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Farmers’ and academia’s views”

Identification and characterisation of salt stress-responsive NHX gene family in chickpea

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Abstract

Chickpea (*Cicer arietinum* L.) is commonly recognised as a garbanzo beans. It has a nut-like flavour and most valuable and nutritious food crop for the globally increasing population. The annual production of chickpea is 11.5 million tons and has the third rank after beans. Salinity has an adverse influence on chickpea germination, vegetative growth, and reproductive activities. Plant adapts the strategies to cope with the salinity stress. Na^+/H^+ exchanger (NHX) is one of the gene families which has been well known to improve salt tolerance in plants. Na^+/H^+ exchanger (NHX) is one of the gene families which has been well known to improve salt tolerance in plants. NHXs are membrane transporters that catalyze the electroneutral exchange of K^+ or Na^+ for the accumulation of H^+ and are important for pH and ion homeostasis and salt tolerance. The aim of this study was the identification and characterisation of the NHX gene family to identify the salt stress-responsive NHX genes in chickpea. We identified the eight salt stress-responsive NHX genes from chickpea on a genome-wide scale. The phylogenetic analysis represented the evolutionary relationship of CaNHXs with other species, and the intron-exon organisations analysed by gene structure analysis revealed that CaNHX7 and CaNHX8 have a high number of introns and exons. Subcellular localisation, protein-conserved motifs, and domains were examined. In silico gene expression analysis revealed that out of eight members of the NHX gene family, two members CaNHX3 (Ca_19073) and CaNHX7 (Ca_02050) have shown high expression under salt stress. Overall, this study provides the specific targets for further comprehensive functional study and identified that CaNHXs may be explored further as potential gene candidates for the improvement of chickpea.

Keywords: Chickpea, expression analysis, gene family, Na^+/H^+ exchanger (NHX), salt stress