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FUNCTIONAL CHARACTERIZATION OF POTATO ARP1 GENE ENCODING AUXIN- REPRESSED PROTEIN IN ARABIDOPSIS THALIANA UNDER SALINITY STRESS CONDITIONS

by

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Abstract

Auxin-repressed proteins (ARPs) are conserved in higher plants and are involved in plant growth anddevelopment by controlling gene expression. ARP1 has been studied for its role in biotic stress response, but its role in abiotic stress response remains unclear. In this study, transgenic *Arabidopsis* plants expressing potato ARP1 were evaluated for their salinity stress response. By gradually increasing NaCl concentrations from 0 to 200mM, plants were subjected to high salinity stress. As compared to wild-type (WT) control plants under stressed conditions, the ARP1 transgenic plants demonstrated improved height and root length and higher chlorophyll content. Under NaCl-induced salinity stress, the stomatal conductance of ARP1 plants was higher than that of WT plants. These measures indicate stress-related tissue damage and plant water status, respectively. As compared to WT plants, ARP1 plants accumulated more proline. Genes encoding antioxidant enzymes such as, Ascorbate peroxidase (APX), Superoxide dismutase (SOD) and Catalase (CAT) were expressed at higher levels in ARP1 plants, indicating better ROS (Reactive oxygen species) detoxification capacity. Chlorophyll-a fluorescence kinetics analyses showed that overexpression of the *S. tuberosum* ARP1 gene increased PI_{ABS} and PI_{total} indices as well as quantum yields and efficiency of photosystem II (PSII) as measured in eleven critical photosynthetic parameters, on salinity stressed ARP1 plants. RNA-seq analyses were conducted to characterize ARP1 plants further. Overall, this study has exhibited the positive role of potato auxin-repressed protein in alleviating salinity stress tolerance in higher plants.

Keywords: *Arabidopsis*, Auxin, chlorophyll-a, hormones, photosynthesis, salinity, transgenic