EFFECT OF GAMMA IRRADIATION ON PROTEINS OF SOME AGRICULTURAL PRODUCTS

BY

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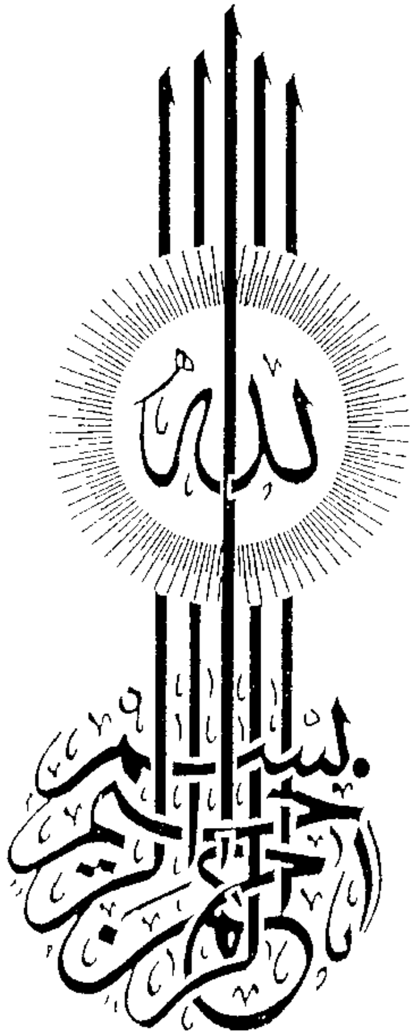
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ABSTRACT

Soybean and broadbean were exposure to gamma rays at dose levels of 10, 30 and 50 KGy. Some chemical changes were studied in beans such as chemical composition, total amino acids, protein electrophorosis and trypsin inhibitor. Also irradiated beans used as a sole source of protein in feeding rats. Some parameters were studied such as, growth rate, food intake, protein efficiency ratio, true protein digestibility, biological value, serum total protein and serum albumin and the results indicated that irradiation treatments, didn't cause any significant

effects on the chemical compositon. Or any changes in the number of protein bands except a little difference in the bands thickness was observed also, the irradiation treatments didn't cause a unique or constant aspect with the majority of the amino acids, but they led to a gradual reduction of trypsin inhibitor activity. As well as, the irradiation treatments caused an increased food intake. And each of rats growth rates, protein efficiency ratio, trve protein digestibility and Biological values of proteins were increased as the irradiation level dose increased but serum total protein and serum albumin didn't affect dve to irradiation.

Key Words: Irradiation, Gamma rays, Proteins, Legumes, Soybean, Broadbean, Nutrition.

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LIST OF ABBREVIATIONS

B.V.	Biological value
Cm	Centimeter
C.P.	Crude protein
D	Dalton
DMB	Dry matter basis
g	gram
Gy	Gray = 100 rad
KCal	Kilocalory
Kg	Kilogram
KGy	Kilogray = 100 kilorad
Krad	Kilorad = 1000 rad
L	Liter
mg.	Milligram
ml.	Milliliter
mmol	Millimole
mol	mole
N	Normality
nm	nanometer = 10^{-7} cm
O.D.	Optical density
PER	Protein efficiency ratio
Rad	The basic unit of absorbed dose of ionizing radiation. It equals 100 erg of absorbed energy per g of absorbing material

Rep	An absolute term for the irradiation dose in material
S.E.	Standard error
T.I.A.	Trypsin inhibitor activity
T.P.D.	True protein digestibility
μl	Micro liter

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INTRODUCTION

The use of ionizing radiation for food processing and other biological applications are some of the important, peaceful applications of nuclear energy. They depend on the understanding of the basic biological effects of radiations and finding the radiation treatment that retard or inhibit the development of microbial growth, insects and decay organisms which cause spoilage, great loss and deterioration. Without appreciable effects on the quality and nutritional adequacy of the product beside no health harzards.

Irradiation treatment offers many possibilities for increasing the total amount of food available for man and animal where it has some advantages over other techniques, so that it can be used at ordinary temperature, the food can be packed in the final state, and it can easily be combined with any other method (Urbain, 1960).

Internationally much research was conducted on food irradiation in 1950s, 1960s, and 1970s. Joint efforts were established in the 1960s between the food and Agriculture Organization (FAO) and the International Atomic Energy Agency (IAEA). In 1970s, on International Project in the

Field of Food Irradiation was established involving 25 countries. Continuing research on toxicology and wholesomeness led to the joint Expert Committee on Food Irradiation (JECFI), in 1980, to a conclusion that irradiation was a process rather than an additive and that the irradiation of any food commodity up to an overall average dose of 10 KGry presents no toxicological hazard, and thereby, toxicological tests on foods as treated are no longer required (WHO, 1981), the international organization concerned with food standards, the "Codex Alimentarius Commission" of the United Nations (FAO) has also endorsed these recommendations.

Five important principles underlie following conclusion:

1. Irradiation is a process with uniform and predictable changes.

2. Radiolysis products pose no short term or long term toxicological hazards based on feeding studies in standards mutagenic tests.

3. Irradiation introduces no special microbiological problems.

4. Nutritional quality is not compromised, and irradiation levels used in specific applications should be consistent

with the objective (sterilization or pasteurization) and the requirements set by the regulatory authorities.

5. Acceptance by health authorities of principles elucidated by this international group of experts should speed up world-wide approval of irradiated foods (IFT), 1983).

A major objective of food irradiation is the improvement of food quality and its storageability. Numerous review articles are available on the changes produced in irradiated foods (Roushdy et al., 1973; Elsayed, 1973 and Mahmoud, 1973). Publications of Rober et al. (1966); WHO (1970); Reichett (1972) and Vakil et al. (1973) established the wholesomeness of irradiated foods on short and long term feeding tests with experimental animals. Low irradiation dose has been reported not to later the nutritive value of foods. However, Ananthaswamy et al. (1970) and Sirinivas et al. (1972) reported that some changes occurred in the physico-chemical properties of macrocomponents like starch and proteins of foods and these changes may be expected to improve food quality.

Legumes are considered a major and less expensive source of dietary protein, particularly in countries that