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Evaluation of Chloride Accumulation in Soybean Salt-tolerant Mutant Lines Induced by Gamma-ray Irradiation

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[Introduction]
Land reclamation, inefficient fertilizing practices, and rising sea levels due to climate change and global warming cause salinity stress on crops. Soybean is susceptible to salt stress that significantly reduces plant growth, seed quality and yield. Mutant breeding techniques are useful for improving many agricultural traits by inducing new variations. Gamma ray was used in many crops such as rice, soybeans, and sweet potatoes as mutation breeding techniques. The purpose of this study was to evaluate the chloride accumulation in soybean salt-tolerant mutant lines induced by gamma irradiation to select high salt-tolerant line.

[Materials and Methods]
The seeds of mutant lines and soybean accessions with salt tolerance were planted in 50-cell plastic trays in greenhouse. At the V1 stage, 150mM sodium chloride (NaCl) was treated for 3 weeks, and plant height, shoot and root weight (fresh and dry), and chlorophyll contents (SPAD) were measured. Chloride (Cl^-) was measured using ion selective electrode (ISE) from a solution dissolved in water by grinding the dried shoot and root.

[Results and Discussion]
In this study, the growth reduction and chloride accumulation were investigated between NaCl treatment and non-treatment. Mutant lines showed 23% and 34% reductions of plant height and fresh weight, respectively. However, soybean accessions showed 48% and 60% reductions. The Cl^- accumulation in mutant lines ranged from 0.194 to 0.472 mol/L for shoot and from 0.212 to 0.665 mol/L for root. The soybean accessions had 0.423 to 0.966 mol/L of Cl^- contents for shoot and 0.192 to 0.390 mol/L of Cl^- contents for root. The Cl^- accumulation of the salt-tolerant cultivar S-100 was 0.519 mol/L in the shoot and 0.294 mol/L in the root. These salt-tolerant mutant lines will be used to create a mapping population and identify new genes related to salt tolerance in soybean.

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