

0513

Genetic improvement of lettuce for salt tolerance by *Arabidopsis DREB* gene transfer

Yuichi UNO

Faculty of Agriculture, Kobe University

Summary

A cDNA encoding transcription factor DREB1A was introduced into lettuce (*Lactuca sativa* L.) by *Agrobacterium tumefaciens*-mediated transformation to improve the salt tolerance. As a first step to establish the evaluation of salt stress tolerance of lettuce, the effect of stress on both growth and survival were investigated. Salinity treatments were imposed by irrigating with nutrient solution containing various concentration of NaCl. Plant growth parameters such as total leaf area and dry weight were reduced gradually with increasing concentrations of NaCl ranged from 0 to 200 mM. In contrast, salinities up to 100 mM did not affect on the survival percentage but more than 150 mM NaCl significantly reduced it to less than 40 %. Therefore, we concluded that early growth retardation might be one of the strategies for survival under salt stress. The assessment of stress tolerance *in vitro* by both root bending assay (Howden and Cobbett, 1992) and root recovery assay had the similar tendency to the result from hydroponic culture. The rate for lack of root bending under stress, which is a sign of growth inhibition, showed the dose response curve in parallel with that of dry mass reduction. The root recovery rate after removal of plants to normal condition also showed the parallel curve to survival percentage. These results suggested that combination of root bending and recovery assay could be a rapid and space-saving method for evaluation of salinity tolerance of lettuce *in vitro*.

Both *35S* or *rd29A* promoter and *GUS* or *DREB* gene cassettes were successfully transferred to lettuce and transgenic plants were obtained for further analysis. *GUS* activity driven by the *rd29A* promoter was induced by desiccation and that by *35S* promoter showed constitutive induction. A *35S::DREB1A-18* strain showed enhanced survivability under salt stress by 200 mM NaCl compared to control plants. These results indicate that the *Arabidopsis rd29A* promoter and *DREB1A* gene might be potentially useful for producing transgenic lettuce that are tolerant to salt stress.