CARPATHIAN JOURNAL OF FOOD SCIENCE AND TECHNOLOGY

journal homepage: **http://chimie-biologie.ubm.ro/carpathian_journal/index.html**

Research Article

EVALUATION OF LOW-ENERGY X-RAY AND GAMMA IRRADIATION FOR AFLATOXIN DECONTAMINATION IN WALNUT KERNELS: A COMPARATIVE STUDY

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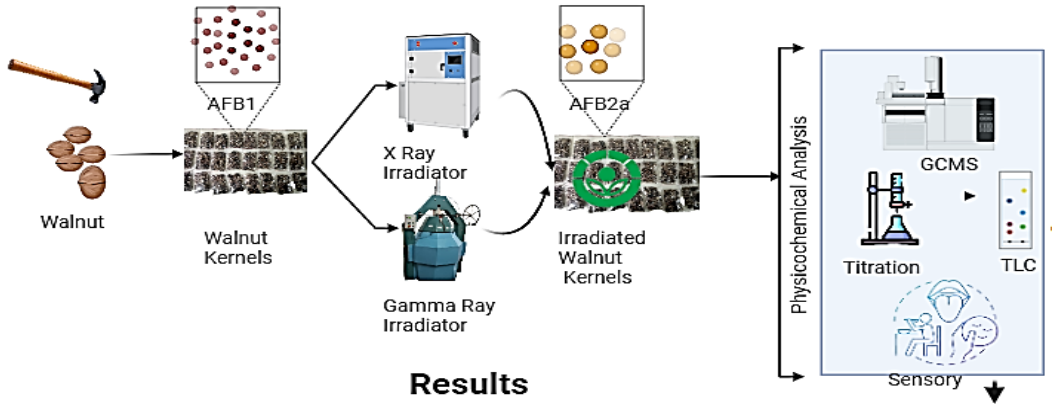
https://doi.org/10.34302/crpjfst/2025.17.1.14

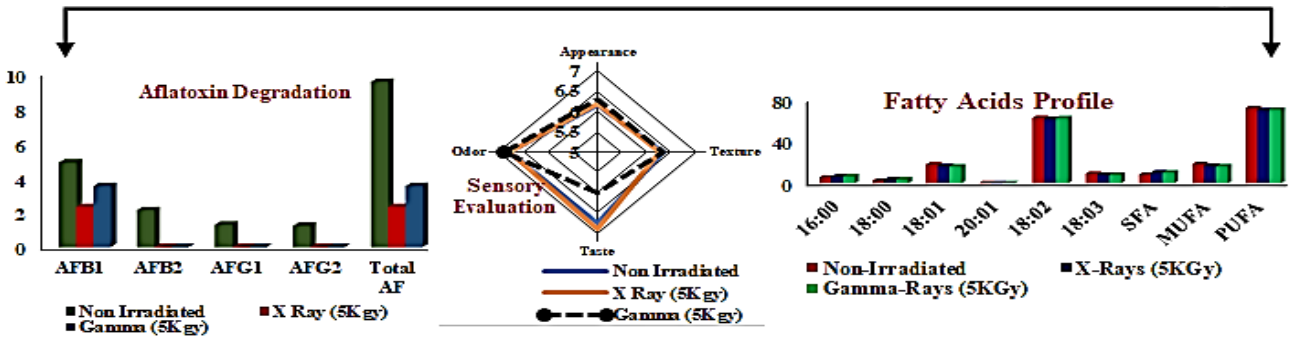
Article history:
Received:
April 6th, 2025
Accepted:
May 1st , 2025

Keywords:
Food Safety;
innovative preservation techniques;
Food Toxicology;
Switch-on/off technologies;
Food Quality.

Abstract

Aflatoxins (AFs) are well-known major health hazards in dry nuts. The current study aimed to evaluate effectiveness of both irradiation sources (Gamma and X-Ray) to reduce AFs levels while preserving their nutritional integrity. Dry shelled of walnut kernels were exposed to 60Co and low-energy X-ray irradiations at doses of 1, 1.5, 3.5, and 5 kGy. A significant decrease in AFs content were observed with increasing dosage of both sources. AFB1 decreased from 4.89 ppb in the control to 2.32 ppb with X-rays and 3.53 ppb with γ-rays at 5 kGy. Additionally AFB2, AFG1 and AFG2 were completely eliminated after irradiation compared to their initial levels of 2.14 ppb 1.3 ppb and 1.23 ppb, respectively in the control. This resulted in a reduction of total AFs from 9.56 ppb to 2.32 ppb with X-rays and 3.53 ppb with γ-rays at 5 kGy. However, irradiation doses of 1, 1.5, 3.5, and 5 kGy resulted in minor increase POV and FFA of irradiated samples with increasing doses and did not lead to significant variation in overall fatty acid composition of shelled walnuts. Overall, current study suggests equal effectiveness of low energy irradiation and potentially safe method for enhancing the safety and quality of walnut kernels.





Graphical Abstract: Effects of Gamma and Low Energy X-rays Irradiation on the Decontamination of Aflatoxins, Physiochemical and Sensory Properties of Walnut Kernels