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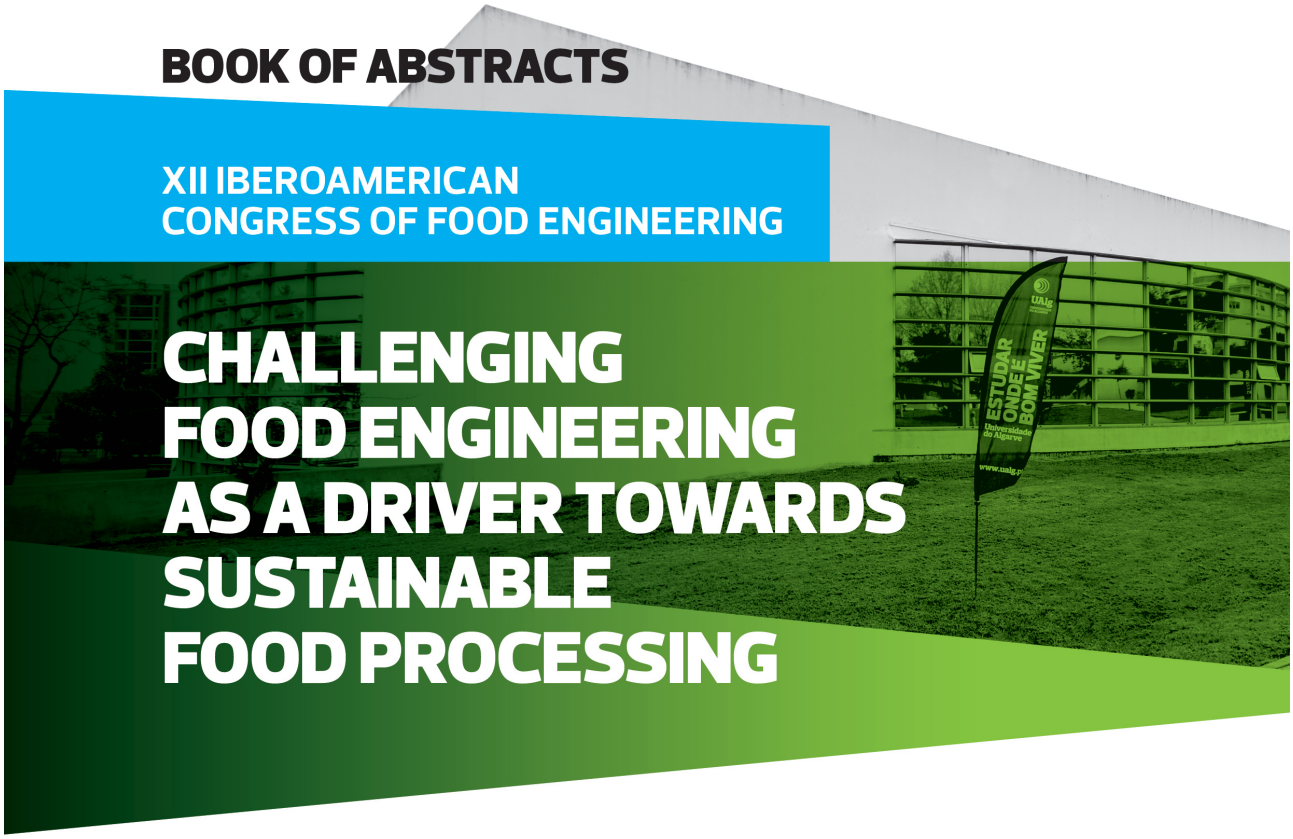

CHALLENGING FOOD ENGINEERING AS A DRIVER TOWARDS SUSTAINABLE FOOD PROCESSING

UNIVERSITY OF ALGARVE, GAMBELAS CAMPUS
FARO / ALGARVE / PORTUGAL
1 > 4 JULY 2019

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"Challenging Food Engineering as a Driver Towards Sustainable Food Processing"

e-Book of Abstracts

Editores

Margarida Vieira

Rui Cruz

Célia Quintas

Gil Fraqueza

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Challenging Food Engineering as a Driver Towards Sustainable Food Processing

Autores

CRUZ, R. M. S.

FRAQUEZA, G.

QUINTAS, C.

VIEIRA, M. M. C.

Edição

1ª edição, julho 2019
Suporte Eletrónico

Faro

Universidade do Algarve
Campus de Gambelas
Portugal

ISBN

978-989-8859-75-4

Design e Layout

Denise Tavares
Universidade do Algarve

Phytochemical and physicochemical properties of dried orange peel as affected by processing conditions

VICHEARAVANN PHUON[a], TERESA R. S. BRANDÃO[a], INÊS N. RAMOS[a*] AND CRISTINA L. M. SILVA[a]

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

*Corresponding author
iramos@porto.ucp.pt

The juice processing industry creates a large amount of orange wastes in the form of seeds, peel, pulp and rag, which represent 50-60 % of the whole fruit. Orange peel flour may be obtained from industrial by-products and incorporated into bakery products, improving their dietary fibre and bioactive compounds content. Therefore, the main objective of this study was to evaluate the phytochemical and physicochemical properties of orange peel as affected by three drying methods: convective drying, microwave drying and freeze-drying.

Orange peels of the 'Naranja Bollo' variety were dried with air at a velocity of 1.01±0.03 m/s, a temperature of 50.14±0.99 °C, and a relative humidity of 51.12±1.67 %. Microwave drying was carried out at a power of 340 watts (W), and freeze-drying at -50 °C with vacuum from 1.5 to 2.0 bar.

The assessed physicochemical properties were colour, moisture content and water activity (aw), and phytochemical properties included total phenolic compounds (TPC) and total antioxidant activity (TAA). The moisture content and water activity values of dried orange peels obtained with the three drying methods were in the range 13.03±0.56% to 5.49±0.26 % and 0.425±0.00 to 0.085±0.00, respectively. The phytochemical characteristics determination of dried orange peels showed that total phenolic compounds, when compared to fresh peel, had an average decrease of 13.71% after microwave drying and increased by 6.38% and 19.50% after convective and freeze-drying processes, respectively. Total antioxidant activities of dried orange peels improved on average 18.08%, 25.03% and 44.07%, after microwave, convective and freeze drying processes, respectively. Freeze-dried (FD) flour presented lower browning index when compared to microwave or convective dried, and therefore revealed higher colour quality. In this present study L*, a*, and b* values of the FD orange flour are statistically different from the values of the fresh samples, L* and b* values increased, and a* value decreased. This means that FD samples are more bright and yellow and less red than fresh orange peels. No significant differences ($p>0.05$) between the average browning index of fresh and FD orange flour were observed.

This study proved that the freeze-drying process enhanced the total phenolic compounds, total antioxidant activity, and colour properties, compared to those in dried orange peels obtained from microwave and convective drying. Furthermore, the dried orange peel flour may be an excellent value added ingredient, with potential to be implemented in the food pastry and bakery industry, by incorporation in cakes, biscuits, bread recipes, etc.

Keywords: Wastes, Orange peel, Drying, Phenolics, Antioxidant activity