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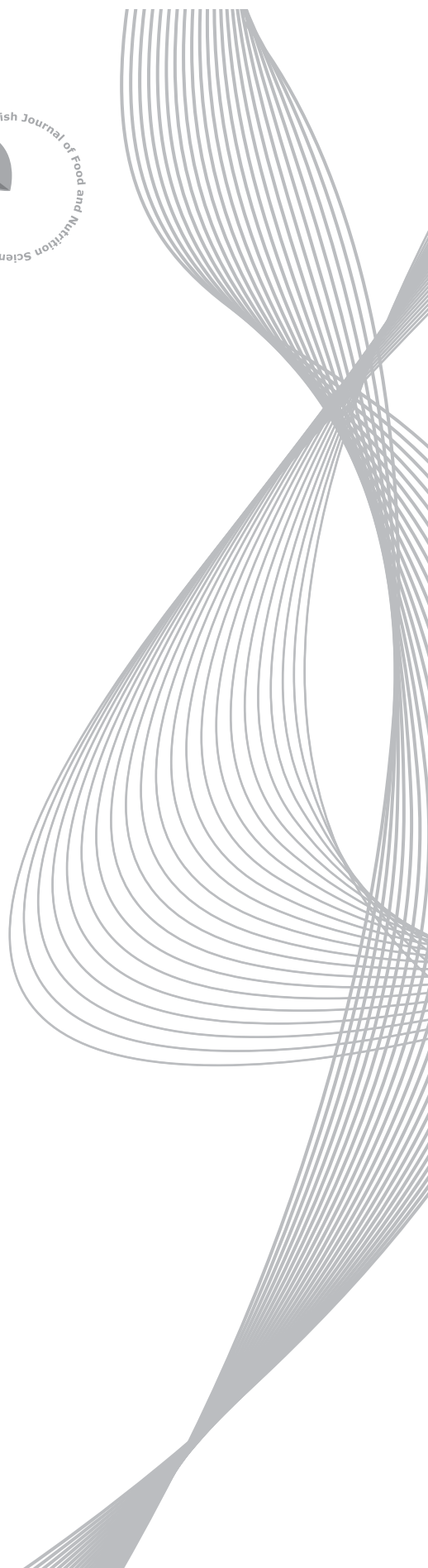
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P180

Effects of Gamma Irradiation on Sugars, Fatty Acids and Tocopherols of Chestnuts (*Castanea sativa* Miller)

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Key words: irradiated chestnuts, gamma irradiation, sugars, fatty acids, tocopherols

As seasonal products chestnuts have to be postharvest treated to increase their shelf-life. The most common preservation method for chestnuts is the use of chemical fumigation with methyl bromide, a toxic agent that is under strictly use under Montreal Protocol due to its adverse effects on human health and environment. Food irradiation is a feasible alternative to substitute the traditional quarantine chemical fumigation treatment.

The main studies in chestnuts irradiation were done in an Asian variety, which is bigger and sweeter than the European types. However, on Portuguese varieties nothing has been reported. Herein, the influence of irradiation and storage time in sugars, fatty acids and tocopherols profiles/quantities in chestnuts (cv. Longal obtained in Trás-os-Montes, North-east Portugal), was evaluated for the first time.

The irradiations were performed in a Co-60 experimental equipment, for 1 h (0.27 kGy) and 2h (0.54 kGy). Sugars and tocopherols were obtained by high performance liquid chromatography (HPLC) coupled to refraction index (RI) and fluorescence detections, respectively, while fatty acids or analysed by gas-chromatography coupled to flame ionization detection (GC-FID). The analyses were performed at 0, 30 and 60 days of storage at 4°C.

Regarding sugars composition, storage time proved to have higher effect than irradiation treatment. Fructose and glucose increased after storage, with the corresponding decrease of sucrose. Otherwise, tocopherols content was higher in irradiated samples, without a significant influence of storage. Saturated (SFA), monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids levels were not affected neither by storage nor irradiation. Nevertheless, some individual fatty acids concentrations were influenced by one of both factors, such as the increase of palmitic acid in ir-

radiated samples or the decrease of oleic acid after 60 days of storage.

Overall, irradiation seems to be a promising alternative treatment to increase chestnuts shelf-life, without affecting the profile and composition in important nutrients.

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P181

Effect on Antioxidants Addition on Changes in Cholesterol Content and Its Oxidation Products in Frozen Meat Products

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Key words: meat products, phenolic antioxidants, cholesterol, oxysterols

Reactions of oxidative character occurring in meat fat and meat products are one of the major causes of deterioration in their quality. They are responsible for degradation of colour, flavor and texture, as well as losses of nutritive value. Reduction or inhibition of negative oxidative changes in lipids of meat product may be the effect of the addition of natural antioxidants. The most important group of substances with antioxidative properties is represented by polyphenolic compounds belonging to secondary metabolites common plant materials. A rich source of these substances are tea and many spices (rosemary, thyme).

The aim of this study was to determinate effect of addition of selected antioxidants (ethanol extract of green tea, ethanol extract of thyme, commercial extract of rosemary and BHT) on changes in contents of cholesterol and oxysterols in meat product made from minced pork meat. Meat product samples were steamed in convection oven at 100°C, next frozen and stored at -18°C for 6 months. Contents of cholesterol and oxysterols (7 α - and 7 β -hydroxysterol, 5 α ,6 α - and 5 β ,6 β -epoxysterol, 7-ketosterol, 20-hydroxy, 25-hydroxy and triol) were estimated by gas chromatography. All indexes periodically in fresh, not frozen, meat products and after 2, 4 and 6 months of storage were estimated. All samples were compared with control sample (meat products without addition of antioxidants).

The results shown that all of applied antioxidants demonstrate inhibitory properties to cholesterol oxidation in meat products. Six months of storage of meat products with no addition of antioxidants led to a higher decrease in the cho-

oxidation products on the antioxidant activity of melanoidin-like fractions.

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P205

Linear Discriminant Analysis as a Tool to Assess the Effects of Irradiation Treatment and Storage Time on Antioxidant Activity of *Castanea sativa* Miller Skins and Fruits

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Key words: *Castanea sativa* Miller, gamma irradiation, storage time, antioxidant activity, LDA

Due to the high levels of chestnuts production in Portugal, and the economical importance of their industrial derivatives, it is essential to find technologies that increase chestnuts shelf-life. This kind of study must always be associated with the evaluation of the effects of those technologies in the final quality of the product.

Herein, the effects of gamma irradiation and storage time in antioxidant potential of chestnut (*Castanea sativa* Miller) fruits and skins obtained in Trás-os-Montes, North-east Portugal, was evaluated for the first time. The irradiations were performed in a 60Co experimental equipment, for 1 h (0.27±0.04 kGy) and 2 h (0.54±0.04 kGy). Bioactive compounds (phenolics and flavonoids) and DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging activity, reducing power and inhibition of β-carotene bleaching capacity were determined at 0, 30 and 60 days of storage at 4°C. The results were evaluated through Linear Discriminant Analysis (LDA) to evaluate if the differences induce by irradiation and storage could act as discriminant variables regarding antioxidant potential and bioactive compounds contents.

The obtained results highlighted the higher influence of storage time over antioxidant activity and bioactive compounds availability when compared with the irradiation dose used. In fact, the storage favoured chestnuts antioxidant potential. The activity of some antioxidant defences (non-enzymatic or enzymatic) present in chestnuts apparently increased along the storage time, in response to the oxidative stress inherent to the storage process. The application of gamma irradiation proved to be advantageous for the assayed antioxidant methods, probably due to an increase in the availability of antioxidant compounds such as polyphenols previously linked to the cell wall. Other studies were also performed in order to evaluate the influence of irradiation in chemical composition of chestnuts fruits (other communication in the present congress).

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P206

New Green Solvents for the Extraction of γ-Linolenic Acid from Spirulina. A Chemometric Optimization

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Key words: pressurized liquid extraction, Spirulina, PUFA, experimental design

In present work, the extraction of valuable fatty acids using green extraction techniques such as pressurized liquid extraction (PLE) has been optimized by using a chemometrical approach.

Nowadays the search of functional food ingredients from natural sources is increasing. Likewise, they are more appreciated when they have been obtained using clean extraction techniques, due to both toxicological and environmental reasons. For a long time, supercritical CO₂ extraction have demonstrated to be an effective technique, but it possess certain limitations mainly due to its low polarity. For this reason, the use of new solvents is under study. In the present work, two green solvents have been used, namely ethanol and ethyl lactate. It is remarkable the natural origin and easy biodegradability of both compounds, which can be found in traditionally consumed foodstuff like wine or beer, for example [1].

The most important source of γ-linolenic acid is borage oil, but algae and microalgae have demonstrated to contain