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Entitled

EXPRESSION OF HUMAN ARGININE VASOPRESSIN IN ARABIDOPSIS AND ASSESSMENT OF ABIOTIC STRESS TOLERANCE

by

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Abstract

Human Arginine Vasopressin (*HsAVP*) is a nona-peptide that acts as an antidiuretic hormone. In human AVP regulates water permeability through the regulation of the water channel, aquaporin 2. The process begins with the binding of vasopressin to V2 receptor which activates cAMP-dependent protein kinase A (PKA). PKA phosphorylates aquaporin-2 at Ser256 and allows the aquaporin-2-containing vesicle to fuse with the apical membrane which increases water permeability. The present study describes the functional analysis of the codon-optimized *HsAVP* overexpressed in *Arabidopsis thaliana*. The main objective of the study is to assess if *HsAVP* affects drought and salinity stress tolerance of the transgenic *A. thaliana in vitro* and in soil. Among the different lines tested, transgenic line 8 (TL8) exhibited high drought tolerance *in vitro* as well as in soil. This plant line overexpressing *HsAVP* showed a significant difference ($p \leq 0.05$) in the root length of the plants grown on half-strength Murashige and Skoog medium supplemented with 350 mM sorbitol compared to the wild type plants (control). The results using the quantitative real-time PCR (qRT-PCR) displayed significant differences ($p \leq 0.05$) in the relative expression of *HsAVP* and plasma membrane intrinsic proteins (*AtPIP1* and *AtPIP2*) in TL8 overexpressing line. In addition, the aquaporin-related genes *PIP1;1, PIP1;2, PIP1;3, PIP1;5, PIP2;1, PIP2;4-2;8* showed relatively increased transcript levels in TL8 under drought stress. The data suggest that drought tolerance in *HsAVP* overexpression lines can be through the activation of plant aquaporin channel genes. The present study on the overexpression of *HsAVP* is the first in plants; thus, *HsAVP* can modulate the expression of different plant aquaporin channel genes to enhance abiotic stress tolerance and plant growth.

Keywords: Abiotic stress tolerance, Aquaporin, *Arabidopsis thaliana*, Arginine vasopressin, Plasma membrane intrinsic proteins.