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Biochemical Studies on Antioxidant Activity of Certain Irradiated Agro Industrial Wastes

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Ashraf Mohamed Monir Shaaban

Contents

Abstract

Abstract

Ashraf Mohamed Monir Shaaban "Biochemical studies on antioxidant activity of certain irradiated agro industrial wastes".
PhD. Thesis, Ain-Shams University, Faculty of Science, Biochemistry Department.

Food irradiation is a method of preservation; it is used to extend the shelf life of food products fresh and/or dried, destroy the contaminating harmful pathogens and modify the activity of bioactive compounds present in food materials.

The present study was conducted to test the possible biochemical impacts of radiation processing on three agro industrial wastes (grape seed-skin, tomato pomace and artichoke leaves), as well as to elucidate the physiological and biochemical effects of feeding growing male Wister rats on diets supplemented with the processed agro industrial wastes at dose levels of 10, 20 and 30 kGy.

The chemical composition of processed agro industrial wastes at the above mentioned doses showed no significant differences in corresponding to the non-irradiated one. The orthogonal statistical analysis of the data revealed that the linear, quadratic and/or cubic effects were not significantly different; however, an exception for these general observations was observed for fiber content where it was significantly reduced accompanied with increase in nitrogen free extract.

Abstract

Statistical analysis of polyphenol, tannin content and free radical scavenging activity results showed that irradiation processing caused an increase in polyphenols as a function of radiation dose, meanwhile grape seed-skin processed by 20 kGy gamma rays showed a decrease by 15.38%, tannin content exhibited an increase in both grape seed-skin and artichoke leaves at all radiation doses used. In contrast, grape seed-skin irradiated at dose level 10 kGy has lost 25 % corresponding to their control one, same observation of reduction in tannins content of tomato pomace, was recorded. Regarding to the impact of irradiation treatment up to 30 kGy on free radical scavenging activity of grape seeds-skin, tomato pomace and artichoke leaves, the results indicated that there was a significant reduction in their ability to scavenge free radicals, while an exception was observed for artichoke leaves processed by 10 kGy.

The amino acid pattern was significantly affected by gamma irradiation, where some amino acids increased; others decreased, or did not change. It was observed that the changes in amino acids pattern as affected by irradiation up to and including 30 kGy was occurred without a specific trend in the three agro industrial wastes under investigation.

The fatty acid profile of the three agro industrial wastes under investigation was significantly affected by radiation processing which caused an increase in some fatty acids, decrease

in others and some did not change, compared to those corresponding fatty acids in non-irradiated three agro industrial wastes, with no specific trend.

The physiological and biochemical performance of growing male Wister rats as affected by feeding high fat diets supplemented with non-irradiated or irradiated up to and including 30 kGy agro industrial wastes under investigation for 8 weeks, showed better results when compared with those rats fed on reference diet. It has been manifested in body weight gain and internal organ weight alongside biochemical aspects such as serum total cholesterol, triglycerides, LDL-C, HDL-C, VLDL-C, AI, ALT, AST and serum glucose.

List of Tables

List of Figures

List of Abbreviations

Abb.	*Full Name*
A.O. A. C.	Association of Official Analytical Chemists
AI	Atherogenic index
ALT	Alanine Aminotransferase
AST	Aspartate aminotransferase
CF	Crude fiber
CP	Crude protein
DPPH	2, 2-diphenyl-1-picrylhydrazyl
DWG	Daily weight gain
FAO	Food and Agriculture Organization of the United Nations
FW	Final weight
HDL-C	High density lipoproteins cholesterol
IAEA	International Atomic Energy Agency
IW	Initial weight
LDL-C	Low density lipoproteins cholesterol
Mo	Moisture
NFE	Nitrogen free extract
RNS	Reactive nitrogen species
ROS	Reactive oxygen species
TAA	Total amino acids
TEAA	Total essential amino acids
TNEAA	Total non-essential amino acids
TWG	Total weight gain
VLDL-C	Very low density lipoproteins cholestero;
WHO	World Health Organization
γ	Gamma irradiation