

## Effects of Salt Stress in Rice (*Oryza sativa* L.) Irradiated Low Dose Gamma Radiation

### I. Effects on Seedling Growth and Antioxidant Enzymes

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저선량 방사선 조사한 벼종자에서의 NaCl 처리 효과

I. 유묘생장과 항산화효소 활성에 미치는 영향

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#### Objectives

Plants have evolved different defensive systems against various environmental stresses such as drought, salt stress, low/high temperatures and air pollution. Although these stresses induce increase in the activities of some antioxidant enzymes, the effect of low dose gamma radiation under salt stress has not been reported. Thus, we investigated on the responses of seedling growth and antioxidant enzymes under salt stress both in Ilpum-byeo and Heukmi irradiated low dose gamma radiation.

#### Materials and Methods

- o Rice (*Oryza sativa* L., cv. Ilpum-byeo and Heukmi) seeds were irradiated at dose of 8 Gy by an irradiator ( $^{60}\text{Co}$ , ca.150 TBq of capacity, AECL). These seeds were harvested in 2001 and stored at room temperature until used.
- o After irradiation, sterilized seeds were sown on a styrofoam sheet with a nylon net bottom. The sheets were floated in plastic trays provided with distilled water (control), 50 and 100 mM NaCl solution. All samples were grown in glasshouse conditions and harvested 14-days old seedlings for determination of antioxidant activities.
- o Germination rate, seedling growth and antioxidant activities were determined.

#### Results and Discussion

- o Even though the final germination rate in Ilpum-byeo was not significantly different between irradiation and unirradiation group, the germination rate of irradiation group at initial stage was higher than unirradiation group. According to the results of shoot length, the growth reduction in Ilpum-byeo and Heukmi was correlation with the increasing concentrations of NaCl. The growth reduction of irradiation group was less than unirradiation group. In addition, it was more significant at 100 mM NaCl.
- o Antioxidant activities were correlated to increase of NaCl concentrations. The irradiation group had more activities under the salt stress than unirradiation group. It was more significant in Ilpum-byeo than Heukmi at 100 mM NaCl.
- o These results suggest that the low dose gamma radiation have better resistance to salt stress, due to the fast and high adaptability.

Table 1. Shoot length in response to different concentrations of NaCl in rice irradiated low dose gamma radiation.

NaCl (mM)	Dose (Gy)	Initial germination (%)		Final germination (%)		Shoot length (cm)	
		Ilpum-byeo	Heukmi	Ilpum-byeo	Heukmi	Ilpum-byeo	Heukmi
cont.	0	45.0	40.0	97.5	87.5	16.4 a	20.9 a
	8	52.5	37.5	98.8	73.8	16.9 a	21.6 a
50	0	32.5	17.5	100	75.0	10.4 c	15.5 b
	8	36.8	20.5	100	77.2	11.0 b	16.2 b
100	0	6.1	1.0	96.9	76.3	5.3 e	7.6 d
	8	13.8	1.0	98.8	73.8	6.0 d	8.6 c

Values with same letters are not significantly different within each column at 5% level by DMRT.

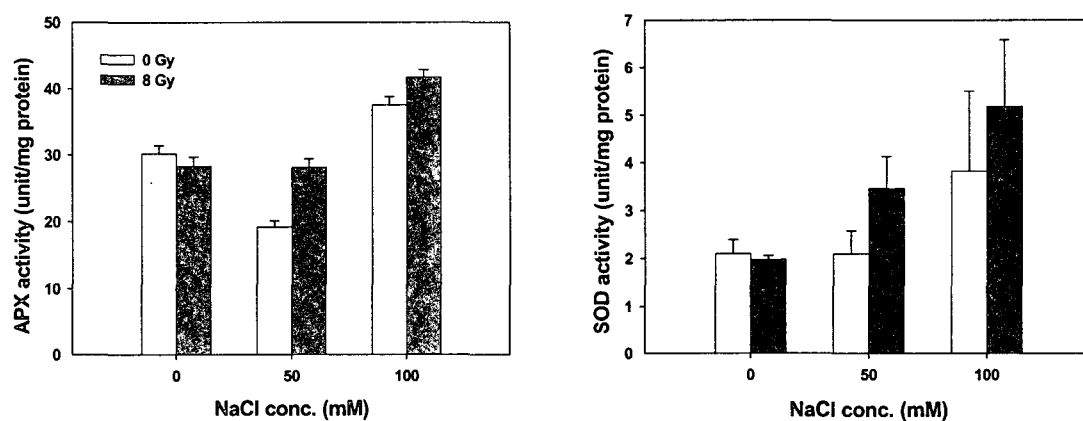


Fig 1. APX and SOD activities in response to different concentrations of NaCl in Ilpum-byeo irradiated low dose gamma radiation. Vertical bars indicate  $\pm$  SE.

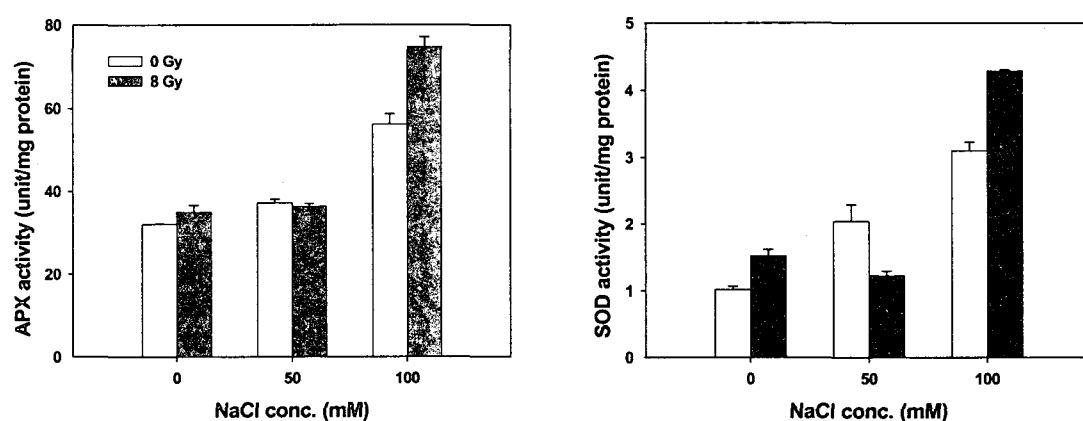


Fig 2. APX and SOD activities in response to different concentrations of NaCl in Heukmi irradiated low dose gamma radiation. Vertical bars indicate  $\pm$  SE.