Effect of gamma radiation on some physiological characteristics of soybean and barley plants under salinity effect

zakaria mohamed el-akied

The effects of various doses of gamma radiation and/or different levels of soil salinity on germination percent-age, fruiting, metabolism of nitrogenous constituents and carbohydrate fractions of soybean and barley plants and fruits have been carried out in the present investigation. The main experimental results can be briefly summerized in the following :Soybean plants :1-The germination percentage was significantly increasedin seeds preirradiated With gamma doses 100 and 200 Gy and significantly decreased with the dose 400 Gy.It was also decreased with increasing soil salinity level.2-Plants grown from seedS irradiated with 100 and 200 Gy gamma doses and/or cultivated on soil salinity 0.5 bar showed a significant increase of shoot length, number of leaves, leaf area, fresh and dry weight of shoot system. Other treatments significantly decreased theseprameters.3-Plants raised from seeds preirradiated with 100 and 200Gy started to produce flowers and fruits earlier thanother treatments.4-The number of fruits .as well as the fresh and dryweight of fruits were significantly increased by increasing the dose of gamma radiation from 100 Gy to 200 Gy then significantly decreased with 400 Gy. Thefruit characters were significantly decreased withincreased soil salinity.5-The number of seed per plant and the yield productionwere significantly increased by the pretreatment with 100 and 200 Gy. Increasing soil salinity led to a significant decrease in the number of seeds per plantand yidld production.6-The contents of the different nitrogen constituentswere significantly increased in shoots and fruits with doses of 100 and 200 Gy and significantly decreased with 400 Gy. Maintaining the plants at salinity level 0.5 bar for 30 days, led to an increase of amino nitro-gen, total soluble nitrogen and total nitrogen. After 60 day growth, however, the increase was only observed in amino nitrogen fraction, while in the seeds amino nitrogen and total soluble nitrogen were increased. Allother treatments significantly decreased the nitrogen-ous fractions.7-Tho. contents of the carbohydrate fractions were signif-icantly increased in shoots and fruits with gamma doses of 100 and 200 Gy and significantly decreased with 400 Gy. Maintaining the plants at salinity level 0.5 bar for 60 days, led to an increase in the direct reducing sugar of shoots. The interaction between gamma doses 100, 200 Gy and salinity level 0.5 bar significantly increased the following fractions :The polysaccharides and total carbohydrates of 30 day old shoots.Direct reducing sugars, disaccharides and totalreducing sugars of 60 day old

shoots.The direct reducing sugars and total carbohYdrates of seeds.Also the interaction between 100 Gy gamma radiation and 0.5 bar soil salinity significantly increased thefollowing)*The disaccharides of 30 day old shoOtS.*The polysaccharides and total carbohydrates of 60 dayold shoots.*The disaccharides, the total reducing sugars and poly-saccharides of seeds. All other treatments significantly decreased the carbOhYdrate fractions.Barley plants :8-The germination percentage was significantly increased in seeds preirradiated.with gamma doses 100 and 200 Gy and significantly decreased with the dose 400 Gy. It was also decreased with increasing soil salinity levels9-Plants grown from seeds irradiated with 100 and 200 Gy gamma doses and/or cultivated on soil salinity 0.5 bar showed significant increase of shoot length, number of leaves,leaf area, fresh and dry weight of shoot system. Other treatments significantly decreased theseprameters.10-Plants raised from grains preirradiated with 100 and 2’00 GI, started to produce flowers ’and fruits earlierthan in other treatments.11-The number of spikelets as well as the fresh and dry weight of spikes were significantly increased by increasing the dose of gamma radiation from 100 Gy to 200 Gy then significantly decreased with 400 Gy. The spike characters were significantly decreased withincreased soil salinity.12-The number of grains per spike and the yield product-ion were significantlY increased by the pretreatment with 100 and 200 Gy. Increasing soil salinity led to a significant decrease in number of grains per plant andin yield production.13-The contents of the different nitrogen constituents were significantly increased in shoots and spikes with doses of 100 and 200 Gy and/or salinity level 0.5 bar. All other treatments significantly decreased thenitrogenous fractions.14-The carbohydrate fractions were significantly increas-ed in shoots and spikes with gamma doses of 100 and 200 Gy and/or salinity level 0.5 bar. All other treatments significantly decreased.the carbohydrate fractions.15- The effect of interaction between preirradiation ofseeds or grains with different gamma doses anddifferent salinity levels revealed a counteraction ofthe inhibition induced by salinity.16-Preirradiation with 100 and 200 Gy led to a stimulat-ion of all growth and biochemical parameters of soy-bean and barley plants when maintained at salinitylevel 0.5 bar.17-At salinity level 1.5 bar, gamma doseS of 100 and 200G’y greatly reduced the inhibitory effect although remained slightly below the corresponding controls. With all salinity levels showed an inhibitory effect which was more pronounced with the increase of the salinity level.