

Tolerance of Photosystem II: Characterizing the Role of Oxygen Evolving Enhancer Protein (OEEP) Gene in Carbon Assimilatory Pathway of Wheat under Heat Stress

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Abstract—Heat stress causes irreversible damage to the plant growth and development affecting the quality and yield of the crop. Heat stress has drastic effect on the carbon assimilatory process altering the source to sink ratios of the plant. Exposure of plant to heat stress initially reduces the rate of photosynthesis by disintegrating the photosystem- II primarily by disruption of the oxygen evolving complex (OEC). Very limited information is available about oxygen evolving enhancer proteins (OEEP) genes in wheat. Here, we identified a unique OEEP gene through mining of whole transcriptome data of wheat under heat stress-treated condition. We cloned putative OEEP gene of 1157 bp from wheat cv. HD2985. BLASTn search showed maximum homology with predicted protein reported from *Hordeum vulgare* (acc. no. AK354253.1). BLASTp search showed maximum homology with OEEP gene in *Leymus chinensis*. Cloned OEEP gene was found to be localized on long arm of chromosome 2B. OEEP gene has an ORF of 328 amino acids with the presence of photosystem II manganese-stabilizing domain in the amino acid sequence. We observed a chloroplastic transit peptide sequence of 21 aa. Numerous phosphorylation sites were observed in the protein sequence of OEEP which validates its role in regulation of activity of different enzymes. There is a need for functional validation of identified unique OEEP gene in order to use it for enhancing the rate of carbon assimilation in plants under elevated temperature. Enhancing the thermal stability of OEEP will pave the way for the development of thermotolerant wheat with very efficient photosynthetic pathway.

Keywords: Heat stress, OEEP, Heat stress, Wheat, Manganese stabilizing domain.