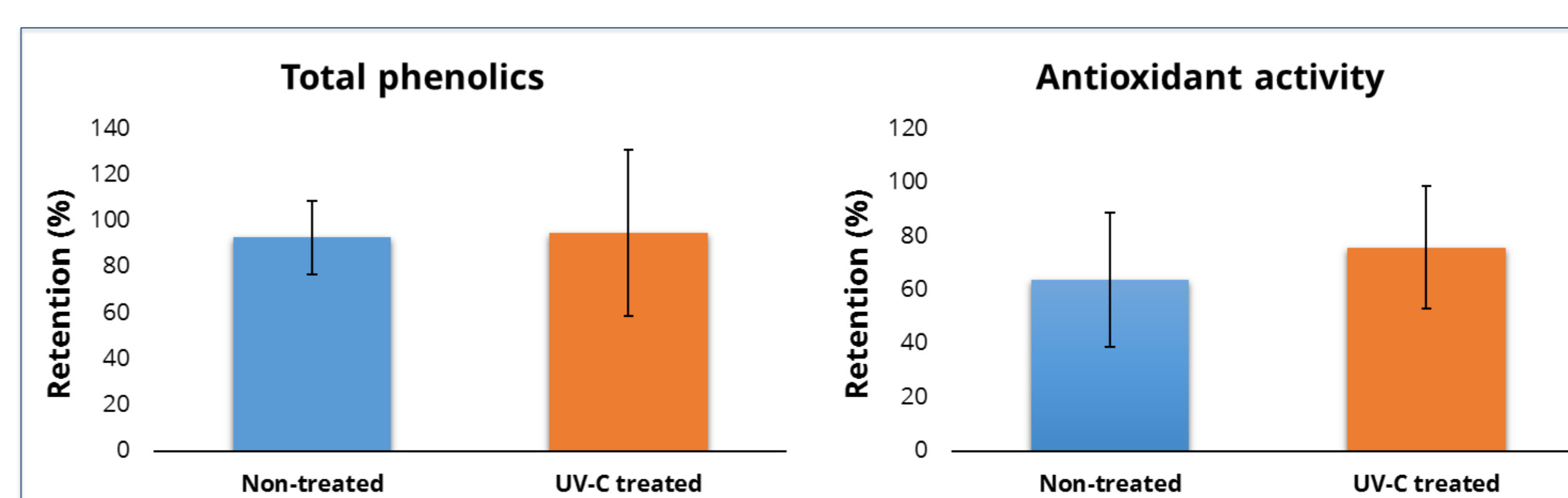


Figure 1. Total phenolics and antioxidant activity retention in non-treated and UV-C treated peel during storage. Data represent mean values and bars the confidence interval at 95%.

UV-C treated peel retained 95% of total phenolics and 76% of antioxidant activity.

Non-treated peel retained 93% of total phenolics but lost 36% of antioxidant activity.

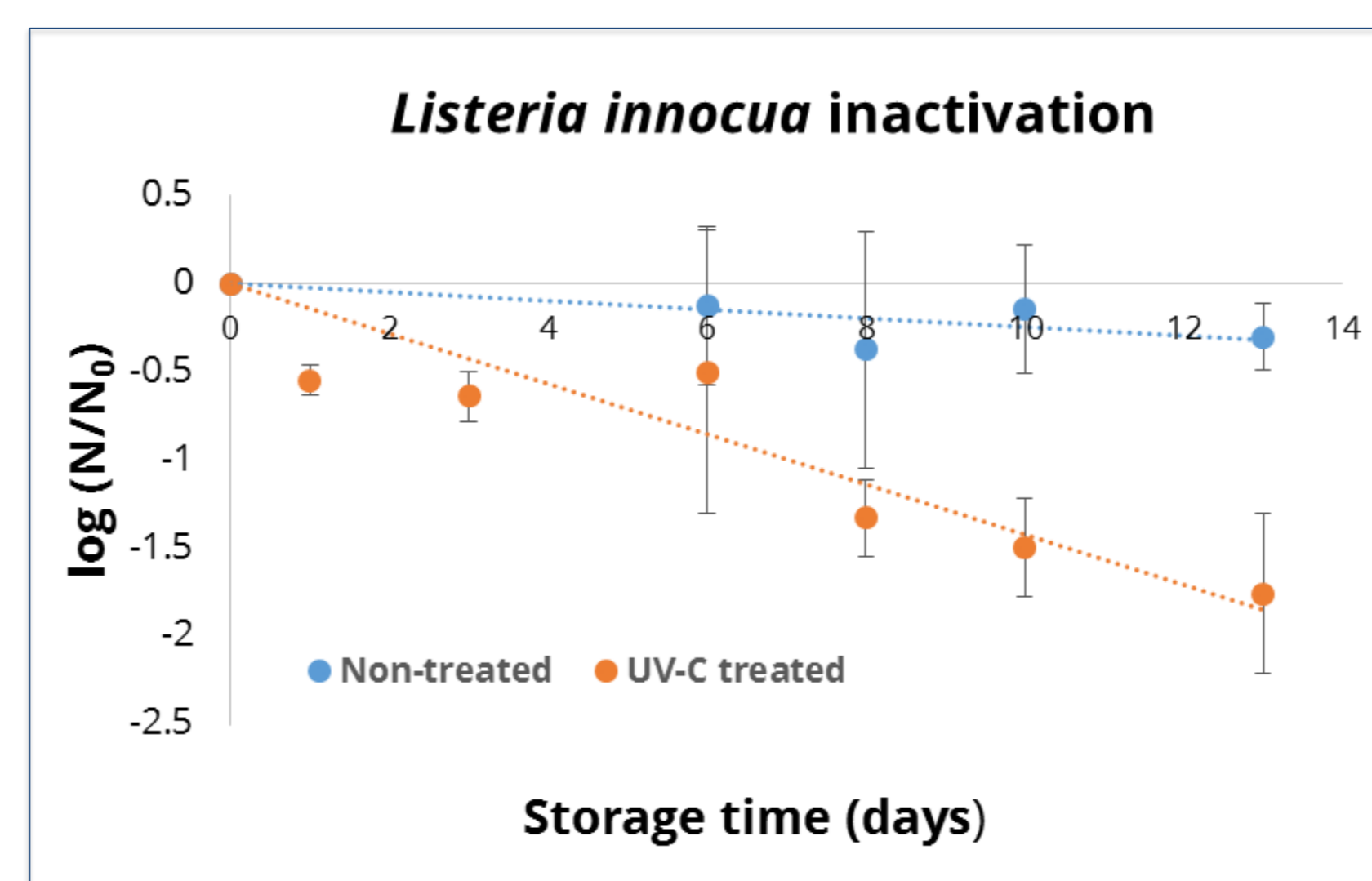


Figure 2. *Listeria innocua* inactivation in non-treated and UV-C treated peel during storage. Data represent mean values and bars the standard deviation.

In **UV-C treated peel**, *L. innocua* reduced approximately 2 log-cycles.

In **non-treated peel** the reduction was not significant.

In both cases, the inactivation behaviour was linear throughout storage time.

Conclusions

- ✓ UV-C radiation is effective for low contaminated melon peel.
- ✓ Total phenolics and antioxidant activity were not significantly affected by UV-C treatment; treated melon peel retained considerably those quality indicators throughout refrigerated storage.
- ✓ Complementary studies are needed to assess UV-C radiation effectiveness using different dosages or even combinations with other mild technologies for developing strategies to add value to fruit wastes.

Acknowledgements

Fátima A. Miller, Joana F. Fundo and Teresa R.S. Brandão gratefully acknowledge their Post-Doctoral Grants (SFRH/BPD/65041/2009, SFRH/BPD/109519/2015 and SFRH/BPD/101179/2014, respectively) to Fundação para a Ciência e a Tecnologia (FCT). This work was supported by National Funds from FCT - Fundação para a Ciência e a Tecnologia through project UID/Multi/50016/2013.