EFFECT OF GAMMA RADIATION ON PROXIMATE COMPOSITION AND FATTY ACID PROFILE IN RELATION TO PACKAGING CONDITIONS


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The effects of \( \gamma \)-irradiation, on proximate composition and fatty acid profile of walnuts (Juglans regia L.) were investigated. Gamma irradiation was applied to doses of 5, 10, and 13 kGy and packaging included atmospheric air, vacuum and modified atmosphere (41% CO\(_2\) – 59% N\(_2\)). Nuts moisture, ash, oil and protein contents as well as fatty acid profile were evaluated immediately after irradiation. Irradiation caused insignificant (\( P>0.05 \)) change on moisture and fat content.

The fatty acid profile of irradiated and control walnut lipid samples were evaluated using GC-FID and GC-MS [1]. Linoleic (C18:2\( \omega-6 \)) and linolenic (C18:3\( \omega-3 \)) acids predominated among the polyunsaturated fatty acids (PUFA) of walnut lipids. Furthermore, the main monounsaturated fatty acids (MUFA) were oleic (C18:1\( \omega-9 \)) and palmitoleic (C16:1\( \omega-9 \)) acids, whereas palmitic (C16:0) and stearic (C18:0) acids were the most abundant among the saturated ones (SFA). All together comprised more than 80 % of the total fatty acids. Concerning the sums of the fatty acids, PUFA occurred in the highest percentage followed by MUFA, while SFA seemed to occur in a lower percentage. Therefore, walnuts have an excellent fatty acid profile that may be beneficial for coronary heart diseases. A diet rich in walnuts has been reported to a statistically significant decrease in the total and LDL cholesterol levels as well as lipoprotein levels [1].

The concentration of SFA increased and MUFA and PUFA decreased with the increase of irradiation dose. Moreover, MUFA/SFA and PUFA/SFA ratios decreased (\( P<0.05 \)) compared to control samples. At irradiation doses of up to 5kGy, the walnuts retained the nutritional benefits of its fatty acids, in particular MUFA and PUFA. Concerning the different types of packaging, greater stability in the nuts was observed during vacuum packaging.

KEYWORDS: Walnuts; \( \gamma \)-irradiation; packaging; fatty acid profile.

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