

Stress-Signaling: De novo Assembly for the Identification of Calcium Dependent Protein Kinase (CDPK) Genes in Wheat under Heat Stress

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Abstract—Calcium-dependent protein kinases (CDPKs) play critical roles in regulating growth, development and stress response in plants. Information about CDPKs in wheat, however, remains obscure in spite of being one of the most important cereal crops in the world. Here, we have identified 98 putative CDPK transcripts through mining of whole transcriptome data of wheat cvs. HD2985 and HD2329 under control and HS-treated conditions. The size of the identified CDPKs ranges from 0.9 – 1.5 Kb. The identified CDPKs were classified into five different families based on the phylogeny tree analysis. The conserve domain search analysis showed the presence of Serine-Threonine kinases (STKs) domain in all the CDPKs identified and predicted to play active role in phosphorylation and regulation of enzymes associated with defense network of wheat under heat stress. Gene Ontology enrichment analysis showed maximum number of CDPK genes to be associated with cellular and metabolic process (biological category), cell and cell part (cellular category) and binding (molecular category). Tissue specific expression study using genevestigator tool showed differential regulation of identified CDPKs under HS with maximum abundance of transcripts in endospermic tissue. We observed transmembrane helix in the identified CDPKs with eleven TMHs in Unigene_12688. There is further need for cloning and characterization of identified CDPKs to be utilized for the screening of wheat germplasm as well as for genetic engineering of cereal for the development of thermotolerant wheat.

Keywords: CDPK, Conserve domain, Identification, In-silico.