

Comparative Physiological and Molecular Response to Drought Stress and Acclimation in Four Seedling Stage Wheat (*Triticum aestivum*) Genotypes

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Drought stress imposes an enormous reduction in crop yield and is one of the greatest limitations to wheat production. Plant, when exposed to mild stress in the early stage of growth, may induce tolerance or resistance to some extent to subsequent stress of severe intensity, which may ensue in the later period of growth or development of the plant, a phenomenon, acclimation. Many studies exist on the physiological and biochemical drought acclimation mechanism. However, molecular mechanism in the process of drought acclimation is not fully understood. In this study, mild water stress (S1) applied at 10 Days after transfer (DAT), was observed to induced acclimation to subsequent water stress of severe intensity (S2), in four (4) wheat (*Triticum aestivum*) genotypes. The exposure of wheat plants to mild stress (S1), followed by severe stress (S2), caused significant enhancement, evident in an increased plant growth and water relations, chlorophyll content, and a reduced membrane, H₂O₂ accumulation, proline, MDA content, and antioxidant enzyme activities of drought acclimated (DA) plants to control (CK) levels, contrary to that, observed in non-acclimation (NA) plants. Furthermore, transcriptional expression analysis at S1 and S2 showed a higher expression of drought response genes, after mild stress exposure, but severe stress caused a significantly lower expression, in DA plant group. However, for NA plant group, an up-regulation of drought responsive genes, was observed, during the S2 period. The results of this study shows acclimation of wheat under drought via physiological and molecular response under water deficit.

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