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## The Effects of Salt Stress on Physiological and Transcriptome Response in *Sorghum bicolor* L.

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### [Introduction]

Abiotic stress is one of the most serious problems in plant productivity because it dramatically delays plant growth and development. One of the abiotic stresses, soil salinity, has an adverse effect on plant growth where irrigation is necessary like semiarid Asia and Africa. Salinity stress adversely effects on plant developmental stages, especially on seed germination and delays post germination growth. The difference of salt resistance may be related to the growth stage of the plant species. It is typically seen in biomass and yield reduction or in viability decrease. Sorghum (*Sorghum bicolor* L.) is rather tolerant to salt stress with the 6 - 8 dSm<sup>-1</sup> value of tolerance, which can make more biomass product than other cereal crops under salt stress. The current study aims for assessing the effect of NaCl with two sorghum genotypes based on their proline, anthocyanin, chlorophyll, reducing sugar and gene expressions in order to determine salt tolerant genotypes. The data acquired from this study will help understanding how to deal with salt stress when the sorghum is farmed on saline soil.

### [Materials and Methods]

Two sorghum genotypes, 'Sodamchal' and salt tolerant 'Nampungchal' were used in this study. Plants growth was performed in a greenhouse at the Chungnam National University (CNU) from June to July 2019. Plants were grown with a half-strength Hoagland nutrient solutions supplemented with 50, and 150 mM NaCl for salt stress treatment and control plants were grown with normal Hoagland nutrient solutions. Proline, anthocyanin, chlorophyll, reducing sugar were extracted and assayed from two sorghum genotypes. Total RNA from the 'Sodamchal' and 'Nampungchal' samples was isolated by using Trizol Reagent according to the manufacturer's instructions (Invitrogen). QuantSeq 3' libraries were generated by following the Lexogen QuantSeq 3' mRNA-Seq Library Prep kit. Libraries were sequenced by Illumina NextSeq 2000.

### [Results and Discussion]

The comparative analysis of two sorghum genotypes revealed difference of growth performance, physiological responses, and gene expression, suggesting that Nampungchal is a tolerant genotype to salt stress. We sequenced shoot and root transcriptome of 'Sodamchal' and 'Nampungchal' under salt stress to extend our knowledge of the molecular basis of salinity tolerance in *Sorghum bicolor* L. RNA sequencing resulted about 32945 genes were obtained. A comparison of abundances showed that 204 genes were differentially expressed due to salt stress. The differentially expressed genes (DEGs) were annotated with Gene Ontology terms, and the key pathways were identified using Kyoto Encyclopedia of Gene and Genomes (KEGG) pathway mapping.

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