Novel Epigenetic, RNA and Peptide Regulation in PlantAbiotic Stress Responses

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Plants respond and adapt to drought, heat, cold and high-salinity stresses in order to survive. Many abiotic stress-regulated genes have been identified by genetic and transcriptome analysis, and its function in the stress responses has been elucidated. However, we think that novel mechanisms involving epigenetic, RNA and peptide regulation have additional functions.

Recently, we found that the following novel regulation mechanisms function in plant abiotic stress responses. 1) *Arabidopsis* Histone Deacetylase 6 (HDA6) is a master regulator of novel drought stress response network. HDA6 regulates conversion of central metabolic pathway from glycolysis to acetic acid biosynthesis under water deficit condition. Furthermore, acetic acid pretreatment enhances plant drought tolerance. 2) Treatment with histone deacetylase (HDAC) inhibitors enhances high-salinity stress tolerance. Ky-2, a HDAC inhibitor, enhances the salinity stress tolerance via regulation of SOS1 in *Arabidopsis.* 3) AT13 peptide functions in high-salinity stress tolerance. 4) Abiotic stress-responsive non- coding antisense RNAs are synthesized from sense transcripts of protein-coding genes without the involvement of siRNA biosynthesis by RNA-dependent RNA polymerases (RDRs) and function in drought stress adaptation.

In this meeting, I will present our recent findings in the abiotic stress adaptation.