# Overexpression of Na+-manipulating genes in wheat by selenium is associated with antioxidant enforcement for enhancement of salinity tolerance

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### Abstract

The present study aimed at alleviating the impacts of salinity on wheat growth, antioxidants and ROS homeostasis by selenium (Se). Seeds were soaked in water or 15 µM Se and sown in plastic pots supplemented with long Ashton (100%) for 2 days then treated with NaCl at 75, 150, and 225 mM. Samples were harvested on the 21st day after sowing. The results show that NaCl significantly decreased growth of wheat seedlings, K+, K/Na ratio, soluble sugars, ascorbic acid and glutathione. Also, activities of catalase, peroxidase, ascorbate peroxidase, and the reduced glutathione reductase, as well as ribulose-1.5-bisphosphate carboxylase/oxygenase (Rubisco) were inhibited. Similar decreases were detected in the expression of the alternative oxidase (*AOX*), salt overly sensitive (*SOS1*) and sodium hydrogen antiporter (*NHX1*) genes. On the contrary, there were elevations in Na+, H2O2, lipid peroxides, phenolics, and proline. The effect of NaCl was dose-dependent. Nonetheless, soaking wheat grains in Se (added as sodium selenite, Na2SeO3 solution) mitigated the injury of salinity; the amelioration in growth parameters coincided with elevation in K+ concentrations, K/Na ratio, antioxidants, Rubisco and the expression of *AOX*, *SOS1*, and *NHX1* genes. Concomitantly, there was retraction in the accumulated Na, lipid peroxides and H2O2. These findings conclude that Se enhances wheat tolerance to NaCl stress through improving the antioxidants and over expression of Na-manipulating genes to cope with harsh habitats.