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Preservation of chestnut fruits by gamma irradiation: inter-comparison of absorbed dose results using three types of dosimeters

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Food irradiation is a well established process, approved by international organizations of food (FAO –Food and Agriculture Organization) and health (WHO –World Health Organization), and regulated in European Union by the Directive 1999/2/EC.

Chestnuts are a seasonal fruit that must be post-harvest treated to meet the food safety regulations. Until recently, this was done with methyl bromide fumigation that was banned in March 2010 by the European legislation [EU, 2008] given no or few alternatives to the producers and agro-industry that process this product. Italy and Portugal are the two main producers of European varieties (*Castanea sativa* Miller) with 42700 kton and 22400 kton., respectively. In this context, irradiation could come as feasible alternative if the food product meets the needed quality parameters after processing. The main irradiation studies on chestnuts were done in Asian varieties and only recently in European varieties [Mangiacotti et al., 2009; Antonio et al., 2011]. Previously to the irradiation of chestnuts dosimetric studies were performed in a Co-60 experimental chamber with four sources, with a total activity of 267 TBq (6.35 kCi) in November 2011 (Precisa 22, Graviner Manufacturing Company Ltd, U.K.). The dose was estimated for a rectangular box with the dimensions of 15 x 15 x 7 cm, in the centre and corners, in two levels of the chamber using two types of dosimeters: a ionization chamber (model FC65-P, from IBA Group, Belgium); a Fricke solution, prepared in the lab following the standard ASTM E1026-92. Routine dosimeters, Amber Perspex (batch V, from Harwell Company, U.K.) were used to confirm the estimated doses. The comparison of results is showed and a dose mapping was built and is presented. The uniformity ratio, D_{max}/D_{min} , obtained was lower than 3, in accord with European legislation for food processing.

EU, 2008. Commission Decision, 753/2008. O.J. L 258/68, 26th September.

Mangiacotti, M. et al. 2009. Rad. Phys. Chem. 78, pp. 695–698.

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