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Electrophoretic Profiles and Amino Acid Compositions of S-(2-aminoethyl)-L-cysteine Resistant Rice Mutants Induced by *in vitro* Mutagenesis

Dong Sub Kim^{1*}, In Sok Lee¹, Cheol Seong Jang², Sang Jae Lee¹, Hi Sup Song¹,
Yong Weon Seo², Young Il Lee¹

¹Korea Atomic Energy Research Institute, P. O. Box 105, Yuseong-gu, Daejeon 305-600, Korea

²Division of Biotechnology and Genetic Engineering, College of Life & Environmental Sciences, Korea University, Anam-Dong, Seongbuk-gu, Seoul 136-701, Korea

Objectives

For increasing the contents of specific free amino acids in rice (*Oryza sativa* L.) cultivar Donganbyeon, the mutant cell lines resistant to growth inhibition by S-(2-aminoethyl)-cysteine (AEC) were selected from the callus irradiated with gamma rays through embryo culture.

Results and Discussion

The treatment of 50 Gy gamma-ray revealed the highest selection frequency at 0.75 mM and 1 mM AEC. The regeneration rate of green plants showed a tendency to decrease according to the increases of AEC concentration and irradiation dose. Four AEC resistant M₃ lines, LR3-69, LR5-132, LR7-2, and LR9-48, were analyzed for protein and amino acid contents within endosperm. In the four lines, total contents of amino acids was 26%, 7%, 29%, and 37%, respectively, greater than in Donganbyeon. The most striking increases in the resistant lines occurred in lysine and

tryptophan levels. Lysine level of the four lines was 2.66, 1.58, 2.37, and 2.29 times, respectively, higher than that of Donganbyeon. The changes of gene expression in response to AEC were analyzed by 2-dimensional gel electrophoresis. Mutant specific proteins in LR3-69, LR5-132, and LR9-48, were 4, 11, and 16 spots, respectively. *De novo* synthesized and enhanced proteins in these mutant lines against AEC were 13, 11, and 9, and 7, 12, and 13 spots, respectively. Five proteins (L1, L2, L5, L6, and L7) were identified as 33 kDa oxygen-evolving protein of photosystem II, ribulose-1,5-bisphosphate carboxylase (Rubisco) large subunit, ascorbate peroxidase (APX), glutamine synthetase (GS), and Cu/Zn superoxide dismutase (Cu/Zn SOD). Based on 2-DE results, AEC stress-mediated responses of two antioxidant enzymes, SOD, and APX, were examined. Comparing with 50.3% increase of the control, the increasing rates of SOD activity in LR3-69, LR7-2, and LR9-48 were 136.5%, 177.1%, and 184.8%, respectively. After AEC treatment, the change of APX activity level in the control was only 5.4% increase, while those of the mutant lines, LR3-69, LR5-132, LR 7-2, and LR9-48, increased 1.6, 1.4, 2.4, and 4.0 fold higher than that of control, respectively.