

FAO/IAEA International Symposium on Plant Mutation Breeding and Biotechnology



Contribution ID: 110

Type: Poster

EVALUATION OF THE EFFECTS OF PROTON BEAM IRRADIATION ON GERMINATION AND GROWTH IN RICE SEEDS

Ionizing radiations are widely used as physical mutagens in mutation breeding. Proton beams (PBs), which are generally regarded as low linear energy transfer (LET) radiation, are known to have physically intermediate properties between low LET gamma rays (GRs) and high LET ion beams, but have still not been utilized for breeding. This study was conducted to estimate the biological effect of proton beam irradiation compared with gamma irradiation and investigate the optimal dose for mutation induction in rice. Rice seeds were irradiated using a 100 MeV Linear Accelerator (TR103) at the Korea Multi-Purpose Accelerator Complex for PB and a ^{60}Co gamma irradiator at the Advanced Radiation Technology Institute for Gamma Ray (GR), with doses of 50, 100, 150, 200, 250, 300, 400, 500, 600, and 700 Gy in both cases. The PB irradiated seeds did not germinate from 500 Gy or higher doses, whereas the GR irradiated seeds did not germinate from 600 Gy or higher doses. The dose showing a half germination, i.e. LD50 against the control were 200 Gy and 350 Gy for PB and GR respectively. The LD50 and GR50 values estimated by analysing the survival rates (LD50) and growth (GR50) of the four-week-old seedlings were 150 Gy and 175 Gy for PB, and 260 Gy and 300 Gy for GR, respectively. These results suggest that the biological damage of PB is more severe than that of the used GR at the same dose. To induce mutations using PB in rice, doses from 100 to 150 Gy seem to be proper, and thus we are planning to make an M1 population with these doses during this year.

Country or International Organization

Republic of Korea

Primary author: Dr CHOI, Hong-Il (Korea Atomic Energy Research Institute)

Co-authors: Mr KIM, Sang Hoon (Korea Atomic Energy Research Institute); Dr KANG, Si-Yong (Korea Atomic Energy Research Institute); Mr HAN, Sung-Min (Korea Atomic Energy Research Institute); Dr LEE, Sungil (Korea Atomic Energy Research Institute); Dr JO, Yeong Deuk (Korea Atomic Energy Research Institute)

Presenter: Dr CHOI, Hong-Il (Korea Atomic Energy Research Institute)

Track Classification: Enhancing agricultural biodiversity through new mutation induction techniques