

Studying the Effect of Diet Containing Genetically Modified Soybean Meal on Rats

by

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ABSTRACT

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With increasing concerns from the public about genetically modified organisms (GMO), the efficient detection of GMO and their derived products is becoming a necessity. Because Roundup ready became the most cultivated genetically modified (GM) crop in the world. The aim of this study compose of two parts. Firstly, to monitor the presence of soybean in Egyptian market and to assess the efficiency of DNA-based (PCR) detection methods for GMO screening; In this study, 23 soybean samples were collected and analysed. The PCR assay employs primers specific for 35S promoter. The results indicated that out of the 23 samples treated, 19 samples gave positive results with the 35S promoter. Our results could also confirm the presence of CP4-EPSPS gene in the 35S positive samples. Glyphosate residues were found in detectable concentrations in GM soybean samples.

Secondly to study the effect of a diet containing genetically modified soybean on both male and female Wistar albino rat. The body weights, food consumption, hematology, serum biochemistry, organ weight and histopathological examination were compared between rats fed GM Soybean and those fed non-GM Soybean after consumption of test diets for 18 weeks. The examined biochemical blood parameters showed that the level of triglycerides (TG) was statistically significantly higher of the female treated groups (T1 & T2) and lactate dehydrogenase (LDH) was significantly higher in treated groups compared to their respective controls. An elevated levels of Alkaline phosphatase (ALP), Aspartate aminotransferase (AST), Alanine aminotransferase (ALT) and creatinine were observed in some of the treated groups. Histopathological examination of selected vital organs (liver, kidney, and pancreas) and testes or ovaries and female mammary gland revealed histological alterations among different treated groups (T1 & T2) with their respective controls. This study shows the necessity of efficient detection of un-authorized GMO of imported crops and their derived products in Egypt. Also, to revise the safety standards of consumption of diets containing GM soybean.

Keywords: GMO, RUR, genetically modified soybean, PCR, herbicide resistance, Roundup Ready, 35S promoter, NOS 3 terminator, CP4-EPSPS, Glyphosate.

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Abstract

With increasing concerns from the public about genetically modified organisms (GMOs), the efficient detection of and their derived products is becoming a necessity. There are several methods available for detecting GMOs. In the present investigation, polymerase chain reaction (PCR) -based method, using either conventional or real-time PCR, has been used to discriminate between genetically modified and non-genetically modified soybean in the Egyptian market. In this study, 23 soybean samples were collected and analysed. The PCR assay employs primers specific for 35S promoter, a promoter commonly used in transgenic products. The results indicated that out of the 23 samples tested, 19 samples gave positive results with the 35S promoter. Our results could also confirm the presence of CP4-EPSPS gene in the 35S positive samples. Recombinant CP4-EPSPS is a component in Roundup Ready (RUR) crops that confers resistance to the herbicide glyphosate. Glyphosate residues were found in detectable concentrations in GM soybean samples. This study shows the necessity of efficient detection of unauthorized GMOs of imported crops and their derived products in Egypt.

Keywords: Genetically modified organisms, 35S promoter, NOS-3 terminator, CP4-EPSPS, Glyphosate.

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