RADIOSENSITIVITY OF TWO *LENS CULINARIS MEDIKUS SUBSP. CULINARIS* VARIETIES TO ELECTRON BEAM IRRADIATION

S. MEJRI
Laboratory of Biotechnology and Nuclear Technologies, CNSTN, Ariana, Tunisia

I. HEMISSI
Institute of agronomic research of Tunisia, INRAT, Ariana, Tunisia,

C. BRINSI, A. ASMI, M. SAIDI, Y. MABROUK
Laboratory of Biotechnology and Nuclear Technologies, CNSTN, Ariana, Tunisia

Researchers are challenged to develop new crop adaptation strategies to withstand the climate changes; at the same time there is the need of sustainable alternatives to our current agricultural model, intending to reduce the environmental impact. Enhanced biotic-stress tolerance of lentil towards sustainable intensification of cropping systems for climate-change adaptation is the expected output of this project. However, nuclear techniques, in contrast to conventional breeding techniques, are widely applied in agriculture for improved genetic variability. Mutation breeding is quick, cost effective, robust and proven method to accelerate the process of developing and selecting novel agronomic traits.

The first step in our breeding program using gamma irradiation and electron beam accelerator as source of physic mutagens for resistance to *Stemphylium botryosum* is the assessment of treatment dose known as radiosensitivity test. The present work will be limited to the comparison of radiosensitivity of two lentil (*L. culinaris)* varieties to electron beam irradiation in M1 generation. Growth and development, as well as on the content of photosynthetic pigments in 28 days lentil leaf were recorded.

The present study was carried out to compare effect of electron beam on two Tunisian lentil varieties, KEF and BOULIFA [1]. Dried seeds of both the varieties were treated with electron beam accelerator (7.5Mev) at the Tunisian National Center for Nuclear Sciences and Technology (CNSTN) with different doses, 200Gy, 300Gy, 400Gy, 500Gy, 600Gy, 700Gy, 850Gy and 1kGy with the control. Initially LD50 dose is determined, which is used as an optimal dose for mutation induction. By ignoring this step, mutagen dose can either be high or low resulting mutation frequency. The radiosensitivity test for the two treated varieties were done and counts of germinated seeds were made daily for 7 days to determine both the final germination percentage and germination index. The photosynthetic pigment content was determined spectrophotometrically [2].

The lethal dose was determined by probit analysis [3]. LD50 dose for KEF and BOULIFA was 400Gy and 250Gy respectively. Results showed that germination, shoot length, root length, seedling height on 28th day, in M1 generation reduced steadily with the increasing doses of mutagen. Chlorophyll contents of *M1* KEF and BOULIFA lentil leafs analyzed at 28 days after planting were found to be significantly ($P \leq 0.05$) affected by various levels of electron beam irradiation doses. The biometric measurements of roots emerged from irradiated seeds showed a significant decrease of root length after two weeks from the start of the experiment. The decrease of root length was confirmed by the increased doses in electron beam treated KEF and BOULIFA. Higher reduction of root length was observed at higher dose of electron beam. Seedling height is widely used as an index in determining the biological effects of various physical mutagens in M1. The present study exhibited that the seedling height measured at 28 days after planting was decreased with the proportion of increase in dose in both the varieties of KEF and BOULIFA. Based on the overall consideration of M1 effects, the variety BOULIFA was more sensitive to mutagen than KEF variety.

Results of this study reveal that higher doses of e-beam irradiation exhibited strong detrimental effects on chlorophyll contents and growth parameters of lentil two varieties. The overall study on the effect of electron beam on germination index, survival, shoot length, root length, seedling height and chlorophyll contents at 28th day in M1 generation of two lentil varieties concluded that, BOULIFA was highly sensitive to electron beam than KEF. These optimum mutagen doses determined for the two lentil genotypes could be useful while formulating lentil mutation breeding program for improvement of specific traits (Stemphylium Blight resistance) in lentil.

Key words: breeding program, lentil, biotic stress, e-beam accelerator.

REFERENCES

[1] KHARRAT, M., SAKER, A., ERSKINE, W., Registration of 'Kef' Lentil, J. Plant Regist., (2007)1:43.
[2] LICHTENTHALER, H. K., Chlorophylls and carotenoids: Pigments of photosynthetic biomembranes, Methods Enzymol., (1987) 350-382.
[3] FINNEY, D.J., Probit analysis, Cambridge University Press (1971).