

## Microwave and Ultrasound Pre-treatments for ‘Rocha’ Pear: Impact on Drying Kinetics and Selected Quality Attributes

Begüm Önal<sup>1</sup>, Giuseppina Adiletta<sup>1</sup>, Marisa Di Matteo<sup>1</sup>, Paola Russo<sup>2</sup>, Inês N. Ramos<sup>3</sup>, Cristina L.M Silva<sup>3</sup>

<sup>1</sup>Department of Industrial Engineering, University of Salerno, Via Giovanni Paolo II, 132, 84084 Fisciano, SA, Italy

<sup>2</sup>Department of Chemical Engineering Materials Environment, Sapienza University of Rome, Via Eudossiana 18, 00184 Rome, Italy

<sup>3</sup>CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Universidade Católica Portuguesa/Porto, Rua de Diogo Botelho 1327, 4169-005 Porto, Portugal

### Abstract

‘Rocha’ pear (*Pyrus communis* L.) is the main cultivar produced in Portugal, and is classified as protected designation of origin (PDO). This pear fruit is characterized by its own typical and specific properties, such as pleasant flavor, crispness and also sweetness. Pears are rich in polyphenols with strong antioxidant activity, offering health promoting benefits. In order to extend its shelf life and increase availability along the year, drying processes are widely applied as a good alternative method for fruits preservation. Drying is used to improve food stability, decrease moisture content and microbial activity, and minimize physico-chemical changes during storage. However, drying process conditions (i.e. air temperature, time, and velocity) usually may lead to food quality degradation in terms of physico-chemical and nutritional attributes. In this context, drying combined with pre-treatments have been proposed in order to reduce the drying impact on products quality.

The objective of this work was to evaluate the use of microwave and ultrasound pre-treatments on ‘Rocha’ pear drying kinetics and quality attributes (water activity, color, shrinkage, total phenolics, antioxidant activity, and texture and rehydration behavior of dried slabs). Three different samples were compared: a) Control, b) Microwave Pre-treatment (1540 MW, 4 min) (MW), and c) Ultrasound Pre-treatment (35 kHz, 10 min, 25°C) (US). Drying experiments were conducted on pear slabs (thickness and diameter of 6 and 38 mm, respectively) in a tray

dryer with an air temperature of 60°C and a fixed velocity of 0.75 m/s. Pear samples pre-treated with MW had shorter drying time than control and ultrasound treated ones. Pear samples pre-treated with US showed the lowest colour changes and shrinkage, higher total phenolics and antioxidant activity, the highest rehydration capacity, and similar drying time to the control. This study contributes with information for the development of new drying pre-treatment conditions of ‘Rocha’ pear fruits, as an alternative to traditional drying in an industrial context.

### Recent Publications

- 1) Önal, B., Adiletta, G., Di Matteo, M. (2019). Drying of fruits and vegetables: Improvement of quality and process modeling. XXIV Workshop on the Developments in the Italian PhD Research on Food Science, Technology and Biotechnology. 11-13<sup>th</sup>, 2019, Florence. Book of Abstracts published by: Università degli Studi di Firenze, ISBN: 978-88-944679-0-1. Editors: Canuti, V., Dinnella, C., Domizio, P., Fia, G., Lencioni, L., Menteleone, E., Picchi, M., Spinelli, S., Zannoni B.
- 2) Önal, B., Adiletta, G., Crescitelli, A., Di Matteo, M., Russo, P. (2019). Optimization of hot air drying temperature combined with pre-treatment to improve physico-chemical and nutritional quality of ‘Annurca’ apple. Food and Bioproducts Processing, 115, 87- 99.
- 3) Önal, B., Ozdikicierler, Onur., Yemiscioglu, Fahri., 2016. Türkiye piyasasında satışa sunulan patates cipslerinde 3-MCPD esterleri ve glisidil esterleri miktarları. Akademik Gıda ( Academic Food Journal), 14(3), 267-274.
- 4) Önal, B., Adiletta, G., Russo, P., Crescitelli, A., Di Matteo, M. (2018). Optimization of drying conditions to preserve phenolic contents and antioxidant activity of ‘Annurca’ apple, Southern Italian Cultivar. 2nd Workshop of Food Waste Recovery & Open Innovation, 2nd July, 2018, Stuttgart, Germany. Book of Abstracts published by: ISEKI-Food Association, ISBN: 978-3900932-58-9. Editors: Galanakis, C.M.



### Biography

Begüm Önal is third year Doctoral Student at the Department of Industrial Engineering at University of Salerno, Italy. She works on ‘Fruit and Vegetables Drying and Mathematical Modelling: Improvement of Quality Attributes’. She did an abroad experience at Centro de Biotecnologia e Química Fina (CBQF) – Laboratório Associado, Universidade Católica Portuguesa, Porto, Portugal for six months, during her doctoral period where she worked on ‘Rocha’ pear drying. She has several peer-reviewed papers in the field of fruits drying.

Email: bonal@unisa.it