Exploring plant microRNAs for engineering and understanding gene regulation

Ramanjulu Sunkar
Oklahoma State university Stillwater OK 74078 USA

The genome-encoded small RNAs have emerged as critical regulators of gene expression in higher eukaryotes. In plants, on the basis of their biogenesis, size and their roles as transcriptional or posttranscriptional gene regulators, these are divided into two major sub classes, microRNAs and small interfering RNAs. MicroRNAs fine-tune target gene expression at the posttranscriptional level either by degrading or inhibiting the protein production of the mRNA target(s) and this regulation is essential for plant growth and development as well as adaptation to stress conditions. Our research mainly focused on identifying plant microRNAs that could be important for adapting to diverse abiotic stresses such as the drought, salt and heat including nutrient deprivation. Additionally, some of our work also has been focused on identifying and engineering microRNAs that could improve biomass accumulation in biofuel and medicinally important plant species. I will discuss these results including identification of upstream signaling events that are required for regulating stress-responsive microRNAs in plants.