

**HEAT SHOCK AFFECTS PLANT GROWTH AND STRESS-RELATED  
GENE EXPRESSION UNDER SALINITY STRESS IN BARLEY  
(*HORDEUM VULGARE* L.)**

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The combination of different stress types occurs in the field and affects crop production. In this work, the effects of a short heat shock (HS) exposure on barley plants growing under salinity stress (SS, 200 mM NaCl) were investigated in a barley variety, Tokak 157/37. 45<sup>0</sup>C was found to be the maximum temperature for HS allowing plant survival and avoiding excessive membrane injury. Root length was significantly decreased by SS, whereas HS alone did not affect root growth. Interestingly, HS stimulated subsequent root elongation under SS. Osmotic adjustment through increased osmolality was promoted by severe SS. On the contrary, HS strongly decreased osmolality in leaves in the absence of SS, and partly counteracted the effect of SS in the HS+SS treatment. The stress-related genes *Cu/Zn-SOD*, *HvAPX*, *HvCAT2*, *HSP17*, *HSP18* and *Hsp90* were expressed in the leaves of HS-treated plants, but not in control plants. *HSP70* was constitutively expressed in both stressed and control plants, but after HS, an additional shorter amplicon was obtained. In roots, the transcript levels of *BASI*, *HvDRF1*, *HvMT2* and *HvNHX* increased after HS. In a recovery experiment in which plants were grown to maturity after stress exposure, plant height was increased and the time to maturity was reduced by HS. In summary, we showed that HS can stimulate plant growth and reduce some of the negative effects of salt stress. Our results suggest that resolving physiological and molecular responses of barley to combinations of heat and salinity stress can contribute to better crop management.