
Screening of phenotypic performance, drought, and salinity tolerance in the mutagenized population of *Oryza sativa* cv. MR219 generated through ion beam irradiation

Hasan, N. A.^{1,2*}, Mohd, Y. R.^{2,3}, Harun, A. R.⁴, Faiz, A.⁴, Sobri, H.⁴ and Yusof, S.⁴

¹Institute of Tropical Agriculture and Food Security, Universiti Putra Malaysia, Serdang, Selangor, Malaysia; ²Faculty of Applied Science, Universiti Teknologi MARA, Cawangan Negeri Sembilan Kampus Kuala Pilah, Negeri Sembilan, Malaysia; ³Department of Crop Science, Universiti Putra Malaysia, Serdang, Selangor, Malaysia; ⁴Agrotechnology & Bioscience Division, Malaysian Nuclear Agency, Kajang, Selangor, Malaysia.

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Abstract Forward genetic approach was used to identify and characterize mutants based on phenotype traits. This approach is considered as a basic element to analyze the function and mechanism of target genes. The morphological mutants among ion-beam irradiated seeds of *Oryza sativa* cv. MR219 was identified. Seedling screening at the three-leaf stage recorded five categories of mutants with 21.97%, whereas the seedling frequency was 16.76% among 1,575 of M₂ and 150 of M₃ mutants' generation. The verification of mutation in the M₃ generation showed that the highest mutation frequency was leaf mutation (5.14%), followed by the root mutant (4.25%), and drought and salinity tolerance (3.69%). At this stage, 14 distinct mutations were involved in a significant number of mutants' tolerance to drought and salinity. By observing rice growth characteristics at the reproductive stage in the M₃ generation, 4.58% mutation covering around 10 mutant traits were marked and verified among 41 mutants. Among the verified mutants, the highest morphological frequency recorded was panicle mutation (1.45%), followed by tillering mutant (1.12%), and leaf mutant (0.89%). These findings revealed that all the examined mutants were suitable for subsequent functional gene analysis and in agronomy study.

Keywords: Drought, Forward genetic, Ion beam irradiation, MR219, Mutant collection

*Corresponding Author: Hasan, N. A.; Email: aishah.hasan@gmail.com