Srimathi Bogamuwa[1,2], Pei-Chi Lin[2,3], and JC Jang[1,2,3]

[1]Department of Horticulture and Crop Science, [2]Plant Biotech Center and [3]Department of Plant Cellular and Molecular Biology
The Ohio State University, Columbus, OH 43210 USA

Phenotypic and molecular analyses of a unique tandem zinc finger (TZF) gene family in Arabidopsis

The global effect of sugars on gene expression plays a central role on plant growth, development and responses to environmental changes. However, very little is known regarding how sugar signal is perceived and transmitted in plant cells. Based on the results of our microarray analyses, a highly sensitive sugar responsive CCCH zinc finger gene was chosen to investigate sugar signal transduction. We began to test its role and sugar signaling by an integrative molecular and reverse genetic analysis. This gene has a unique tandem zinc finger structure which shows limited and yet significant homology to the human TZF protein, Tristetraprolin (TTP).

Remarkably, this unique TZF can only be identified in plant kingdom, raising a possibility that this motif is evolved independently later in plants. Using this motif, a gene family of 11 and 8 genes can be identified in Arabidopsis and rice, respectively. Whereas 11 genes seem to be highly redundant, they show sequence variations outside the TZF and have distinct temporal and spatial expression patterns. This raises the possibility that they have distinct functions in plant growth, development, and environmental responses. This is supported by the evidence that over-expression of two different members of the gene family resulted in distinct phenotypes. My future work is centered on the characterization of gain- and loss-of-function plants and further elucidation of their roles in sugar signal transduction.

Reference:

Price, J., Laxmi, A., St. Martin, S. K., and Jang, J.C. (2004). Global transcription profiling reveals multiple sugar signal transduction mechanisms in Arabidopsis. Plant Cell 16:2128-2150.