

## Abstract of Presentation

**Note: This paper should be typed in “Times New Roman” of 12pt.**

Presentation Title(Should be no more than 20 words):

Improving Abiotic Stress Tolerance in Crops

Abstract :

Plant productivity is markedly affected by environmental stresses such as cold, and drought. A *cis*-acting element DRE/CRT, with the core sequence A/GCCGAC plays an important role in regulating gene expression in response to cold- and drought-stresses. *Arabidopsis* cDNAs encoding DRE-binding proteins, *DREB1/CBF* and *DREB2*, have been isolated by using yeast one-hybrid screening. *DREB1/CBF* and *DREB2* function as transcriptional activators in cold- and drought-responsive gene expression, respectively. Overexpression of *DREB1A* in transgenic *Arabidopsis* activated expression of many stress-inducible genes and resulted in improved tolerance to drought, high salinity and freezing. To identify target stress-inducible genes of *DREB1A*, we performed microarray analysis. We identified more than 50 genes as the *DREB1A* downstream genes. The products of these genes were known to function not only in stress tolerance but also in stress responses. On the other hand, we overexpressed a constitutive active form of *DREB2A* in *Arabidopsis*. These transgenic plants showed strong stress tolerance to drought and heat but not so strong to cold. We analyzed downstream genes of *DREB2A* using microarray and found that some downstream genes of *DREB2A* are different from those of *DREB1A*. Function of these genes may be important for difference between these transgenic plants.

In rice, we have isolated cDNAs for *DREB* homologs and named them *OsDREBs*. The *OsDREB* proteins were specifically bound to DRE and function as transcriptional activators. We generated transgenic rice plants overexpressing *OsDREB1A* and *DREB1A*. These transgenic plants showed not only growth retardation under normal growth condition but also improved tolerance to drought, high-salt and cold stresses like the transgenic *Arabidopsis* plants overexpressing *DREB1A*. We analyzed downstream genes of *OsDREB1A* in rice by using microarray and identified some genes as downstream genes. These results indicate that the *DREB* gene family is quite useful for improvement of tolerance to environmental stresses in various kinds of transgenic plants including rice.