UNIVERSITI TEKNOLOGI MARA

IN VITRO MUTATION BREEDING ON *Musa acuminata cv.* Berangan USING GAMMA RADIATION

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ABSTRACT

The traditional breeding mode is poor solely due to the lack of species variability, infertility and polyploidy state of the banana cultivar. The application of in vitro cultivation is aimed at providing continuous banana supply in a highly efficient and systematic manner. In fact, mutation is also considered as an effective strategy to improve the performance of the in vitro culture since it is a potent alternative to invent novel varieties for banana improvement. Hence, induced mutagenesis via gamma ray in combination with in vitro tissue culture through micro cross section culture procedure was conducted to evaluate the effects of gamma radiation on the growth and development of the in vitro plantlet as well as to identify the genetic variations of the irradiated plant. The stem of the tissue cultured banana plantlet was used as the source of explant in this study. The plantlet was cut into half (2 cm) and exposed to gamma ray with different dosages at 0 Gy (control), 20 Gy, 25 Gy, 30 Gy, 35 Gy, 40 Gy, 45 Gy, 50 Gy, 55 Gy, 60 Gy and 80 Gy. The radiosensitivity test was conducted to determine Lethal Dose (LD_{50}) and the result obtained was at 37 Gy. Highest percentage of survival rate was recorded in 20 Gy (23.33%) while the lowest was in 80 Gy (0.33%). The morphological study on the growth of in vitro radiated plantlets revealed that 25 Gy induced stimulant effects in terms of fresh weight (13.63± 4.77), number of shoot emerged (5.56 ± 0.98) and plant height (6.34± 0.24) over non-radiated banana explants on in vitro culture condition. Interestingly, the mutants of 25 Gy showed the best growth performance in all morphological traits when transferred to ambient condition. Next, molecular analysis was performed using PCR based RAPD marker to assess the genetic variation of the radiated plantlets. Based on the observation, RAPD molecular analysis generated 81.16% of genetic polymorphism, a high reposition incidence in the DNA sequence of irradiated banana. Several primers namely OPA7, OPA11, OPA14, OPC01 and OPD16 displayed unique banding profile ranged from 200 bp to 1500 bp. Thus, this study contributed to the development of gamma irradiated banana using in vitro culture system for future breeding of new varieties of banana and the DNA polymorphism revealed by RAPD study can be interpreted to offer a reliable molecular marker for the identification of modifications in gamma treated plants.

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