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BOOK OF ABSTRACTS

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Second International Conference on Radiation and Dosimetry in Various Fields of Research

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May 27 - 30, 2014 | Faculty of Electronic Engineering | Niš | Serbia

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ABSORBED DOSE AND EFFECTIVE DOSE IN FOOD IRRADIATION: MEASUREMENT AND VALIDATION WITH DIFFERENT PHANTOMS

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Food products are processed by different technologies in order to increase its safety and shelf-life. Food irradiation is regulated in European Union by the Directive 1999/2/EC, approved by international organizations of food (FAO – Food and Agriculture Organization) and health (WHO – World Health Organization) and the demand for post-harvest processed food products without use of chemicals could be an opportunity to boost irradiation technologies, that are already currently used for food preservation, namely for ripening delay, insects' disinfestation or food decontamination.

Before starting an irradiation process a dosimetric study is always performed to characterize the absorbed dose taking in account food product characteristics, namely bulk and volumetric density, in order to guarantee the desired effect, without compromising the main physico-chemical parameters.

The dose inside the food product can only be assessed indirectly or estimated by computational methods. The effective dose, a concept used more in human radiotherapy, takes in account the type of radiation and tissue. In food irradiation the effective dose could be estimated from the absorbed dose, considering the physical characteristics of the product.

The irradiations of food and food phantoms were performed in a Co-60 experimental chamber, with a total activity of 198 TBq (5.33 kCi) in November 2012 (Precisa 22, Graviner Manufacturing Company Ltd, U.K.). The dose was estimated for each fruit in three different positions in the chamber and the values of absorbed dose were obtained by spectrophotometric methods, using previous calibrated routine Amber Perspex dosimeters (batch V, from Harwell Company, U.K.).

Using an experimental approach, the estimated absorbed dose for different phantoms are presented and corrected with the physical characteristics, dimensions, density and radiation mass attenuation coefficient of the food product to obtain the effective dose, that could be used to better characterize the irradiation process.

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