

Physiological and Molecular Changes in Fenugreek (*Trigonella foenum graecum* L.) As A Response to Gamma Rays

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Abstract : Two pot experiments were carried out at the green house of National Research Centre, Dokki, Giza, Egypt, during the two successive seasons (2013-2014) and (2014-2015) to study the effect of gamma ray on growth, productivity and conduct genetic diversity analysis of fenugreek seeds. This study was performed by exposing the seeds of fenugreek (*Trigonella foenum-graecum* L.) to different gamma ray doses (0,100,150,200,250 and 300 Gy.). The study revealed that there was stimulation in germination percentage, plant survival percentage by increasing γ - ray doses up to 200 Gy, and inhibition appeared at higher doses. There were positive effect of γ - ray doses on morphological criteria; plant height, number of leaves /plant, stem and leaves fresh weight till the dose 200 Gy which recorded the highest values. Moreover, data recorded that γ - ray doses at 100,150,200 Gy increased all yield characters. The number of pods per plant was increased by increasing gamma ray doses up to 200 Gy which recorded the highest number (30.81 pods/plant) as compared to control (26.80 pods/plant). The same trend was found in other studied characters (pods yield/plant, seeds yield/plant and the weight of 1000 seeds). Gamma ray also enhanced the percentage of protein and soluble carbohydrate content and decrease the percentage of oil in yielded seeds. The varied effect of gamma ray was cleared on content of phenolic content. There were many new protein bands in irradiated plants which can be used as markers for each dose. Using DNA-RAPD assay, there were three negative molecular markers which found only in control as compared to irradiated plants, with molecular sizes 751.687, 389.280 and 358.697 bp.

Key words: fenugreek, gamma ray, protein electrophoresis, DNA molecular markers, RAPD.