**Ectopic expression of *Glycine max* NHX3 and NHX1 genes enhance Arabidopsis drought tolerance**

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**Abstract:**

The important role played by Na+/H+ antiporters in salt tolerance has been demonstrated in many plant species, but there are relatively few studies providing information of their protective role during drought stress. To study the possible contribution to stress tolerance under water-limiting growth conditions in plants, two closely related soybean Na+/H+antiporters, *GmNHX3* and *GmNHX1* isolated from cultivar MUNASQA, were expressed in *Arabidopsis thaliana*. Transgenic *A. thaliana* plants overexpressing *GmNHX3* and *GmNHX1*displayed a higher visually drought tolerant phenotype than non-transformed plants, and this visual effect was accompanied by an increase in relative water and chlorophyll content in transgenic lines under low water availability, as compared to non-transformed reference plants. Furthermore, an increased sensitivity to abscisic acid was observed through stomatal closure and seed germination inhibition studies in transgenic plants expressing *GmNHX*3, but not *GmNHX*1. Biochemical profiling revealed that both *GmNHX3* and *GmNHX1* transgenic lines displayed increased antioxidant enzyme activity, accumulated a higher concentration of free proline and showed less membrane damage due to lipid peroxidation under water deficit, as compared to wild-type plants. Finally, a significantly more rapid up-regulation of abiotic stress-related genes was observed in transgenic lines as compared to wild-type plants in response to both abscisic acid and mannitol treatments. Altogether, the physiological, biochemical and molecular results demonstrated that both *GmNHX3* and *GmNHX1* antiporters confer improved protection during drought stress in higher plants and hence are potential genetic targets to improve drought tolerance in soybean and other crops.