

PLANT BIOTECHNOLOGY AND AGRICULTURE

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Mutated and wild type in

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Universal Stress Protein-2 (GUSP-2) gene confers resistance to stresses and cotton plant

is considered to be a rich source of stress responsive genes and EST data base revealed that mostly of its genes are uncharacterized. The full length universal stress protein-2 (usp-2) gene (510 bp) was cloned in *S. cerevisiae*, and characterized and point mutated at three positions separately at 352-354, Lysine-60 to proline (L60P-2) and 214-216, aspartic acid-26 to serine (S26-2) and 145-147, Lysine-3 to proline (L3P-2) to study its role in abiotic stress tolerance. It was found that heterologous expression of one mutant (L60P-2) provided enhanced tolerance against salt and osmotic stresses, recombinant cells have higher growth up to 10⁻⁵ dilution in spot assay as compared to Wusp-2 (wild type GUSP-2), S26-2 and M3-usp-2 genes. L60P-2 in *Pichia pastoris* transcript profiling exhibited significant expression (7.1-fold) to salt and (9.7) and osmotic stresses. L60P-2 gene was also found to enhance drought tolerance and significant expression (8.7) in CIM-496-*Gossypium hirsutum* transgenic plants. However, little tolerance against heat and cold stresses both in recombinant yeast and bacterial cells was observed. The results from our study concluded that activity of usp-2 was enhanced in L60P-2 but wipe out in M2-usp-2 and M3-usp-2 response remained almost parallel to Wusp-2. Further, it was predicted through in silico analysis that L60P-2, S26-2 and L3P-2

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