Salt and Drought Stress Differentially Affect the Accumulation of Extracellular Proteins in Barley

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Barley (*Hordeum vulgare*) was grown for eight days in the presence of a range of salt concentrations or subjected to repeated cycles of wilting and rehydration. Changes in apoplastic protein content, protein pattern, enzymic activities and ion composition were investigated under salinity and drought. The protein content of intercellular washing fluid (IWF) increased 2.5- to 3.0-fold when the NaCl concentration in the growth medium was increased from 0 to 100 mM. The elevated protein content was the result of a general increase in most polypeptides and a pronounced increase in the abundance of specific polypeptides of apparent molecular masses of 15, 21, 22, 26, 36, 40 and 62 kDa. Conversely, the IWF protein content decreased during wilting similar as after application of colchicin, cytochalasin B or cycloheximide suggesting that inihibition of protein synthesis or vesicle transport may be the cause for the decrease in apoplastic protein content and enzyme activities in dehydrating plant tissue. The changes in apoplastic protein content were accompanied by stress-specific alterations in activities of apoplastic enzymes. The greater apoplastic protein content was the consequence of stimulated protein synthesis in the presence of NaCl, as evidenced by increased incorporation of [^{35}S]-methionine into IWF protein. The results demonstrate that the leaf apoplast is a compartment which sensitively and differentially responds to drought and salinity with consequences for plant growth.

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